MANAV RACHNA UNIVERSITY

Declared as State Private University vide Haryana Act 26 of 2014

4 QUALITY EDUCATION

SDG 4: QUALITY EDUCATION

Progress Report

2023-2024

MANAV RACHNA UNIVERSITY

Established wide Haryana state Legislature Act No 26 of 2014 & under section 2(f) of UGC 1956

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

PREAMBLE

WE, THE FACULTY, STAFF, AND STUDENTS OF MANAV RACHNA UNIVERSITY, recognizing education as the most powerful catalyst for sustainable development, social mobility, and democratic citizenship, hereby affirm our unwavering commitment to the objectives of the United Nations Sustainable Development Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

WHEREAS an inclusive and high-quality learning environment is necessary to equip individuals with the knowledge, skills, values, and competencies required to thrive in a rapidly evolving global economy;

WHEREAS the institution has established structural programs, such as the Prakarsh vertical and the PEHEL Project, to extend educational equity by providing free, quality education and mentorship to underprivileged children, bridging critical learning gaps in marginalized communities;

WHEREAS fostering lifelong learning is a strategic imperative, supported by providing flexible educational opportunities, promoting digital literacy, and consistently updating curricula to align with industry needs, entrepreneurship, and emerging technologies;

WHEREAS the continuous professional development of educators and the achievement of global academic standards—including the development of research, Open Educational Resources (OERs), and programs recognized by international bodies—are essential to maintaining pedagogical excellence and preparing future-ready teachers;

NOW, THEREFORE, BE IT RESOLVED that Manav Rachna University shall continue to champion an ethos of academic rigor and inclusivity, committing its resources to remove barriers to access, cultivate future educators, drive innovation in learning methodologies, and ensure that every member of the community, regardless of background, is empowered through an education that promotes peace, sustainability, and personal fulfillment.

SDG 4: QUALITY EDUCATION

Education is not just about going to school and learning facts. It is a fundamental human right and a powerful tool for breaking the cycle of poverty, reducing inequalities, promoting peace, and driving sustainable development. Sustainable Development Goal 4 (SDG 4), adopted by all United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development, calls for ensuring inclusive, equitable, and quality education and promoting lifelong learning opportunities for all.

Despite progress over the decades, millions of children, especially girls, those in conflict zones, children with disabilities, and rural poor, still lack access to quality education. Global events like the COVID-19 pandemic have worsened inequalities, disrupting learning for more than 1.6 billion students at its peak.

Vision: SDG 4 envisions a world where every person — regardless of gender, income, geography, or ability — can access quality education from early childhood to adulthood. The goal recognizes education as the key driver of human development, empowerment, innovation, and peaceful societies. It urges all nations to transform their education systems to be inclusive, gender-sensitive, technologically enabled, and responsive to the needs of a changing world.

1. Global Context

Sustainable Development Goal 4 (SDG 4) aims to provide inclusive, equitable, and quality education for all and to promote lifelong learning opportunities. It recognizes that access to relevant, learner-centered education is key to personal development, social transformation, employability, and innovation. The goal emphasizes the importance of foundational literacy, skill development, global citizenship, emotional well-being, and equitable learning environments that empower all learners to thrive in a rapidly evolving world.

1.1 Relevance to Higher Education

Manav Rachna University (MRU) integrates the core values of SDG 4 through an outcome-based educational ecosystem that promotes active learning, skill enhancement, values-based leadership, and interdisciplinary collaboration. By offering a wide range of co-curricular and academic engagements—including bridge courses, expert-led workshops, alumni talks, competitions, and wellness seminars—MRU strengthens its commitment to holistic and transformative education.

These initiatives foster student confidence, practical application of theoretical knowledge, and self-reflection. Activities like poster-making on SDGs, Logic Wars (Debate), Quizmania, and management sessions based on Bhagavad Gita encourage creativity, analytical thinking,

leadership, and emotional intelligence—all crucial for personal and professional growth in alignment with SDG 4.

1.2 Alignment with Manav Rachna University's Mission

Manav Rachna University is strategically focused on enhancing educational outcomes through curriculum enrichment, student engagement, and faculty innovation. The institution views education as a means for empowerment, ethical leadership, and sustainable development. All academic practices are designed to prepare students for the complex demands of a knowledge-based society, fostering the spirit of inquiry, creativity, resilience, and collaboration.

The university's strategic educational framework actively supports lifelong learning, personalized learning paths, and co-curricular integration for 21st-century competencies, thereby directly contributing to SDG 4 targets.

1.3 Policy Alignment and Institutional Values

MRU's institutional policies reflect an integrated approach to quality education, emphasizing inclusivity, sustainability, and innovation. Key policy alignments include:

- Holistic orientation and bridge programs to ensure smooth academic transition for first-year students.
- Value-based education through spirituality-linked sessions like "Lessons from the Gita".
- Inclusion of soft skills and communication development in curriculum delivery.
- Structured faculty development and guest lecture programs to encourage continuous pedagogical innovation.
- Promotion of co-curricular learning through competitions, wellness sessions, and SDG-linked creativity tasks.

The university operates on core values of empathy, inclusion, innovation, integrity, and excellence, all of which are embedded in its SDG 4-aligned initiatives.

2. Key Initiatives and Achievements

2.1 Key Administrative/Academic Units Involved

The following units at MRU actively contribute to achieving SDG 4:

- School of Management and Commerce (SoMC)
- Department of Education and Humanities
- Institution's Innovation Council (IIC)
- Centre for Peace and Sustainability (MRCPS)

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- Student Welfare Cell
- Office of Alumni Relations

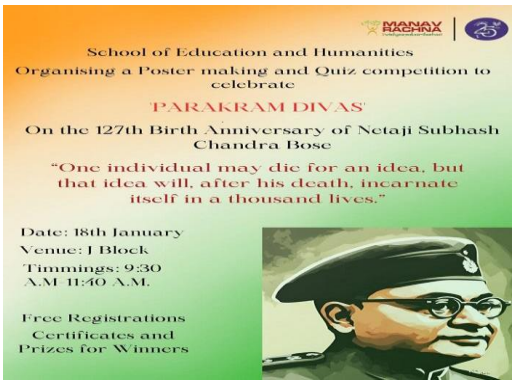
Student Competitions

Poster-Making Competition on SDGs

Creative Awareness for a Better Future: A Step Towards SDG 4

On 31st July 2024, the School of Management and Commerce at Manav Rachna University organized a Poster Making Competition on the theme “Sustainable Development Goals (SDGs)” as part of the student orientation program. Held from 1:30 PM to 3:30 PM in the I Block Auditorium, the event was coordinated by Dr. Shweta Goel and Dr. Akanchha Singh, and aimed at promoting awareness and creative understanding of global sustainability challenges, in line with SDG 4 – Quality Education.

Parakram Divas Celebration: Honouring Courage through



On 18th January 2024, the School of Education and Humanities, Manav Rachna University, organized a Poster Making and Quiz Competition to celebrate Parakram Divas, marking the 127th birth anniversary of Netaji Subhash Chandra Bose. Held at J Block from 9:30 a.m. to 11:30 a.m., the event was coordinated by Dr. Arvinder Kaur and Dr. Nibedita Hazarika, with active support from the student club Kalakriti. The competition saw enthusiastic participation from students across the department, showcasing their creativity and knowledge.Through posters and quiz responses, students reflected on the bravery, sacrifices, and leadership of Netaji, reinforcing the values of courage, unity, and resilience. The event not only celebrated India’s freedom movement but also served as an educational platform to deepen student understanding of national heroes.Dr. Ritu Sharma and Dr. Kiran Gupta felicitated the winners, making the event both meaningful and inspiring for all present.

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Logic debate war

Encouraging Critical Thinking and Dialogue: A Step Towards SDG 4

The School of Management & Commerce organized a debate competition titled "Logic Wars" on 22nd February 2024 at Room IG03, bringing together 18 students from the 2022–2025 batch. Aligned with SDG 4 – Quality Education, the event aimed to promote critical thinking, effective communication, and collaborative learning among students from diverse academic backgrounds. The first debate centered on Big Data Analytics and the ethical implications of AI, where the team arguing against AI's growing influence—Kushagra, Harshit, and Abhay—emerged victorious. The second round focused on the Union Budget and its role in solving modern economic issues, with Janhavi, Devvrat, and Jigyanshu winning for defending the budget. Janhavi was also awarded Best Speaker for her compelling arguments. Judged by Dr. Animesh, Dr. Yogita Sharma, and Dr. Chhavi, the event encouraged students to engage in informed debates, handle logical fallacies, and respond to real-time interjections. Students showcased sharp reasoning and poise, while the audience participated with attentiveness and curiosity.

"Logic Wars" successfully met its objectives by fostering thoughtful dialogue, enhancing analytical skills, and promoting experiential learning—thus reflecting the true spirit of holistic and inclusive education envisioned under SDG 4.

Redefining the Future: Linking AI with Healthcare – A Step Towards Innovation and Awareness

The School of Management and Commerce, Manav Rachna University, organized an Inter-College Presentation Competition on 7th October 2024 at the I Block Auditorium, titled "Redefining the Future: Linking AI with Healthcare." The event brought together 35 students from Amity University, Echelon Institute of Technology (YMCA), MVN University, and MRU, encouraging academic exchange and innovative thinking on the impact of Artificial Intelligence in the healthcare sector. The competition was coordinated by Ms. Minakshi Sharma. Participants had 15 minutes each to present, followed by interactive Q&A sessions, which created a vibrant atmosphere for discussion. Topics covered included AI in diagnostics, predictive analytics, robotic surgery, telemedicine, and ethical concerns such as data privacy and algorithmic bias. The presentations highlighted AI's transformative

potential in improving patient care, operational efficiency, and remote healthcare delivery. The judging panel, comprising Dr. Pooja Kapoor and Dr. Gurpreet Kaur, evaluated teams based on content quality, clarity, innovation, and Q&A performance. The event was further enriched by the presence of Dr. Parul Jhajharia, Dean SMC, who shared insightful remarks with the participants.

Capacity Building & Engagement

Workshops & Expert Sessions

Workshop on Six Thinking Hats

The School of Management and Commerce organized an engaging workshop on Six Thinking Hats for first-year BBA and MBA students. The session was conducted by Ms. Neha Wahi, Managing Partner at Women with Wings, a renowned expert in personal development with a psychology background from Delhi University and certifications from Dale Carnegie and Dr. Richard Bandler's NLP. The objective of the workshop was to introduce students to various thinking styles—lateral, divergent, and convergent—using Edward de Bono's Six Thinking Hats framework. Ms. Wahi used interactive methods and group activities to demonstrate how each hat represents a distinct approach to problem-solving and decision-making.

Happiness and well being

The E-cell of Manav Rachna University organized a seminar titled "Happiness and Well-Being – Getting Back to Basics" on April 12, 2024, from 10:00 AM to 11:30 AM at the I-Block Auditorium. The expert speaker for the session was Ms. Shyamasree Chakrabarty, Senior Director at HappyPlus Consulting. With over 19 years of global experience across regions like ANZ, the Middle East, and the US, Ms. Chakrabarty brought valuable insights into employee engagement,

organizational transformation, and workplace happiness. During the seminar, she shared her extensive knowledge on the growing significance of happiness and well-being in corporate environments and its impact on work-life balance. She also emphasized the importance of talent acquisition and people management in modern workplaces. The session included interactive elements such as quizzes and videos, keeping students actively involved and encouraging them to raise questions.

Management Lessons from the Bhagavad Gita (Dr. Bindu Aggarwal)

On 24th July 2023, Manav Rachna University organized a day-long orientation programme at the I Block Auditorium, promoting SDG 4 – Quality Education through academic and value-based activities. The day began with student interaction and attendance, followed by bridge courses in Economics and Accountancy led by Dr. Shweta and Miss Sandhya, which helped students strengthen foundational knowledge. A poster-making event on SDGs encouraged creativity and awareness under the guidance of Miss Khushboo and Miss Sandhya, with posters displayed in the department. The highlight was a unique session by Dr. Bindu Aggarwal on "Management Lessons from the Shreemad Bhagavad Gita," which focused on leadership, karma, empathy, and dharma. Through engaging discussions and activities, students gained self-awareness and learned the importance of ethical leadership.

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Alumni Talks

Date: 1st April 2024
Venue: School of Management & Commerce, Manav Rachna University
The School of Management & Commerce organized an insightful Alumni Talk Session featuring Mr. Gaurav Sharma, BBA Healthcare Management alumnus (Batch 2017–2020), currently working as Officer HR at Powergrid Corporation of India. The session titled "Navigating Government Sector Jobs After Graduation" focused on bridging the gap between academic learning and professional roles in the government sector. Mr. Gaurav shared his journey, offering insights on government sector dynamics, recruitment processes, and the importance of skill enhancement and time management. He emphasized preparation, communication skills, and staying updated with current affairs to succeed in government exams and interviews. The session concluded with a Q&A round, where Mr. Gaurav answered student queries on work-life balance and growth in government roles. Prof. (Dr.) Parul Jhajharia and Prof. (Dr.) Pooja Kapoor appreciated his valuable contribution and reiterated the department's aim to host more such interactions.

Alumni Session with Vansh Mittal

The School of Management and Commerce at Manav Rachna University organized an insightful alumni interaction session with Vansh Mittal, an MBA (Finance) second-year student and currently working as a Credit Analyst at JP Morgan. The session was designed to offer students a real-world perspective on navigating through diverse academic and career choices in the field of finance and business. Vansh shared his unconventional yet inspiring journey, starting from preparing for the NEET examination in 2011 with an initial aspiration for a career in medicine. However, upon self-reflection, he realized that his interests aligned more with the world of business and finance. Shifting gears, he pursued a BBA in Finance in 2018, which laid the foundation for his current success.During the session, Vansh spoke candidly about his career

exploration phase, which included preparing for UPSC exams before finally settling into finance—a field that resonated deeply with his strengths and interests. His honest recounting of struggles and learning moments offered students a realistic view of the uncertainties and discoveries that shape a professional journey

Academic Integration

Bridge Courses (Economics & Accountancy)

On 24th July 2023, Manav Rachna University organized a day-long orientation programme at the I Block Auditorium, promoting SDG 4 – Quality Education through academic and value-based activities. The day began with student interaction and attendance, followed by bridge courses in Economics and Accountancy led by Dr. Shweta and Miss Sandhya, which helped students strengthen foundational knowledge. A poster-making event on SDGs encouraged creativity and awareness under the guidance of Miss Khushboo and Miss Sandhya, with posters displayed in the department. The highlight was a unique session by Dr. Bindu Aggarwal on "Management Lessons from the Shreemad Bhagavad Gita," which focused on leadership, karma, empathy, and dharma. Through engaging discussions and activities, students gained self-awareness and learned the importance of ethical leadership. The programme provided a well-rounded educational experience, integrating academic knowledge, creativity, and values—truly embodying the goals of SDG 4.

Guest Lecture on Hypothesis Testing (Dr. Shivoham Singh)

The School of Management and Commerce, Manav Rachna University, organized an online guest lecture titled "Decoding Hypothesis Testing: Revealing the Insights" on 19th August 2023 for Ph.D. scholars. Delivered by Dr. Shivoham Singh, the session aimed to deepen understanding of

hypothesis testing, a crucial component of academic research. Dr. Singh covered key topics such as the fundamentals and steps of hypothesis testing, types of errors, interpreting results, and real-world applications. The session was highly interactive, with over 20 PhD scholars actively participating, asking questions, and engaging in discussions related to their research work. Coordinated by Dr. Animesh Singh, the lecture successfully strengthened participants' statistical foundations and promoted critical thinking. It served as a valuable platform for collaborative learning and left scholars better equipped to apply hypothesis testing in their research.

Online Workshop on PivotTables (Dr. Animesh Singh)

An online session on PivotTables was conducted by Dr. Animesh Singh, Associate Professor, School of Management & Commerce, on August 11, 2023. Held under the Management Development Program (MDP) hosted by AJNIFM, the session aimed to enhance participants' proficiency in using PivotTables for effective financial decision-making through Excel. Dr. Singh began by introducing the purpose and advantages of PivotTables in organizing and analyzing large financial datasets. He explained the process of creating a PivotTable, including data selection, field arrangement, and customization to meet various analytical needs. The session covered advanced functionalities such as grouping, calculated fields, and filtering, all demonstrated with relevant real-world examples. A segment on converting PivotTable data into PivotCharts helped participants understand how to present insights visually for better impact and communication. Dr. Singh's practical teaching style made the concepts accessible and easy to follow. The session concluded with an interactive Q&A, where attendees discussed real-time challenges and sought expert guidance. Participants appreciated Dr. Singh's clarity, depth of knowledge, and the session's hands-on approach, calling it a valuable addition to their professional toolkit in financial analysis.

Hawk Like Vigilance – Spotting Opportunities Ahead

The School of Management and Commerce (SoMC), Manav Rachna University, hosted an enriching session titled "Hawk Like Vigilance – Spotting Opportunities Ahead" for first-year BBA and MBA students. The session was led by Mr. Rahul Khurana, a Chartered Accountant and dynamic entrepreneur, known for his diverse ventures and strategic acumen in finance and business. Mr. Khurana began by sharing his journey—from mastering finance and taxation as a CA to launching successful businesses across multiple industries. He emphasized the significance of financial literacy, adaptability, and

entrepreneurial spirit in today's evolving world. Drawing from personal experiences, he discussed overcoming professional challenges and embracing risks with resilience and innovation. Throughout the session, Mr. Khurana inspired students to remain vigilant and proactive in identifying emerging opportunities. He stressed the need to stay updated with market trends, continuously learn, and build networks. His advice on work ethics, integrity, and maintaining a growth mindset left a deep impression on the attendees. The session also included anecdotes that highlighted real-life business scenarios, decision-making processes, and the importance of ethical practices in sustaining long-term success. Students actively engaged in the discussion, asking questions and reflecting on their future aspirations.

Applications of Probability & Statistics

The School of Sciences, Department of Sciences (Mathematics), Manav Rachna University organized an expert talk on "Applications of Probability & Statistics" on March 27, 2024, for UG and PG students and faculty members. The session aimed to bridge theoretical knowledge with real-world applications of statistical methods in decision-making. The session began with a warm welcome and felicitation of the speaker. Ms. Vineeta, M.Sc. Mathematics student, introduced the topic and its relevance. Prof. Ranjita commenced the talk by highlighting the significance of statistics in interpreting data and making informed decisions under uncertainty. She discussed the importance of statistical techniques and probability in both experimental and observational studies. A major focus of the lecture was understanding how statistical studies determine the effectiveness of preventive measures (experimental study) or evaluate causes and impacts when external conditions are uncontrolled (observational study). Prof. Ranjita emphasized that statistics is not just about numbers but about understanding and changing beliefs based on evidence.

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Impact Metrics

KPI Category	Indicator	2023–24 Outcome
Academic Readiness	Number of bridge courses conducted for foundational knowledge	2 sessions conducted in Economics and Accountancy
Student Engagement	Number of students participating in SDG 4-related events	300+ students across 6 key events
Industry Exposure	Number of expert-led sessions or guest lectures	7 expert sessions (including alumni talks and external experts)
Curriculum relevance	Sessions/workshops using practical tools (e.g., Excel, critical thinking)	4 hands-on workshops focusing on real-world applicability
Emotional well being	Mental health and values-based education sessions	2 key sessions (Happiness & Well-being, Management Lessons from the Gita)
Research literacy	Doctoral/research-focused lectures or workshops	1 advanced workshop on Hypothesis Testing (PhD level)
Innovation and leadership	Competitions encouraging creativity, logic, and teamwork	3 major events: Quizmania, Logic Wars, Poster-Making on SDGs

Outcome Highlights

Impact Area	Evidence of outcome
Holistic orientation	Orientation events helped new students integrate academically and socially into the university environment.
Skill enhancement	Events like debates and quizzes improved communication, critical thinking, and teamwork.
Emotional intelligence	Workshops on happiness, empathy, and thinking strategies built resilience and decision-making skills.
Research capacity	PhD workshop enhanced understanding of hypothesis testing and scholarly inquiry.
Career awareness	Alumni sessions provided real-world guidance on navigating public and corporate sectors.
Creativity & SDG Literacy	Poster competition promoted awareness of global challenges and visual expression of solutions.

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Fostering Quality Education: Manav Rachna's Commitment to SDG 4

Manav Rachna University, through its diverse range of competitions, workshops, and expert lectures, is actively contributing to the promotion of Sustainable Development Goal 4 (SDG 4) – Quality Education. The university's commitment is clearly reflected in the various student-centric initiatives designed to foster critical thinking, creativity, and lifelong learning opportunities for all learners.From orientation activities like the Poster Making Competition on SDGs, which encouraged students to visually interpret global challenges, to expert-led sessions on topics like Hypothesis Testing, PivotTables in Financial Analysis, and Applications of Probability and Statistics, each event aimed to make education more relevant, practical, and engaging. These initiatives not only build academic knowledge but also enhance analytical, problem-solving, and communication skills, which are essential for holistic education.Additionally, sessions such as "Happiness and Well-Being" and "Six Thinking Hats" contribute to emotional intelligence, mental well-being, and innovative thinking, reflecting an inclusive approach to learning. Alumni talks and entrepreneurial guidance sessions further bridge the gap between academic learning and real-world application, offering students the opportunity to understand career pathways and industry expectations.

INNOVATION & INCUBATION CENTRE

Report on IDEATHON 1.0

A team of students from the **Department of Computer Science and Technology (DoCST)**, Manav Rachna University, participated in the **Ideathon 2023** organized by **J.C. Bose University of Science and Technology, YMCA, Faridabad** on **8th November 2023**. The team, comprising **Rishav**, **Harsh**, and **Avdhesh Kumar Sharma**, all students of the **5th semester**, secured the **3rd Prize** □ among several competing teams from reputed institutions.

The students presented an innovative project based on the problem statement **"AI-Driven Navigation Assistant for Enhancing the Mobility of Blind Individuals."** The project focused on developing an intelligent assistive system that integrates artificial intelligence and sensor technologies to help visually impaired individuals navigate their surroundings safely and independently. The proposed solution aims to improve mobility, confidence, and accessibility, thereby contributing to the empowerment and inclusion of the blind community.

The project received appreciation for its **technical innovation, societal relevance, and practical application** in addressing a critical real-world challenge. The recognition at this prestigious platform reflects the students' strong problem-solving approach, teamwork, and ability to apply advanced technologies for social good.

This achievement also highlights the university's commitment to nurturing **innovation and social entrepreneurship** under the **Institution's Innovation Council (IIC)**, encouraging students to develop impactful solutions aligned with the United Nations Sustainable Development Goals (SDGs).

Report on participation in Ideathon 2.0

A team from the Department of Computer Science & Technology (DoCST) — Rishav, Harsh and Avdhesh Kumar Sharma (6th semester) — achieved **1st prize** in IDEATHON 2.0 held at J.C. Bose University of Science & Technology, YMCA, Faridabad on **6 March 2024**.

The team developed an **AI-driven navigation system** aimed at empowering visually impaired individuals by facilitating both education and self-reliance. According to the university's Innovation & Incubation Centre records, the project emphasises inclusive technology and social impact.

The competition, organised by the Institution's Innovation Council (IIC) of J.C. Bose University, provided a platform for student teams to propose innovative solutions to real-world challenges.

The achievement underscores the commitment of DoCST students to technological innovation with societal relevance and adds to the institution's portfolio of awards and achievements in innovation.

Report on participation in scociathon

A team of students from the Department of Computer Science and Technology (DoCST), Manav Rachna University, participated in the **Sociothon** event at the **National Social Summit 2024**, hosted by **IIT Roorkee**. The team, named **Team Bring Hope**, comprised **Rishav**, **Harsh**, and **Avdhesh Kumar Sharma**, all students of the **6th semester**, DoCST. The team secured the **3rd Prize** □ among several participants from reputed institutions across the country.

Team Bring Hope presented an innovative project titled **"AI-Driven Navigation System to Empower Blind Individuals."** The solution aims to leverage artificial intelligence to assist visually impaired individuals in navigating their surroundings safely and independently. The system not only facilitates mobility but also integrates educational support modules to help users gain knowledge and enhance their self-reliance.

The project reflects the team's vision of creating an inclusive society through the application of technology for social good. Their idea stood out for its **innovation, practicality, and strong social impact**, aligning with the broader goals of accessibility and empowerment for differently-abled individuals.

Participation in this prestigious event provided the students with exposure to real-world social innovation challenges, interdisciplinary collaboration, and the opportunity to present their ideas before esteemed judges and experts. The team's success at IIT Roorkee highlights their dedication, creativity, and technical excellence.

The achievement also underscores Manav Rachna University's commitment to promoting innovation and entrepreneurship under the **Institution's Innovation Council (IIC)** framework, encouraging students to contribute toward building a sustainable and inclusive future.

Report on Innovation Day

Innovation Institution Council (IIC) - MRU, honoured our former president Dr. A.P.J. Abdul Kalam birth anniversary as "Innovation Day" on 15 Oct.,2023. On this day, an Internal hackathon was conducted for the students to exhibit their talent and to motivate them towards innovation. More than 20 teams from various departments of Engineering & Technology had participated in the event. A team of technical experts from the industry was invited as judges to MRU to evaluate the idea solution and its implementation and other parameters to specific problem statements demonstrated by several competing teams of our Engineering students. Students participated enthusiastically and presented their solutions to the Jury members. Mr. Pranav Chauhan (Technical Manager, Design Tech Pvt Ltd), Dr. Kiran Khattar (Associate professor at BML University) and

Dr. Devnajali (Associate professor at BML University) were the three judges invited from industry. The evaluation process was done with solution presentation and students demonstrated the basic functionalities of their solutions in both hardware and software category. The rigorous evaluation process and feedback done by all the jury members were constructive for the teams to understand their shortcomings and solution improvement. Jury members congratulated all the team members and gave them best wishes for the national level event. A few Pics of the event are attached.

Report of Inter Institutional Business Plan Competition and Reward of Best Innovation -Manage through YUKTI-NIR

"The Government of India declared May 11 as National Technology Day in the year 1999 and since then the day holds a special significance for the entire Nation. With India progressing at a fast pace in the field of Science, Technology, Innovation and Entrepreneurship, the theme for this year's National Technology Day is School to Start-ups - Igniting Young Minds". Institution Innovation Council of Manav Rachna University celebrated National Technology Day and organised Idea/Business Plan competition spanning over 11th May to 12th May 2023 for start-up for funding. The event was coordinated by IIC Faculty members Mr. Vijay Kumar Gill and Dr. Prashant Bhardwaj. The students devised their original maxims or catchphrases on the theme mentioned above. They participated in the event with great assiduity and sincerity. Total of 16 Teams participated in the event and presented ideas and business plans ranging from web development for services, improving Bluetooth device, Home Automation, Home Intruder Alarm System, Solar Grass Cutter, Automatic Fire Extinguisher, high-speed Quadcopter, Medical Transcription, and Electronic Device made from recycling other Electronic Device etc. Dr. Susmita Ray (President, IIC) and Dr. Parneeta Dhaliwal (Vice President, IIC and Director Innovation & Incubation) interacted with students and suggested some inputs for their Ideas and thoughts. All the participants got incredibly motivated and felt thankful for the knowledge they gained from the other participants. The best innovation was rewarded. Total 10 ideas were

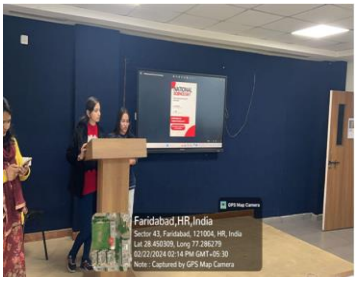
shortlisted which will be uploaded and further managed from prototype to market ready product development on Yukti INR.




REPORT – Workshop on "National Science Day''

School of Education and Humanities, Manav Rachna University organized a Two Day event for students of BSc B.Ed. to celebrate National Science Day" from 22-23 February, 2024. The Celebration of Science Day at Department of Education and Humanities was a resounding success to commemorate the spirit of scientific inquiry and discovery. The event featured a symposium, and an innovative scientific cartoon script competition on day 1 (22nd Feb) and a seminar on pancreatic cancer, day 2 (23nd Feb). The event started on 22nd Feb with two competitions; a symposium on Green Technology and a cartoon script writing on "Sustainable future". All the students of BSc B.Ed. program and BA BEd participated. The symposium provided a platform for discussions, and promoting the integration of ideas. The cartoon script, accompanied by visual illustrations, aimed to simplify complex scientific concepts related to sustainable future and students came up with very innovative ideas. On 23 Feb, an insightful seminar on pancreatic cancer, a disease that continues to pose significant challenges in the field of medicine. Renowned expert, Dr. Rajender K Motiani from Regional Centre for Biotechnology, Faridabad shared his latest research findings and discussed cutting-edge treatments and diagnostic approaches. The audience actively engaged in Q&A sessions, fostering a collaborative environment for knowledge

exchange. Lastly, a Vote of Thanks was extended by Dr. Kiran Gupta, Associate Professor Department of Education and humanities, MRU.



Report on Start Up Conclave

The Innovation & Entrepreneurship Club (I&E Club), under the Pre-Incubation Unit of the Institution's Innovation Council (IIC), Manav Rachna University, organized a **Start-Up Conclave** from **November 10–12, 2022**. The event commenced with a lamp-lighting ceremony graced by university dignitaries including **Prof. (Dr.) I.K. Bhat**, Vice Chancellor, MRU. A keynote session on *"Taking Your Start-up Towards Profitability"* was delivered by **Dr. Munish Jindal**, Founder & CEO, HoverRobotix, followed by an engaging panel discussion featuring startup founders and mentors who shared insights on building a sustainable entrepreneurial ecosystem. The conclave inspired students to explore innovation and entrepreneurship through interactive dialogues, mentorship, and real-world experiences. It concluded with the **"Pitch Deck – Idea Pitching Competition,"** where students presented creative startup ideas. The event, coordinated by **Dr. Yogita Sharma**, successfully fostered entrepreneurial spirit and innovation among participants.

Report on Incubator visit to AIC IIT Delhi, Sonipat, Haryana

The **School of Management & Commerce**, in association with the **Innovation & Entrepreneurship Club** under the **Pre-Incubation Unit**, Manav Rachna University, and in collaboration with **IIC-MRU**, organized an **Incubator Visit to AIC IIT Delhi, Sonipat** on **April 25, 2024**. The visit aimed to familiarize students with the start-up ecosystem and expose them to entrepreneurial challenges and growth opportunities. Forty participants from **BBA-Entrepreneurship & Family Business**, **MBA-Business Analytics**, and **Engineering** attended the visit. The session began with an insightful address by an AIC mentor highlighting the incubator's role in fostering innovation and self-reliance. Students then participated in a **Business Model Canvas Activity** using the **SCAMPER Technique**, developing and presenting creative business ideas in teams. The visit provided practical exposure, enhancing students' entrepreneurial mindset

and understanding of start-up dynamics. The program was conducted under the guidance of **Prof. (Dr.) Yogita Sharma** and **Dr. Shiv Kumar Singh Pundir**.

"Kaushal": A skill development program

Innovation and Incubation centre (IIC) MRU in association with the Dr. O P Bhalla Foundation has been diligently working on enhancing the skill development of Government School Students through its initiative called Kaushal. We are proud to announce the successful completion of two batches, each comprising 50 students, under this program. On April 25, 2024, marked the commencement of the first session of the third batch at Manav Rachna University (MRU). Under the mission of enhancing the skill of Government School Students and making them ready for job through its initiative called Kaushal Karyashala. The students were taught the basics of Microsoft Office emphasizing on MS Word. The Program is being conducted by Dr Prashant Bhardwaj, and Dr. Jai Prakash Sharma with the guidance of Dr Parneeta Dhaliwal. The students of this third batch belong to Grades 9 to 12 and are from GSSS Bhankri. Their enthusiasm was palpable during the inaugural class, where they delved into the basics of Hardware and Software, mastering essential skills such as operating a mouse. We are excited about the prospects of this new batch and remain committed to empowering these students with valuable IT skills that will undoubtedly shape their futures.

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4 QUALITY EDUCATION

Report on "Demo Day"

On **April 18–19, 2024**, the **Innovation and Incubation Center (IIC)** in collaboration with the **School of Engineering, Manav Rachna University**, organized an engaging **Demo Day** to showcase student innovation and creativity. The event commenced with a welcome address by **Dr. Shruti Vashist, Dean Academics, MRU**, followed by remarks from **Prof. (Dr.) Rajeev Kumar Maheswari**, Lucknow, who served as the guest judge and provided valuable insights to the participants. Over **35 teams** presented innovative projects across hardware and software domains. Noteworthy projects included **Peach Leaf Disease Classification**, using machine learning to detect agricultural diseases; **Hypertensive Retinopathy Prediction**, focused on eye health; and **Machine Learning-Based Prediction of Preeclampsia Risk**, contributing to maternal care. Students from **Computer Science, Mechanical, and Electronics & Communication Engineering** collaboratively demonstrated technical expertise and problem-solving skills. The event successfully fostered a culture of **innovation, interdisciplinary learning, and entrepreneurship**, inspiring students to translate ideas into impactful real-world solutions.

Report of Expert Talk on Translation of IP for an academic institution

The **Innovation & Entrepreneurship Club (I&E Club)**, under the **Pre-Incubation Unit** of the **Institution Innovation Council (IIC)**, **Manav Rachna University**, organized an **Expert Talk on "Translation of IP for an Academic Institution"** on **December 28, 2022**. The session was conducted by **Ms. Reema Sahni Mediratta**, In-charge & Senior Project Manager at the Innovation Technology Transfer Office, accompanied by **Ms. Kriti** from IIT Delhi. Ms. Reema, a registered Patent Agent and Innovation Ambassador (MHRD, GoI), emphasized the growing importance of **Intellectual Property Rights (IPR)** in academia. She elaborated on patents, copyrights, trademarks, industrial designs, and technology commercialization, encouraging students to file patents early and transform innovations into valuable assets. She also discussed **Technology Readiness Levels** and **technology transfer procedures**, highlighting how IPR can drive entrepreneurship and financial growth. The event, coordinated by **Dr. Yogita Sharma**, concluded with a **Vote of Thanks** by her, marking an insightful and enriching session.

Report on the Session: "Ideas to Impact: Innovate with purpose"

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On **July 23, 2024**, an enlightening session titled **"Ideas to Impact: Innovate with Purpose"** was organized at **Manav Rachna University**. The event was inaugurated by **Dr. Geeta Thakur**, Dean Student Welfare, who welcomed the guest speaker **Prof. (Dr.) Parneeta Dhaliwal**. Held in **G Block Mandal** from **9:30 AM to 10:30 AM**, the session aimed to motivate students to engage with the **National Innovation and Startup Policy (NISP)** and explore its opportunities.

Prof. Dhaliwal provided a detailed overview of NISP, emphasizing its goal of nurturing entrepreneurial thinking and innovation among students. She discussed how NISP helps institutions foster startups, aligning innovation with national and global objectives. Key highlights included opportunities for students to participate in **national and international innovation events**, **earn academic credits** for entrepreneurial work, and **access financial assistance** to support their startup ideas.

Students who had benefited from NISP also shared their success stories, reflecting on how the policy enabled them to gain exposure, recognition, and resources to scale their ventures. The session proved to be **insightful and motivating**, inspiring students to transform their ideas into impactful innovations and actively contribute to the growing startup ecosystem.

Report on Educational trip to Waste to Wonder Park and Arbro Pharmaceuticals

The educational trip organized by the Department of Sciences (Program Chemistry) in collaboration with IIC, MRU, for B.Sc. (Hons.) Chemistry and M.Sc. Chemistry students on 13th October 2023 was indeed an enriching experience. The trip was organised as a part of the project "The Journey from Wastes to Resources" sanctioned by the Hazardous Substances Management Division, Ministry of Environment, Forest and Climate Change under the Central Sector Scheme. The trip had two main destinations: Waste to Wonder Park (New Delhi) and ARBRO

Pharmaceuticals Pvt. Ltd. (Kriti Nagar, Delhi). A total of 40 students, accompanied by 5 faculty members, joined the educational trip.

Waste to Wonder Park

The "Waste to Wonder" Park (Delhi), an initiative by the South Delhi Municipal Corporation (SDMC), focuses on effectively managing the city's waste while beautifying public spaces. The park showcases intricate and beautifully crafted replicas of the Seven Wonders of the World, all made from scrap materials promoting sustainability and waste recycling emphasizing the importance of repurposing waste materials! The experience likely left the students inspired and more aware of their roles in protecting the environment and promoting sustainability.

ARBRO Pharmaceuticals

ARBRO Pharmaceuticals is a well-established pharmaceutical company with a strong commitment to quality and healthcare, having been founded in 1985. Their motto "Care for Quality, Cure for All" reflects their dedication to producing high-quality medicines. The company conducts rigorous testing of medicines and other products in accordance with the guidelines set by various pharmacopeia commissions, such as the Indian Pharmacopoeia Commission, US Pharmacopoeia, Japan Pharmacopoeia, BIS, and FSSAI. During the visit, the students had the opportunity to observe the manufacturing and packaging processes of medicines. They also visited analytical division equipped with modern instrumentation for quality control. This educational trip provided students with valuable insights into the pharmaceutical industry. The quality assurance process, while primarily geared toward health and safety, also reflects a sustainable approach to pharmaceutical production by minimizing risks and waste.

Report on Industrial visit to the National Small Industries Corporation (NSIC)

The **Innovation & Entrepreneurship Club**, under the **Pre-Incubation Unit** at **Manav Rachna University**, in collaboration with **IIC-MRU**, organized an **industrial visit to the National Small Industries Corporation (NSIC)**, Ministry of MSME, Government of India, on **September 21, 2023**. The visit aimed to familiarize students with the entrepreneurial ecosystem, government initiatives, and operational aspects of MSMEs. A total of **55 participants** joined the visit. The session began with an insightful address by **Mr. Shakeel Ahmed Khan**, Mentor at NSIC, who

highlighted NSIC's vital role in promoting innovation, employment, and self-reliance. He elaborated on various **government schemes** offering financial aid, technology support, and marketing opportunities for budding entrepreneurs. Students also toured NSIC's state-of-the-art facilities, gaining hands-on exposure to machinery, production processes, and cost structures. Mr. Khan further introduced a **15-day government-sponsored course** designed to help aspiring entrepreneurs secure funding and develop essential business skills. The visit, coordinated by **Prof. (Dr.) Yogita Sharma**, Head – Startup, Incubation & Entrepreneurship, proved highly enriching, enhancing students' understanding of the MSME sector and motivating them to pursue entrepreneurial ventures.

Report of Workshop on "Code and Innovate: A workshop on UX/UI Automation with APIs"

The **Institution Innovation Council (IIC)** and **Research Cluster of Computing (RCC)** of **Manav Rachna University** jointly organized a two-day workshop titled **"Code and Innovate: A Workshop on UX/UI Automation with APIs"** from **January 12 to 15, 2024**. The session aimed to provide participants with a deep understanding of modern software development and automation practices. The workshop was conducted by **Mr. Suyash Sharma**, Software Engineer at **IDEMIA**, with over two years of industry experience. The inaugural session highlighted the growing importance of **UX/UI automation** in improving design efficiency and enhancing user experience. By automating repetitive tasks, developers can focus more on creativity and strategic innovation. The workshop offered **hands-on training**, covering key topics such as **introduction to UX/UI automation, project development, and deployment scenarios**. Participants engaged in practical exercises that deepened their understanding of automation concepts and real-world implementation. A total of **22 students** attended the workshop, gaining valuable insights into how automation accelerates innovation and product delivery. The event concluded with a **vote of thanks** to Mr. Sharma, appreciating his time and contribution. Overall, the workshop proved to be an informative and skill-enriching experience for all participants.

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Report on ATVC

Under the **MRU–Institution's Innovation Council (IIC)**, a team of **nine students** from **Manav Rachna University** participated in the **Aravalli Terrain Vehicle Championship (ATVC)** held from **March 1 to 5, 2024**. The team, led by **Mr. Mohit Sanju** and **Mr. Rajveer Singh Bedi**, worked under the mentorship of **Dr. J.P. Sharma** and **Dr. Prashant Bhardwaj**. With funding support of **₹5,70,000** from the university, the students designed and fabricated a rugged off-road vehicle at the **Fabrication Centre**. Built using advanced **CAD/CAM** software, the vehicle featured a lightweight yet durable chassis, efficient suspension, and robust braking and steering systems. It underwent rigorous testing to ensure superior performance, safety, and stability across challenging terrains.

The team competed at the **National Level Championship** hosted by **Nutan Maharashtra Institute of Engineering and Technology, Talegaon**, and **Orison Education India Ltd.**, securing the **9th position** among over **100 teams and 3500 participants**. The event promoted initiatives like **Skill India**, **Startup India**, and **Make in India**. The team's achievement exemplified innovation, teamwork, and engineering excellence, reflecting MRU's commitment to nurturing future-ready technocrats through experiential learning and applied research.

INNOVATHON 2023

A team of students from the **Department of Computer Science and Technology (DoCST)**, **Manav Rachna University**, participated in **Innovathon 2023** organized by **Amity University, Gurugram** on **November 2–3, 2023**, and secured the **2nd position** in this prestigious innovation competition. The team, comprising **Tejas Singh, Vansh Aggarwal, Ayush Sachdeva**, and **Kartik Dargan**, worked under the mentorship of **Dr. Parneeta Dhaliwal**. Their project, titled **"Revolutionising Waste Segregation using Deep Learning and Robotic Arm,"** combined artificial intelligence and robotics to automate the waste segregation process. The innovation

employs deep learning algorithms for precise waste classification and a robotic arm for efficient sorting, addressing key environmental and waste management challenges. The project was commended for its technical creativity, societal relevance, and practical impact, earning the team a **cash prize of INR 50,000**. This achievement reflects the strong **innovation culture** nurtured by the **Institution's Innovation Council (IIC)**, encouraging students to develop sustainable, technology-driven solutions.

Internal Hackathon, AVISHKAR 2023

The **Internal Hackathon AVISHKAR 2023**, an event under the **Smart India Hackathon (SIH) 2023**, was organized by the **Institution's Innovation Council (IIC)** at **Manav Rachna University** on **September 20, 2023**. A total of **18 teams**, each comprising six students with at least one female participant, presented innovative solutions to real-world problem statements. The event was judged by industry experts **Mr. Pranav Chauhan** (Design Tech Pvt. Ltd.), **Dr. Kiran Khattar**, and **Dr. Devnajali** (BML University). The jury evaluated projects in both hardware and software categories as per SIH guidelines, providing constructive feedback and selecting the best teams for national-level SIH participation.A few Pictures of the event are attached along with list of teams and few sample certificate are attached as below:

Dr. OP Bhalla Foundation

Margdarshan - Career Aptitude Test

Organized by: Dr. O.P. Bhalla Foundation in collaboration with Manav Rachna University (MRU)

Initiative Title: *Margdarshan – Career Counseling and Guidance Program*
Inaugural Year: 2022
Target Audience: Students from Classes 10th to 12th in Government Schools

The **Margdarshan initiative**, launched by the **Dr. O.P. Bhalla Foundation** in collaboration with **Manav Rachna University (MRU)**, aims to bridge the gap in structured career counseling for

students in government schools. The program focuses on empowering students to make informed academic and career choices through **psychometric assessments**, **one-on-one counseling sessions**, and **career awareness workshops**. It also engages families to help them understand diverse educational and professional pathways.

Since its inception in **2022**, the initiative has positively impacted hundreds of students across **Faridabad and nearby regions**. Starting with 150 students, the outreach expanded to over **300 students in 2023**, including participants from **GBSSS Old Faridabad**, **GGSSS Old Faridabad**, and other schools. Each student received personalized guidance from MRU's trained career counselors, enabling them to recognize their interests, aptitudes, and strengths.

In addition to counseling sessions, **campus visits to MRU** provided hands-on exposure to various academic disciplines, laboratories, and learning environments. This experience not only motivated students to pursue higher education but also inspired confidence in aligning their ambitions with realistic and well-informed career pathways.

Raddi Recycling & Pustak - Notebook Distribution Drive

"Raddi" project

Introduction

The Dr. O P Bhalla Foundation in collaboration with MREI has been steadfast in its mission to promote sustainability and recycling of resources. One of its significant initiatives, the "Raddi" project, focuses on recycling waste paper into new notebooks. This project has successfully recycled over 55,000 kgs of paper into usable notebooks.

Event Overview
Event I - Report on the Notebook Donation Event by Dr. O P Bhalla Foundation
Date: 1st May 2024

On 1st May 2024, the Dr. O P Bhalla Foundation, with the support of MR Associates, conducted a noteworthy event at Government Senior Secondary School (GSSS) Bhankri. The Foundation's team donated a total of 8 new notebooks to each of the 385 students at the school made from recycled paper collected through Raddi collection drive. This initiative aimed to provide essential educational resources as the new academic session commenced, ensuring that all students had access to the necessary materials for their studies.

Details of the Event

- **Project:** Raddi (Waste Paper Recycling)
- **Purpose:** Donation of recycled notebooks
- **Beneficiaries:** 385 students of GSSS Bhankri
- **Items Donated:** 8 notebooks per student

Conclusion

The Dr. O P Bhalla Foundation remains committed to its goal of sustainability and resource recycling. The recent donation event at GSSS Bhankri is a testament to the Foundation's dedication to supporting education through environmentally responsible practices. The Foundation will continue to work towards similar initiatives, aiming to make a significant impact on both the environment and the community.

Event-II: Report on Raddi Recycling Initiative
Organized by: Dr. O.P. Bhalla Foundation
Date: March 27, 2024

The **Dr. O.P. Bhalla Foundation** successfully organized the **Raddi Recycling Initiative**, an ongoing sustainability project aimed at recycling waste paper from the **Manav Rachna campus** into usable stationery items such as notebooks, notepads, and A4 reams. This initiative promotes environmental responsibility and efficient resource utilization across the campus.

As of **March 27, 2024**, the Foundation has processed a substantial quantity of waste paper, resulting in the production of **250 reams of recycled A4 paper**, which were handed over to the **Central Store** for campus use. The initiative not only reduces paper waste and conserves natural resources but also cuts stationery costs and fosters environmental awareness among students, faculty, and staff.

Going forward, the Foundation plans to expand collection efforts, diversify recycled products, and conduct awareness programs to strengthen MRU’s commitment to sustainability and eco-friendly practices.

Recent Events:

13th June 2024: 20 students from Shirdi Sai Baba School, Faridabad, received guidance and information on available courses and scholarships:

Under the *Margadarshan* initiative of the **Dr. O.P. Bhalla Foundation**, 20 students from **Shirdi Sai Baba School, Faridabad**, received personalized guidance. These students engaged in **one- on-one sessions** with the **Career Development Center (CDC)** team of **Manav Rachna University** after a **psychometric analysis** to better understand their interests, abilities, and aptitudes. The **admissions team** of Manav Rachna University further guided the students through various courses offered by both **Manav Rachna University** and **Manav Rachna International Institute of Research and Studies**, helping them choose suitable academic paths and facilitating the **admissions process**. They were also assured of **scholarships** from the Dr. O.P. Bhalla Foundation based on their academic credentials. Additionally, a **comprehensive campus tour** was provided, showcasing available courses to assist them in making informed decisions for their future studies.

This initiative aimed to empower students in choosing a suitable career path while offering support through scholarships and detailed guidance.

4th May 2024: 40 students from NVN School, Bhiduki, participated in one-on-one sessions with the Career Development Center (CDC) team following psychometric

Under the **Margadarshan initiative** of the **Dr. O.P. Bhalla Foundation**, 40 students from **NVN School, Village Bhiduki**, visited **Manav Rachna University** on **May 4, 2024**, to receive personalized career guidance. The program, conducted in collaboration with the **Career Development Center (CDC)**, included **psychometric assessments** followed by **one-on-one counseling sessions** to help students understand their strengths, interests, and potential career paths.

Students also participated in a **comprehensive campus tour**, exploring various courses offered by **Manav Rachna University** and **Manav Rachna International Institute of Research and Studies**. This exposure enabled them to make informed academic and career decisions.

Notably, NVN School had earlier partnered with the Foundation during a village visit for UK students, showcasing a strong community bond. The initiative reinforces Manav Rachna's commitment to empowering students from diverse backgrounds through informed guidance and educational opportunities, fostering holistic career development.

14th December 2023: 98 students from GGSSS Old Faridabad received career guidance at Manav Rachna Campus.

As part of the **Margadarshan initiative**, the **Dr. O.P. Bhalla Foundation** hosted **98 students from Government Girls Senior Secondary School (GGSSS), Old Faridabad**, at the **Manav Rachna University** campus on **December 14 and 16, 2023**, for a **Career Aptitude Test**. The sessions were facilitated by the **Career Development Center (CDC)** team, who provided **individualized guidance** to help students interpret their test results and understand their strengths, interests, and potential career options.

The initiative aimed to **empower students** with informed career choices and awareness of higher education pathways, aligning with the **Sustainable Development Goals (SDGs)** on *Quality Education* and *Decent Work and Economic Growth*. By providing structured counseling and practical insights, the program enabled students to make better academic and career decisions.

Through this initiative, **Manav Rachna University** and the **Dr. O.P. Bhalla Foundation** reaffirmed their commitment to nurturing young talent and promoting inclusive, future-oriented education.

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21st November 2023: 53 and 45 students from GGSSS Old Faridabad underwent aptitude

On **November 21st and 22nd, 2023**, as part of the ongoing *Margadarshan* initiative, the **Dr.O.P. Bhalla Foundation** hosted **53** and **45 students** from **Government Girls Senior Secondary School (GGSSS), Old Faridabad**, at the **Manav Rachna University** campus for a **Career Aptitude Test**.

The sessions aimed to provide these students with valuable insights into their strengths, interests, and potential career paths, empowering them to make informed decisions regarding their future. **Career Counselors** from the **Career Development Center (CDC)** of **Manav Rachna University** offered personalized guidance and counseling to each student, helping them understand their aptitude test results and exploring suitable academic and career options.

This initiative is aligned with **Sustainable Development Goal 4 (SDG 4) - Quality Education**, emphasizing the commitment of **Manav Rachna University** and the **Dr. O.P. Bhalla Foundation** to support and uplift the educational aspirations of students from diverse backgrounds. By providing this guidance, the initiative aims to ensure that these students are well-equipped to pursue higher education and build successful careers.

Through the *Margadarshan* initiative, **Manav Rachna University** and the **Dr. O.P. Bhalla Foundation** continue to demonstrate their dedication to fostering a brighter future for young minds, contributing to the broader goal of quality education and lifelong learning opportunities for all.

3rd November 2023: 56 students from GGSSS Old Faridabad attended the program.

On 3rd November 2023, as a continuation of the Margdarshan Initiative, Dr. O P Bhalla Foundation successfully hosted the fourth batch of 56 students from GGSSS Old Faridabad at MR Campus for a Career Aptitude Test. The primary objective remains to offer these students valuable insights into their future careers and higher education opportunities, furthering our commitment to Sustainable Development Goal 4 (SDG 4) - Quality Education.

2nd November 2023: 47 students from GGSSS Old Faridabad joined for career assessment.

On 2nd November 2023, as part of the Margdarshan Initiative and in consonance with the DC - Faridabad, Dr. O P Bhalla Foundation hosted 47 students from GGSSS Old Faridabad at MR Campus for a Career Aptitude Test. The main aim is to provide these students with insights into their future careers and higher education options, contributing to Sustainable Development Goal 4 (SDG 4) - Quality Education. Career Counsellors from the CDC Department also explained the test and reports to the students.

19th October 2023: 38 students from GBSSS Old Faridabad participated in the program.

19.10.2023 - Taking the Margdarshan Initiative further, Dr. O P Bhalla Foundation hosted the second batch of 38 students from GBSSS Old Faridabad at MR Campus for a Career Aptitude Test. The primary objective of this program was to provide these students with valuable insights into their future career prospects and higher education opportunities. This initiative is a step towards achieving Sustainable Development Goal 4 (SDG 4) - Quality Education. By guiding these students towards well-informed career choices, we are contributing to a brighter and more promising future for them.

17th October 2023: 48 students from GBSSS Old Faridabad attended a Career Aptitude Test at **Manav Rachna Campus**.

On 17.10.2023, in alignment with the Margdarshan Initiative and under the guidance of DC Faridabad, Dr. O P Bhalla Foundation hosted the first batch of 48 students from GBSSS Old Faridabad at MR Campus for a Career Aptitude Test. The primary objective of this program was to provide these students with valuable insights into their future career prospects and higher education opportunities. This initiative is a step towards achieving Sustainable Development Goal 4 (SDG 4) - Quality Education. By guiding these students towards well-informed career choices, we are contributing to a brighter and more promising future for them.

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MANAV RACHNA CENTRE FOR PEACE AND SUSTAINABILITY

Stall at orientation for freshers' interaction

Title: Stall at orientation for freshers' interaction
Date: July 14, 2023
Venue: In front of G block, Manav Rachna University

On July 14, 2023, The Manav Rachna Centre for Peace and Sustainability (MRCPS) set up interactive stalls during the orientation on July 14, 2023, to engage and inspire new students. Each stall, creatively designed around themes of sustainability and mindfulness, highlighted the Centre's objectives and achievements. Coordinated by team leaders, the initiative featured engaging activities and a skit that drew enthusiastic participation. The event concluded with the recruitment of 60 new members, marking a promising start for the council. The stall reflected MRU's commitment to sustainability, creativity, and student involvement while fostering awareness of peace and environmental responsibility among the freshers.

Youth for Peace online Workshop

MRCPS hosted an online "Youth for Peace" workshop on July 6, 2023, with Ms. Shweta Bhatnagar as the resource speaker. The session aimed to inspire youth leadership in peacebuilding and sustainable development. Through interactive discussions and activities, Ms. Bhatnagar shared valuable insights on conflict resolution and empowering young changemakers. Participants gained practical tools for promoting harmony and sustainability in their communities. The workshop celebrated MRCPS's one-year milestone, reaffirming its dedication to nurturing responsible, peace-oriented global citizens. It served as an enriching platform for students to engage, reflect, and commit to meaningful social change.

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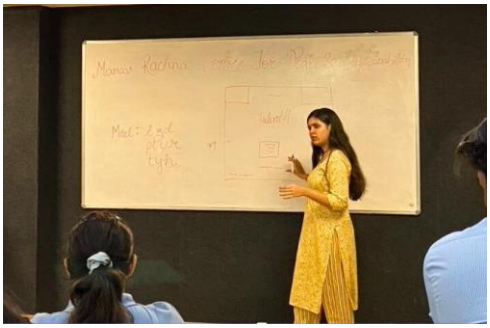
4 QUALITY EDUCATION

Workshop on hand-based flyer design

MRCPS organized a hands-on workshop on "Hand-Based Flyer Design" on July 27, 2023, led by Ms. Avni Bhatia. The session aimed to enhance creativity and design thinking among students, focusing on color theory, typography, and layout design. Participants actively created visually appealing flyers while exchanging innovative ideas in a collaborative environment. The workshop fostered creativity, teamwork, and aesthetic awareness, empowering students to express concepts through design. It reinforced MRU's vision of integrating practical learning with creative expression, helping participants develop essential communication and design skills for impactful visual storytelling.



Students learning format of the flyer

Interaction with expert

Just a Minute Debate on Peace, Conflict & Resolution

MRCPS organized a hands-on workshop on "Hand-Based Flyer Design" on July 27, 2023, led by Ms. Avni Bhatia. The session aimed to enhance creativity and design thinking among students, focusing on color theory, typography, and layout design. Participants actively created visually appealing flyers while exchanging innovative ideas in a collaborative environment. The workshop fostered creativity, teamwork, and aesthetic awareness, empowering students to express concepts through design. It reinforced MRU's vision of integrating practical learning with creative expression, helping participants develop essential communication and design skills for impactful visual storytelling.

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4 QUALITY EDUCATION

Visit to Angels Public School for SDG Awareness

Title: Visit to Angels Public School for SDG Awareness
Date: October 20, 2023
Purpose:

The aim of the MRCPS volunteer-led visit to Angels Public School on October 20, was to in still awareness and understanding of sustainability among students through interactive activities and poster creation.

About the event:

On October 20, volunteers from Manav Rachna Centre for Peace and Sustainability (MRCPS) orchestrated an impactful visit to Angels Public School in New Delhi as part of their "Education for Sustainability" (ESDP) project. The primary objective was to impart valuable insights about sustainability to the students, fostering a sense of environmental consciousness and responsibility. The volunteers engaged the students in a series of interactive activities designed to enhance their understanding of sustainable practices.

During the visit, the participating students were actively involved in hands-on activities, contributing to the creation of informative posters that encapsulated key aspects of sustainability. This hands-on approach not only facilitated a dynamic learning experience but also empowered the students to visually express their newfound knowledge. The collaborative effort in making posters became a platform for students to absorb practical lessons about sustainable living, reinforcing the importance of responsible choices and environmental stewardship.

The MRCPS volunteers played a pivotal role in facilitating an enriching educational experience at Angels Public School, underscoring the organization's commitment to promoting sustainability through hands-on engagement and interactive learning. The visit left a lasting impact on both the volunteers and the students, emphasizing the significance of education for sustainability in shaping conscientious future leaders.

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4 QUALITY EDUCATION

Stall at remembrance ceremony of Dr. OP Bhalla sir

Title: Stall at remembrance ceremony of Dr. OP Bhalla sir

Date: September 15, 2023

Venue: T block front, Manav Rachna University

The commemorative stall organized by MRCP Society Volunteers, in conjunction with NGO partners, students, and Chief Minister sh. Krishnpal Gurjar, proved to be a resounding success. Held on the remembrance anniversary of Dr. OP Bhalla, the event celebrated his enduring legacy by providing a dynamic platform for NGOs to showcase their impactful initiatives, students to display innovative projects, and the community to engage with meaningful causes.

Chief Minister sh. Krishnpal Gurjar's presence added a significant touch, emphasizing the importance of collective efforts in upholding the values championed by Dr. Bhalla. The event not only paid a fitting tribute to a visionary but also reinforced the spirit of unity and service within our community, aligning with the principles Dr. Bhalla held dear.

School Visit for SDG Awareness

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Title: MSC School Visit for SDG Awareness
Date: January 18, 2024
Venue: MSC school Anangpur Village, Faridabad

Manav Rachna Centre for Peace and Sustainability recently organized a visit to Anangpur Village MSC School as part of their Education for Sustainability Program (ESDP). Dr. Pooja led an insightful session for the students, focusing on sustainable development principles.

As part of this initiative, sustainably made notebooks were distributed, emphasizing the importance of eco-friendly practices in everyday life. The session aimed to instill a sense of responsibility for the environment among the students, promoting a holistic understanding of sustainability. Student heads Diya and Ipshita efficiently coordinated the event, ensuring its smooth execution.

School Visit for SDG Awareness

Title: Visit to MSC Public School for SDG Awareness
Date: February 1,2024
Venue: MSC school Anangpur Village, Faridabad

Manav Rachna Centre for Peace and Sustainability recently organized a visit to Anangpur Village MSC School as part of their Education for Sustainability Development Program (ESDP).

Ms. Yashita and Ms. Avni led an insightful session for the students, focusing on sustainable development principles. As part of this initiative, prizes were distributed, emphasizing the importance of eco-friendly practices in everyday life. The session aimed to instill a sense of responsibility for the environment among the students, promoting a holistic understanding of sustainability.

Student heads Akshita and Chetna efficiently coordinated the event, ensuring its smooth execution. The enthusiastic participation of the school students reflected their engagement and receptiveness to the crucial information shared during the sessions.

The success of the visit was made possible by the meticulous planning and coordination of Ms. Avni, who orchestrated the entire event. Overall, the event aimed to sensitize students about the importance of sustainable development from an early age, laying the foundation for informed and responsible citizenship.

Glimpses of the event:

GUEST LECTURES

Session - A lesson for Management, Shree Mad Bhagwat Geeta
Event 5 : Management Lessons from Gita
Date : 24th July, 2023
Time : 1pm- 2pm.

An interesting session was taken by Dr. Bindu Aggarwal . Topic " A lesson for Management , Shree Mad Bhagwat Geeta ". The session highlighted the Management Concept on Geeta. Dr Bindu presented the four lessons depicting Role and Responsibility (Dharma) Directions, Empathy , Karma , and leadership . The Students were involved in different activities related to self awareness and different types of leadership.

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"Career Prospects in Banking Industry"

Date: 9th August 2023, Time:10:00AM-11:30 AM

Event Coordinator: Dr Sunil Kadyan, Associate Professor SMC, Manav Rachna University

School of Management and Commerce, Manav Rachna University Faridabad organised an informative guest lecture on the topic "Career Prospects in Banking Industry" for UG and PG students at I Block Auditorium, Manav Rachna University on 9th August 2023. Prof (Dr) N K Bhasin, Head, Professional Development Centre (PDC), Indian Institute of Banking & Finance (IIBF) New Delhi was keynote speaker for this event. The main objective of this guest lecture was to sensitize the students regarding career prospects, various new job roles available in the Banking Industry. To make them aware about the role of Banking Professional Certification in their career path.

The program was initiated with a warm welcome from the organizers. The speaker talked about various IIFB certifications available for students. He also talked about the scope of these certifications. He laid emphasis on required skill set required for Banking jobs. He said there are lot of job opportunities in Banking sector.

A meeting was held after the guest lecture in longue which was attended by IIBF officials Dr N K Bhasin, Head PDC, Mr Aman Dhar Executive CDC with Dr Parul Jhajharia Dean SMC, Prof (Dr)Tanushri Purohit HOD SMC, Dr Pragati Chauhan Associate Professor SMC, Dr Sunil Kadyan Associate Professor SMC for future MOU and professional collaborations with IIBF New Delhi.

The event received positive feedback from both students and faculty members, indicating a strong demand for such informative sessions in the future. The organizers expressed their commitment to continuing these efforts to empower students with the knowledge and skills required to get job in BFSI domain effectively.

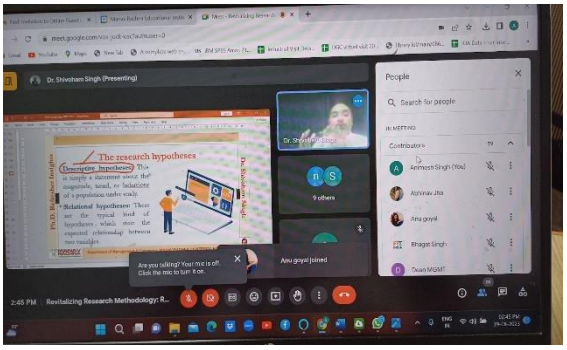
Session Report: Online Session on PivotTable by Dr. Animesh Singh

On **August 11, 2023**, an online session was conducted by **Dr. Animesh Singh**, *Associate Professor, School of Management & Commerce*, **Manav Rachna University**, as part of the **Management Development Program (MDP)** on *"Financial Decision-Making Using Excel,"* hosted by the **Arun Jaitley National Institute of Financial Management (AJNIFM)**. The session focused on the use of **PivotTables** for financial analysis and decision-making.

Dr. Singh explained how PivotTables simplify complex financial datasets, enabling users to generate actionable insights. Participants learned to create and customize PivotTables, apply grouping, calculated fields, and filters, and convert data into **Pivot Charts** for effective visualization. The interactive session included practical demonstrations and real-world examples, making the concepts easily comprehensible.

The program concluded with an engaging **Q&A session**, where participants appreciated Dr. Singh's clarity, depth of knowledge, and interactive approach, acknowledging the session's value in strengthening analytical and financial decision-making skills.

Online Guest Lecture on "Decoding Hypothesis Testing: Revealing The Insights"



On **August 11, 2023**, **Dr. Animesh Singh**, *Associate Professor, School of Management & Commerce*, **Manav Rachna University**, conducted an online session on **"Financial Decision-Making Using Excel"** as part of the **Management Development Program (MDP)** hosted by the **Arun Jaitley National Institute of Financial Management (AJNIFM)**.

The session, held from **2:00 PM to 3:00 PM**, focused on the use of **PivotTables** in financial analysis. Dr. Singh explained how PivotTables help summarize and interpret large financial datasets, aiding effective decision-making. Participants were guided through the process of creating and customizing PivotTables, using data grouping, calculated fields, filters, and converting data into **Pivot Charts** for visualization.

The interactive format allowed participants to clarify doubts and discuss real-world applications. The session received positive feedback for its practical insights and clarity, with participants appreciating Dr. Singh's engaging teaching approach and expertise in simplifying complex financial concepts.

CAMPUS TO CORPORATE MANTRA

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Following our ongoing efforts to strengthen their numerous PD sessions in order to boost their Placement possibilities, the Institute of Analytics (IoA) arranged a 2-day workshop on "CAMPUS TO CORPORATE MANTRA" for our BBA-BA 5th Semester and MBA-BA 1st and 3rd Semester on September 26 and 27. They attended sessions on a variety of topics, including CV preparation and counseling, mock interviews, the most recent developments in business analytics, expectations of employers, and non-negotiable business analyst abilities. The sessions were taken by Mr. Hadrine H. Pereira, Head of Corporate Relations and Placements at International Skill Development Corporation, Mr. Syed Ismail Zabiulla, Assistant Manager at International Skill Development Corporation, and Mr. Siddhant Chandel, Regional Manager- Business Relationship at International Skill Development Corporation.

ALUMNI TALK on *"Corporate Culture and Resume Writing"*

School of Management & Commerce had an Alumni Talk by Mr. Archit Gupta(Business Intelligence Analyst in SIFY Technologies) and Mr. Desh Pareekh (Lead in Business Operations & Optimisation, NTT India Ltd.) on "*Corporate Culture and Resume Writing*" on 20th Oct 2023 at 11.00am. Around 42 participants from different years joined the Session.

The lecture commenced with an engaging opening session by the alumni's, the experienced mentors. The Guest elucidated the purpose & objective of their visit in the University emphasizing the crucial role of Data Analytics in the economy and further guided students about how important the curricular activities are and how they impact an individual's personality and outlook.

Mr. Archit and Mr. Desh covered topics related to introducing oneself, Corporate Dilemma, Data Analytics and Business Intelligence, and gave an overview of different certification skills that are Important for a data analyst like POWER BI, PYTHON, MY SQL, EXCEL, SECURITY , FINACLE etc.

The session was concluded by Prof. (Dr.) Pooja Kapoor, with a vote of thanks for taking out their valuable time and enlightening their juniors with the current trends in the industry.

Session on Enhancing Financial Awareness for Future Business Leaders: Navigating the financial landscape.

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A session on **"Enhancing Financial Awareness for Future Business Leaders: Navigating the Financial Landscape"** was organized by the **School of Management and Commerce (SMC), Manav Rachna University**, on **November 20, 2023**, at the **B Block Auditorium**. The session, conducted by **Dr. Manisha Jain**, a finance expert and SEBI-empaneled trainer, aimed to enhance financial literacy among **BBA Semester I** students.

Dr. Jain, with extensive experience in banking, investment, and financial consulting, shared insights on budgeting, credit management, banking services, investment principles, and financial planning. She highlighted the importance of financial awareness in both personal and professional decision-making.

Organized by **Dr. Rashi Banerji**, Assistant Professor, the session witnessed active participation from **75 students**. **Dr. Tanushri Purohit**, Head of Department, SMC, welcomed and felicitated the resource person. Students appreciated the interactive nature, practical case studies, and relevance of the session to their academic and professional growth.

Navigating Government Sector Jobs After Graduation: Insights from Alumni

The School of Management & Commerce at MRU recently hosted an enlightening alumni talk focusing on "Navigating Government Sector Jobs After Graduation: Insights from Alumni" on 1st April, 2024. The session catered BBA students, offering them a unique opportunity to learn from the experiences of a distinguished alumnus. Mr. Gaurav commenced the session by sharing his personal journey from academia to the professional realm of government service. He highlighted the pivotal role of strategic planning, perseverance, and continuous learning in carving a successful career path. Drawing from his own experiences, He emphasized the importance of understanding the nuances of government sector recruitment processes and cultivating relevant skills to stand out in a competitive job market.

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Happiness And Well-Being

The seminar on "Happiness and wellbeing- getting back to Basics" was conducted by the E-cell of Manav Rachna University on April 12, 2024, from 10:00 AM to 11:30 AM at the I-Block Auditorium. The expert speaker for the event was Ms. Shyamasree Chakrabarty.

Ms. Shyamasree Chakrabarty is an accomplished leader known for her expertise in driving organizational transformation, enhancing employee experience and wellbeing, and developing effective leadership strategies. She has over 19 years of extensive global experience across India, ANZ, Southeast Asia, Middle East, and the US. Before starting with HappyPlus Consulting, she worked with AON for 15 years and was leading entire Asia Pacific, Middle East, and EU markets as Consulting Implementation Head and People Analytics Lead.

The seminar was an interactive and engaging session where Ms. Shyamasree shared her insights and experiences in various areas including Employee Engagement, Happiness and Wellbeing etc. She shared with the student's data showcasing the work done in the area of promoting happiness in different corporates workplaces, growing relevance towards this concept and why this is creating work life imbalances as understood by everyone. She also talked on the relevance of talent management and talent acquisition in workplaces today. Through a short quiz and interactive videos, students were actively involved in the session and raise their queries on the topic being discussed. The seminar provided valuable insights into how students can also take up future research in this area for better understanding the workplace trends and challenges.

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Academic Visit to IIT Delhi & Expert Talk on "One Small Theorem and Big Applications"

The School of Sciences, Program Mathematics, Manav Rachna University organized an Academic visit to IIT Delhi Campus on 25th January 2024, from 9:30 a.m. onwards for the UG and PG students and the faculty members. In total 28 Students & 11 Teaching Faculties visited IIT campus.

The Academic visit was divided into three phases, the first phase was the interaction with P.G and Ph.D. scholars of IIT Delhi, the second phase was the expert lecture by Prof. R.K. Sharma and the third phase was the visit to the Central Library.

At around 10:30 a.m., a brief introduction of IIT Delhi and its cutting-edge research, academic facilities, and opportunities available at one of India's premier institutions was given by an undergraduate student. Our students participated in insightful discussions with their P.G. students and Ph.D. scholars, gaining valuable insights into ongoing projects and research areas.
At 11:30 p.m., Prof. R. K. Sharma delivered the talk on “One Small Theorem and Big Application”. The talk was very interactive, focusing on the importance of information security. He started his talk by introducing numbers and their importance in our lives. Dr. Sharma explained how number theory plays a significant role in our lives and how it forms the basis of cryptography. Dr. Sharma also mentioned how we are prone to security breaches while using the internet and suggested the usage of adequate measures to protect our personal information.

Around 2:00 p.m., all students along with faculty members visited the central library. One faculty member from IIT Delhi assisted and demonstrated the different online services available at the central library. She also informed us about the different types of journals available in the library. Students were very excited to explore the different sections of the library. They also visited the repository sections.

The visit facilitated networking among students from different academic backgrounds, creating a platform for interdisciplinary collaborations.

Applications of Probability & Statistics

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School of Sciences, Department of Sciences(Mathematics), Manav Rachna University organized an expert talk on **"Applications of Probability & Statistics"** at Manav Rachna University on 27th March 2024, from 11:30 am onwards for the UG & PG students and the faculty members.

The expert speaker was welcomed by presenting her with a sapling as a token of love and gratitude. Ms. Vineeta, student of M.Sc.(Mathematics) gave a brief introduction of the speaker and the objective of the invited talk.

Prof. Ranjita commenced the talk with an overview of Statistics .She emphasized the significant role played by statistics in understanding the story of data and how statistics assists in making decisions when uncertainty exists.

A significant portion of the lecture was dedicated to exploring the various statistical methods. Prof. Ranjita elucidated the role of statistical techniques and probability in making informed decisions based on data. She also explained the statistical study concerns which are mentioned as experimental and observational study.The applications of the two depend on to determine the desirability of different treatments or preventive measures or to bring desired change(**experimental study)** or to assess the effects of causal factors (a predisposition/an environmental exposure/ individual's lifestyle over which the researcher has no control) on the occurrence or progression of the study aspect (any unwanted medical/psychological condition). This leads to **observational study.**

The central focus was how Statistical science is concerned with the evidentiary value of observations. The speaker explained Statistics is concerned with how data changes beliefs - the purpose of statistical science is to help people change their beliefs in a rational way when confronted with new information.

The lecture was followed by an interactive question-and-answer session, allowing the audience to engage with the speaker directly. Attendees had the opportunity to seek clarification on specific concepts.

The session was concluded with a vote of Thanks proposed by Dr. Aparna Vyas, Program Head-Mathematics, Department of Sciences.

Approximation Theory and its Applications

The School of Sciences, Department of Sciences (Mathematics) at Manav Rachna University organized an expert talk on "Approximation Theory and its Applications" on April 25, 2024, from 12:20 PM onwards for UG and PG students and faculty. The speaker, Professor Gupta, was welcomed with a sapling and introduced by M.Sc. student Ms. Geetika, who outlined the talk's objectives. Prof. Gupta began with the Weierstrass Approximation Theorem and Korovkin's convergence result, then explored enhanced approximation methods using linear and iterative combinations to accelerate convergence. He discussed composition operators, quantum calculus, and interdisciplinary applications involving statistics, numerical techniques, special functions, and software like Mathematica and Matlab. He also highlighted special numbers such as Armstrong, Kaprekar, and Ramanujan squares. An interactive Q&A session followed, enabling direct engagement. Dr. Aparna Vyas, Program Head-Mathematics, concluded the event with a vote of thanks.

Employability Skills

On 08th November 2023 at 10:30 am in HF-03, Mr. Ayush Kumar Jha, Member Technical at Automatic Data Processing, Pune, addressed 10 undergraduate students and faculty from the Department of Mechanical Engineering. The alumni talk aimed to motivate students for recruiter preparation by enhancing technical skills and dispelling market myths. He shared industry insights, emphasizing early job research, skill development with mentors, strong academic performance, conceptual clarity, and publishing research to stand out. He debunked myths about mechanical engineers in software roles and stressed crafting impressive resumes. The session concluded with a Q&A, followed by Prof. (Dr.) Ajit's vote of thanks, wishing the speaker a bright future.

Career Opportunities in Mechanical Engineering

The School of Sciences, Department of Sciences (Mathematics) at Manav Rachna University organized an expert talk on "Approximation Theory and its Applications" on April 25, 2024, from 12:20 PM onwards for UG and PG students and faculty members. Professor Gupta was warmly welcomed with a sapling as a token of gratitude, and Ms. Geetika, an M.Sc. (Mathematics) student, introduced the speaker and the session's objectives. Prof. Gupta commenced with the Weierstrass Approximation Theorem and Korovkin's convergence result, then delved into advanced approximation methods using linear and iterative combinations to enhance convergence speed. He explored composition operators, quantum calculus, and interdisciplinary applications integrating statistics, numerical techniques, special functions, and tools like Mathematica and Matlab. Additionally, he discussed intriguing concepts such as Armstrong numbers, Kaprekar numbers, and Ramanujan squares. The lecture concluded with an engaging Q&A session, followed by a vote of thanks proposed by Dr. Aparna Vyas, Program Head-Mathematics.

Role of Flow Structures in Heat Transfer Enhancement

On 25th July 2023 at 11:30 am in HF-03, Dr. Naveen Sharma, Assistant Professor at the Department of Mechanical Engineering, Netaji Subhas University of Technology, New Delhi, addressed 15 participants. Holding a PhD in Thermal Engineering from IIT Roorkee (2018), M.Tech in CFD & HT from NIT Hamirpur (2011), and BE from MDU (2009), he has over four years of teaching and research experience with more than 40 international publications. Dr. Sharma shared insights on initiating research and highlighted optical techniques like Liquid Crystal Thermography and Particle Image Velocimetry in heat transfer studies. He discussed heat transfer enhancement in forced internal single-phase flow using additively manufactured internally finned channels under constant external heat flux, covering thermal resistance in laminar flow and convection resistance in turbulent flow. The session concluded with an interactive Q&A, followed by Prof. (Dr.) Ajit's vote of thanks, wishing Dr. Sharma a bright future.

WORKSHOPS & TRAININGS

Data Analytics Workshop using Python

The Data Analytics Workshop using Python was organized for MBA Business Analytics (BA) Sem IV students at Manav Rachna University (MRU) from January 24 to January 25, 2024. The workshop was conducted by Mr. Shiv Kumar Singh Pundhir, Assistant Professor at the School of Management and Commerce (SoMC), MRU. The objective of the workshop was to equip students with practical skills in data analytics using Python, a highly versatile and widely-used programming language in the field.The workshop was well-received by the participants, who appreciated the practical approach and the clarity of instruction provided by Mr. Shiv Kumar Singh Pundhir. The interactive sessions and hands-on practice were particularly highlighted as beneficial aspects of the workshop. The students left with a stronger foundation in data analytics and greater confidence in using Python for their academic and professional pursuits. In conclusion, the Data Analytics Workshop using Python was a successful initiative that significantly contributed to the students' learning and skill development in the domain of data analytics.

4 DAY BUSINESS SIMULATION WORKSHOP CONDUCTED AT SCHOOL OF MANAGEMENT & COMMERCE, MRU

The School of Management & Commerce, MRU, conducted a 4-day Business Simulation Workshop titled “Business Fundamentals- Carbon Fibre Bike Challenge” from 12th to 15th March 2024, licensed by US Marketplace Simulations. Thirty-five students in seven teams created virtual companies in a competitive bicycle industry introducing economical 3D-manufactured carbon fibre bikes. Over four quarters simulating a year, participants handled escalating decisions: organizing firms (Q1), tactical choices in pricing, production, marketing, and cash flow (Q2), strategic SWOT analysis and market expansion (Q3), and future investments with venture funding (Q4). Held daily from 10 am to 4 pm, the workshop fostered analytical thinking, leadership, teamwork, and integrated decision-making using the Balanced Scorecard. One all-girls team from K L Mehta Dayanand College, Faridabad, participated enthusiastically, seeking MRU IIC support for future entrepreneurship. Team-building exercises enhanced coordination. Dr Pragati Chauhan and Dr Bindu Agrawal served as resource persons and coaches.

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EVENT REPORT

School Visit for ESDP & POCSO

On January 18, 2024, Manav Rachna Centre for Peace and Sustainability visited MSC School, Anangpur Village, Faridabad, engaging 200 students in Education for Sustainability Program (ESDP) and POCSO awareness. Dr. Pooja led an interactive session on sustainable development, distributing eco-friendly notebooks to promote environmental responsibility and instill lifelong eco-conscious habits. Concurrently, Dr. Sumbul conducted the "Kuch Kehna Hai" project, sensitizing students on good touch, bad touch, and POCSO provisions to foster safety awareness. Student coordinators Diya and Ipshita ensured seamless execution, while Ms. Avni orchestrated meticulous planning. Mr. Mandeep and Mr. Pradeep managed transportation and discipline. The enthusiastic participation underscored the event's impact in nurturing informed, responsible citizenship from an early age, blending sustainability education with child protection.

Insightful Session for the Students

Teaching the students

Animal Shelter Visit

Date: August 2, 2024
Venue: Shree Narayan Gaushala, Faridabad
No. of participants: 8

Purpose of the Event:

The Gaushala visit had multiple objectives, all aligned with the mission of MRCPS and Vertical Sadbhav. The primary objective was to extend support and compassion to the cows by providing them with nutritious fodder, promoting their welfare and well-being. Additionally, the visit aimed to raise awareness among participants about the importance of animal welfare and the compassionate treatment of all living beings, while also fostering community engagement by providing volunteers with an opportunity to interact with the local community, caretakers, and the cows themselves.

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About the Event:

On the 8th of February, volunteers from Manav Rachna's Centre for Peace and Sustainability (MRCPS), Sadbhav, embarked on a noble journey to Shree Narayan Gaushala for a day of service and harmony. The visit aimed to provide care and kindness to the gentle creatures residing in the Gaushala.

The significance of the Gaushala visit extends beyond a mere act of service. It embodies the core values of compassion, empathy, and responsibility towards all living beings. By providing care and nourishment to the cows, volunteers not only contributed to their immediate well- being but also reinforced the importance of animal welfare in our society. The visit served as an educational platform, offering insights into the daily operations of the Gaushala and highlighting the interconnectedness of all living beings in our ecosystem. Furthermore, it fostered a sense of community engagement, bringing together volunteers, caretakers, and the local community in a shared effort to promote harmony and compassion.

The Gaushala visit organized by MRCPS, Sadbhav was a resounding success, achieving its objectives of promoting animal welfare, raising awareness, and fostering community engagement. Through collective efforts, volunteers provided nourishment and care to the cows, embodying the essence of kindness and compassion. As we reflect on this enriching experience, let us continue to support initiatives aimed at promoting the welfare of animals and fostering harmony in our society.

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FACULTY DEVELOPMENT PROGRAM (FDP)

Report on FDP on 'Wireless Networks'

The Department of Computer Science & Technology, in collaboration with the National Institute of Technical Teachers Training & Research (NITTTR), Chandigarh, successfully organized a five-day Faculty Development Programme (FDP) on "Wireless Network" from 12th to 16th February 2024. Conducted in ICT-based online mode, the program was held in Room No-9, Second Floor, H Block, from 10:00 AM to 4:00 PM daily. The FDP aimed to enhance faculty expertise in emerging wireless technologies through in-depth theoretical insights, practical demonstrations, and hands-on training delivered by renowned scientists, academicians, and industry professionals.

Day 1 commenced with a keynote by Prof. Ramakrishnan on wireless communication systems, highlighting their transformative impact on connectivity through electromagnetic wave transmission, offering mobility, scalability, and flexibility. He discussed rapid technological advancements reshaping modern communication. Er. S.K. Chopra, Sr. GM (O&M), BBNL Punjab, traced the evolution of mobile networks from 2G to 5G, emphasizing performance leaps in speed, latency, and capacity. Dr. Sujata Pal, Assistant Professor, IIT Ropar, presented ongoing research, unveiling cutting-edge developments and future directions in wireless networks.

Day 2 focused on practical and emerging paradigms. Sh. Vipin Gupta, Director, U-Net Solution, introduced Software Defined Networking (SDN), demonstrating its role in dynamic control of wireless devices through hands-on software labs. Dr. Garima Saini, NITTTR Chandigarh, elaborated on 5G New Radio (NR), the 3GPP-standardized air interface enabling diverse use cases with superior efficiency, spectral performance, and low latency compared to legacy systems.

Day 3 delved into decentralized and sensor-based networks. Dr. C. Ramakrishna explained Wireless Ad hoc Networks (WANETs)—self-configuring, infrastructure-less systems with dynamic topology, limited range, and adaptive routing protocols. Dr. Dilip Kumar, SLIET Longowal, detailed energy-efficient routing protocols for Wireless Sensor Networks (WSNs), crucial for battery-constrained nodes. He covered LEACH, TEEN, and SEP protocols, optimizing energy consumption and network lifetime. Mr. Sandeep Singhai, CSIR-AMPRI, Bhopal, concluded with a live Zigbee demonstration, showcasing low-power, short-range communication applications.

Day 4 explored intelligent and short-range technologies. Dr. Rishu Chhabra, Chitkara University, discussed Intelligent Transportation Systems (ITS), illustrating how wireless networks enhance traffic management, safety, and efficiency. He demonstrated simulation tools SUMO and NS-3,

widely used in research modeling. Mr. Sandeep Singhai returned to present Bluetooth technology—its architecture, versions, and pivotal role in personal area networks—through practical Bluetooth-based wireless demos.

Day 5 addressed network security and diagnostics. Dr. Nilesh Patil, Government Polytechnic, Maharashtra, conducted a session on troubleshooting network anomalies using Wireshark, providing step-by-step packet analysis techniques. He also explored DDoS attack motivations, defense challenges, and emerging research strategies to safeguard wireless infrastructures.

The FDP concluded with a valedictory session, where participants shared feedback, reflecting high satisfaction with the content depth, practical exposure, and expert interactions. Certificates were distributed, followed by a group photograph. The program significantly enriched faculty understanding of wireless ecosystems—from foundational concepts to advanced 5G, IoT, and security paradigms—equipping them to integrate cutting-edge knowledge into teaching and research. The blend of theory, industry insights, and hands-on sessions fostered a forward-looking perspective on the future of wireless communication technologies.

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Manav Rachna University

Report on
Faculty Development Program
on
"Internet of Things"
SDG 9- Industry , Innovation and Infrastructure

The CST and ECE departments of Manav Rachna University, in collaboration with ICT Academy, recently organized a one-week Faculty Development Program (FDP) on the theme of "Internet of Things." The program, held from November 28th to December 2nd, 2023, featured distinguished trainers: Dr. K. Subramanian, Technical Lead at Enthu Technology Solutions India Pvt. Ltd., and Dr. Jagadeswaran R., Technical Engineer at Enthu Technology Solutions India Pvt. Ltd. Thirty two enthusiastic participants actively engaged in this FDP, gaining valuable insights and knowledge in the dynamic field of Internet of Things.

This Faculty Development Program (FDP) was designed to provide participants with fundamental insights into the applications of the Internet of Things (IoT). It served as a high-level, career-oriented training program, emphasizing a hands-on approach to impart comprehensive experience with cutting-edge technologies. The primary objective was to equip participants with a solid foundation in IoT applications, ensuring a practical and skill-oriented learning experience.

The Objectives of the FDP were:

• To introduce the fundamental architecture of Microcontrollers

• To Learn the interface of peripheral devices(Sensors/Actuators)

• To explore the integration between Microcontrollers with the IoT platform

• Understand the concept of Wireless Communication Protocols for IoT Applications (Wi-Fi, Bluetooth, BLE)

• Understand the concept of MQTT, HTTP Protocols

The FDP started with an inaugural event on 28th November 2023 in the I block auditorium. The guests of the event were Mr. Abhinandan Kumar pandey, State Head, Government and Corporate Initiatives, ICT Academy, Mr Amit Vishvas, Relationship manager, ICT Academy. All the sessions were then organized in LT10.

The Faculty Development Program on IoT provided participants with a comprehensive understanding of IoT concepts, architectures, and practical skills in microcontroller programming and sensor interfacing. The program's interactive sessions and hands-on workshops facilitated active learning and engagement among

participants, enabling them to incorporate IoT technologies into their teaching and research endeavors effectively. Participants expressed satisfaction with the content coverage, practical sessions, and the overall organization of the program. They appreciated the opportunity to learn new skills and explore emerging technologies in the field of IoT.The FDP ended on 2nd December 2023 with a valedictory session, marking the successful culmination of the program.

Some Glimpse of the Event:

Inauguration of the Faculty Development Development

Expert giving valuable insights and knowledge in the dynamic field of Internet of Things

Participants deeply engaged in the session

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Faculty Development Program Report

School of Management and Commerce, MRU organized a one week FDP on Research Methodology from February 27- March 02. 2024.

Details of the FDP are:

Date: February 27th February -2nd March , 2024

Mode: Hybrid Mode

Resource Persons: Dr. Monica Arora - Amity University ,Gurugram, Dr.Archana Bhatia DAV Centenary College,Faridabad , Dr.Divesh Kumar – MNIT,Jaipur, Dr. Deepak K. Verma- MNIT,Jaipur

Participants: 65 Research Scholars and Faculty members

Objectives :

- To provide an understanding of the foundation of research, literature review, scaling and sampling techniques.
- To provide an understanding of Descriptive analytics and inferential statistics.
- How to use AMOS and Smart PLS to analyse data effectively.

The FDP was conducted over five days, each focused on different aspects of research methodology and its usage. It started with welcome address by Prof. (Dr.) Parul Jhajharia, Dean-FMC.

Day 1- Dr. Monica Arora, Professor, Amity Business School, Gurugram

Dr. Monika Arora provided guidance on how to structure an introduction, what to focus on and guided participants on how to identify and highlight the unique propositions in their research papers. This involved understanding the significance of their research and presenting it in a compelling and distinctive manner.Participants had the opportunity to share their research ideas and receive feedback and suggestions. These topics aimed to enhance participants' research skills and improve their ability to communicate their ideas effectively.

Day 2- Dr.Archana Bhatia, Head and Associate Professor, DAV Centenary College, Faridabad

The second day of the FDP, focused on key aspects of research methodology. Dr.Archana Bhatia led session on questionnaire development, sampling, measurement, and scaling.: Participants learned about the process of developing effective questionnaires for research purposes. This included understanding the importance of clear and concise questions, proper response options, and the overall structure of the questionnaire. The resource person also provided insights into different sampling techniques used in research. Participants learned about probability and non-probability sampling methods, their advantages, and when to use each approach based on the research objectives.

The session covered the importance of selecting appropriate measurement scales for research variables. Participants gained an understanding of different scaling techniques, such as Likert scales, semantic differential scales, and more. The focus was on ensuring reliable and valid measurement of variables.These topics aimed to equip participants with the necessary knowledge and skills to design robust research studies.

Day 3- Dr.Divesh Kumar, Associate Professor, DMS MNIT, Jaipur

Dr.Divesh Kumar led an insightful session on Confirmatory Factor Analysis (CFA) within the context of Structural Equation Modelling (SEM) using the AMOS software.Participants gained practical knowledge on how to set up and run CB SEM models, exploring the nuances of measurement models and latent variables.The session included a thorough discussion of results obtained from participants' individual SEM analyses.

He also provided constructive feedback on model outcomes, encouraging participants to critically evaluate their findings and interpret the statistical outputs effectively.Dr. Kumar elucidated various indices used for assessing the goodness-of-fit, emphasizing the importance of selecting appropriate fit indices based on the research context.Practical demonstrations were given to help participants comprehend how to interpret and improve model fit.

Day 4 - Dr. Deepak K. Verma, Head and Associate Professor, DMS MNIT, Jaipur

Dr. Deepak K. Verma provided an extensive overview of Structural Equation Modeling (SEM) and its diverse applications in research.The session delved into the fundamental concepts of latent constructs, manifest variables, and path coefficients within the SEM framework.He also discussed the distinctions between formative and reflective models, offering clarity on when to use each type and the implications for model interpretation.Practical examples were provided to reinforce understanding.

The day included in-depth discussions on measurement and structural models, focusing on their roles in SEM.The session included a practical introduction to Smart PLS, exploring its interface and various analytical options.Participants learned how to navigate the software for efficient PLS-SEM modelling. They also gained hands-on experience in organizing and managing data for PLS-SEM.

Day 5 - Dr. Deepak K. Verma, Head and Associate Professor, DMS MNIT, Jaipur

Dr. Deepak K. Verma conducted an insightful session on the evaluation of PLS-SEM models.Participants learned about various criteria and metrics for assessing model fit, reliability, and validity in the context of PLS-SEM.Dr.Verma provided theoretical foundations and practical examples on how to explore and interpret mediating effects in their models.The FDP concluded with an in-depth exploration of moderation and interaction analysis in PLS-SEM.Participants gained insights into the role of moderators, understanding how to assess and interpret interaction effects in their research.

The Faculty Development Program was conceptualised and coordinated for all 5days by Dr.Yogita Sharma Prof -SoMC along with Ms Mona A Research Scholar .We highly appreciate their sincere efforts in ensuring this FDP to be a great success in terms of participation and Leanings.

We have received positive Feedback from all Research Scholars and the Faculties that all sessions had been very insightful with such Powerful ,Knowledgeable Resource Persons and have requested to conduct more such sessions in the future in order to ensure a smooth research Journey.

Outcomes

- Participants were able to enhance their research skills and improve their ability to communicate their ideas effectively.
- Participants had the opportunity to dive deeper into the topics of questionnaire development, sampling, measurement, and scaling.
- Participants gained Comprehensive Understanding of SEM Concepts.
- They also had Hands-on Experience with AMOS and Smart PLSto apply theoretical knowledge, enhancing their proficiency in setting up and analysing SEM and PLS-SEM models.

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4 QUALITY EDUCATION

REPORT ON

"TWO DAYS FDP CONDUCTED ON OBE & ATTAINMENT"

School of Management & Commerce organized a workshop on Outcome Based Education [OBE] & PO, PSO attainment [Direct & Indirect] manually on 14th-15thMay 2024. The FDP was purely in workshop mode. Target participants were faculty members of SMC.

The resource person was Prof. (Dr.) Sunil Roy , HOD/Professor, SoMC at MRU.

WORKSHOP OBJECTIVES

1. To ensure that all faculty members understand the OBE, its evolution & implementation process.
2. To understand & calculate PO and PSO attainment manually for the graduated batch 2020-23. It included Direct and Indirect attainment.

ACTIVITY OUTCOMES

1. List of students 2020-23 in FAA along with their result of 1st semester was given to the participants & first year attainment calculation was demonstrated. Later on, the second year result was shared & participants did it on their own. They were given an assignment to complete for the remaining years.
2. Indirect attainment of Employer and Alumni was calculated with a weightage of 5%. They were asked to do it for the remaining two components viz program exit survey & Extracurricular/ co curricular activities.
3. Total attainment (Direct & Indirect) was demonstrated along with a comparative graphical chart depicting comparison with previous batch attainment. Weaker POs attainments were identified and Action proposed for an improvement was shown.
4. A task was given that 21-24 graduating batch [after the result is declared] to be made & a comparison should be made with 2020-23 result.

The participants found the workshop to be useful & appreciated the clarity shared by the HOD - Prof. (Dr.) Sunil Roy.

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4 QUALITY EDUCATION

REPORT ON "FDP Conducted on BIBLIOGRAPHIC ANALYSIS"

Date: 14.05.2024, Tuesday

Venue: IF03

Time: 1 PM-4 PM

School of Management & Commerce organized a workshop on Bibliographic analysis using R-Studio free software & VOS Viewer on 14th May 2024.

The target participants were faculty members of SoMC & Full-time and Part-time PhD Scholars at SoMC.

The resource person was Dr. Geetanjali Batra, Associate Professor of ABVSME, JNU, New Delhi.

WORKSHOP OBJECTIVES

1. To ensure that all faculty members and research scholars conduct a bibliographic analysis for a data-sheet in the workshop &submit a paper in one month to be sent for publication in reputed journals.
2. To make the participants aware of bibliographic analysis & Systematic literature review & the process to be followed to conduct this analysis.

OUTCOMES

1. All the participants will submit the draft of the bibliographic analysis within ONE Month to be reviewed by the resource person.
2. All the PhD Scholars will conduct two analyses related to their topic - viz bibliographic Analysis & systematic literature review before their synopsis approval.

Dr. Geetanjali Batra was felicitated by the Dean and HOD and appreciated for the in-depth knowledge shared with our faculty members and the research scholars with respect to the secondary research. Faculty members were highly appreciative of this workshop as it gave them insightful research opportunities in the Scopus portal which will support them in achieving their research targets.

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4 QUALITY EDUCATION

Students & Faculty Projects

Face Recognition-Based Attendance System

Abstract

This project aims to develop a face recognition-based attendance system that automates the process of marking attendance using real-time video feed and face recognition technology. The timeline is structured into four weeks, each dedicated to specific tasks, ensuring a comprehensive approach to system development.

Introduction

In educational institutions and workplaces, attendance tracking is a critical but time-consuming task. Traditional methods often involve manual entry, leading to inefficiencies and inaccuracies. With advancements in computer vision and machine learning, it is now possible to automate attendance tracking through face recognition technology. This project focuses on building a system that captures video from a webcam, detects and recognizes faces, and logs attendance in real-time. The system also generates visual reports of attendance statistics, providing a comprehensive solution for attendance management.

1. Project Planning and Setup

1.1 Project Planning

Objective Setting: Defined clear project goals, including automated attendance tracking, real-time face recognition, and attendance reporting.

Scope Definition: Determined the system features and functionalities, such as handling multiple individuals, generating attendance logs, and creating visual reports.

Resource Identification: Listed the required software (Python, OpenCV, face_recognition library, Matplotlib) and hardware (webcam, computer).

1.2 Environment Setup

Software Installation: Installed Python and necessary libraries (opencv-python, face_recognition, matplotlib).

Development Environment Configuration: Set up IDE (e.g., VSCode) and version control (e.g., Git). Ensure webcam access and test the setup with simple scripts.

Verification: Run test scripts to ensure all libraries are correctly installed and the webcam is accessible.

1.3 Dataset Collection

Image Gathering: Collected images of individuals to be recognized, ensuring a variety of angles and lighting conditions.

Dataset Organization: Created structured directories for each individual, maintaining consistent naming conventions.

Quality Check: Reviewed the images for clarity and suitability for face recognition, ensuring high-quality data for encoding.

2. Data Preprocessing

2.1 Image Preprocessing

Resizing and Cropping: Standardized image sizes and crop to focus on faces, removing unnecessary background elements.

Color Conversion: Converted images to RGB format as required by the face_recognition library. Apply grayscale if beneficial for face detection.

Noise Reduction: Applied filters to enhance image quality and reduce noise, such as Gaussian blur.

2.2 Face Encoding

Face Detection: Used the face_recognition library to detect faces in the images and ensure accuracy.

Generate Encodings: Created and store face encodings for each individual, which will be used for recognition in real-time video feed.

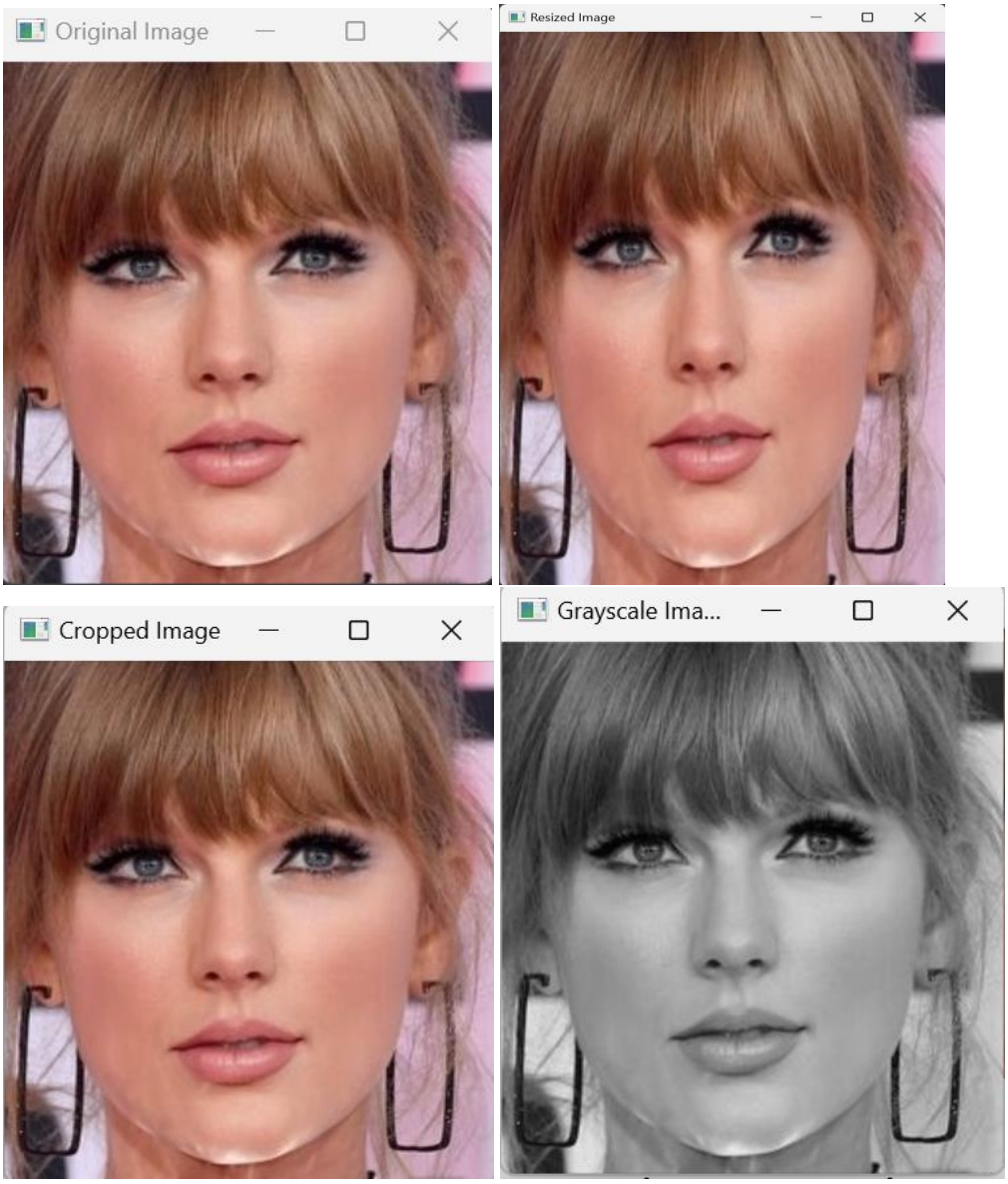
Storage and Labeling: Saved the face encodings in a structured format and label them with corresponding names for easy identification.

2.3 Data Augmentation

Image Augmentation: Applied transformations like rotation, scaling, and flipping to increase dataset diversity.

Update Encodings: Generated face encodings for augmented images and update the dataset.

Quality Verification: Checked the quality and consistency of augmented data and its impact on face recognition accuracy.



3. System Implementation

3.1 Face Recognition Module

Webcam Feed Setup: Initialized and tested video capture using OpenCV to ensure a smooth live feed.

Real-Time Face Detection: Implemented and optimized face detection in the video feed for quick and accurate performance.

Face Recognition Integration: Compared detected faces with stored face encodings and label recognized faces in real-time.

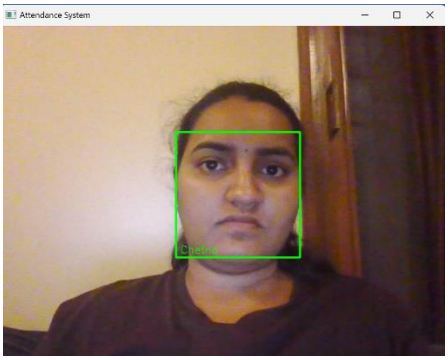
3.2 Attendance Logging

CSV Logging System: Developed a mechanism to log attendance in CSV files, including date and time stamps for each entry.

Real-Time Logging: Ensured that recognized faces are logged in real-time with accurate timestamps.

Duplicate Handling: Implemented logic to avoid multiple entries for the same individual during a session, such as a cooldown period or flags.

4. Testing, Evaluation, and Deployment



4.1 System Testing

Unit Testing: Tested individual modules like face detection, recognition, and logging to validate their functionality.

Integration Testing: Assessed the complete system, ensuring seamless interaction between all components.

Performance Testing: Evaluated the system under different conditions, such as varying lighting and angles, and optimize for performance.

4.2 Evaluation and Refinement

Analyze Results: Reviewed the system's accuracy and reliability, comparing results with benchmarks.

System Refinement: Implemented improvements based on evaluation, focusing on accuracy, speed, and usability.

Documentation: Prepared detailed documentation, including user manuals and technical specifications for system setup and maintenance.

4.3 Deployment and Reporting

System Deployment: Installed and configure the system for production use, ensuring all components are fully functional.

Attendance Reports: Automated the generation of visual reports (graphs, charts) summarizing attendance statistics.

Name	Status	Time
Chetna	Present	22:58:42
Taylor Swi	Present	22:59:30
Elon Musk	Present	22:59:41
Emma Sto	Present	22:59:47
Ronaldo	Present	23:00:24

Final Review and Report: Conducted a project review and compiled a comprehensive report covering the development process, challenges, outcomes, and future recommendations.

Conclusion

The face recognition-based attendance system project provides an innovative solution for automating attendance tracking, leveraging advanced computer vision techniques. The structured timeline ensures a systematic approach to development, from planning and setup to final deployment. By integrating real-time face recognition and robust data logging, this system offers a significant improvement over traditional methods, enhancing efficiency and accuracy. The project's success lies in its ability to streamline attendance processes, reduce manual effort, and provide reliable and detailed attendance reports. Future enhancements can further expand its capabilities, making it a versatile tool for various applications in education and beyond.

OCULAR DISEASE DETECTION USING TRANSFER LEARNING AND CUSTOM CNN MODEL

I. Team Details

Name	Roll No	Class	Email Id	Contact
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Liza Kansal	2K21CSUN04017	B Tech CSE AIML 7A	lizakansal28052003@gmail.com	9953956800

II. Supervisor Details

Name	Designation	Department Name
Dr. Parneeta Dhaliwal	Professor	Computer Science and Technology

III. Introduction

Cataracts are a common and significant cause of vision impairment globally, contributing to nearly half of the world's cases of blindness. This condition arises when the lens of the eye becomes cloudy due to protein accumulation or other structural changes, resulting in blurred or hazy vision. While cataracts predominantly affect older adults, they can also develop due to factors like diabetes, eye injuries, or genetic predispositions. Early detection and timely treatment are crucial, as cataracts are highly treatable through surgical intervention. However, the diagnostic process remains challenging in resource-limited settings, where access to trained ophthalmologists is often scarce.

The advent of digital imaging techniques, such as fundus photography, has revolutionized ocular diagnostics. Fundus photography captures high-resolution images of the retina, optic nerve, macula, and lens, providing valuable insights into ocular health. These images play a crucial role in detecting cataracts and other ocular diseases. When combined with artificial intelligence (AI) and machine learning (ML) algorithms, fundus imaging enables the development of automated systems capable of diagnosing cataracts with precision. Such systems hold immense potential to bridge gaps in healthcare delivery, particularly in remote and underserved regions.

This project leverages the use of a dataset titled, 'Retina_dataset', a comprehensive collection of labeled fundus images and diagnostic notes, to train an AI model for cataract prediction. The dataset is annotated by trained professionals under rigorous quality control measures, ensuring the reliability of its labels. It includes 4 distinct categories of ocular conditions: Normal (N), Glaucoma (G), Cataract (C), and Retina diseases (R).

The proposed system combines fundus image analysis with text-based diagnostic data to identify cataracts more effectively. By focusing on a subset of cases where the presence of pathology and the affected eye are definitively annotated, the model aims to achieve high diagnostic precision. This approach not only enhances the reliability of predictions but also addresses the critical need for accessible, automated detection. Ultimately, the system aspires to support clinicians by streamlining the diagnostic process, reducing the burden of manual screening, and enabling timely interventions that can significantly improve patient outcomes.

By advancing the application of AI in healthcare, this project contributes to the broader effort to combat preventable blindness. The integration of innovative technology with clinical expertise exemplifies a step forward in ensuring equitable access to high-quality eye care for all populations.

IV. SDG

The project aligns with the following **United Nations Sustainable Development Goals (SDGs):**

1. SDG 3: Good Health and Well-Being

- Achieve universal health coverage and access to quality healthcare. The project enables early detection of cataracts, preventing vision loss and ensuring timely medical intervention.
- Strengthen early warning and risk reduction in healthcare. The AI-based system contributes to the early diagnosis of eye diseases, enhancing healthcare outcomes.

2. SDG 4: Quality Education

- Ensure learners acquire knowledge of sustainable development and innovative technologies. The project provides a case study for students and professionals in AI, fostering learning in healthcare technology.

3. SDG 9: Industry, Innovation, and Infrastructure

- Enhance scientific research and technological innovation. The project employs advanced AI technologies, fostering innovation in the medical field.
- Increase access to information and communication technologies. The scalability of the system ensures it can be integrated into portable devices, improving accessibility in remote areas.

V. Scope

This project aims to develop an AI-based system for automated ocular disease detection using fundus images and diagnostic notes. By leveraging the Retinal dataset, the model
focuses on accurate identification of cataracts among various ocular diseases. The system is designed to enhance accessibility to early diagnosis, support clinicians in decision-making, and reduce the burden of preventable blindness.

1. Automated Detection of Cataracts: The primary goal is to build a machine learning model that can accurately detect cataracts from fundus images. By analyzing features such as lens opacities, the model can identify the presence of cataracts without manual intervention. Combining imaging data with diagnostic notes improves the diagnostic confidence and accuracy of predictions.

2. Utilization of Dataset: The dataset provides a rich collection of fundus images annotated for various ocular conditions. This ensures the availability of high-quality training data. By focusing on cases specifically labeled as cataracts, the project utilizes this resource effectively to build a robust model.

3. Focused Data Selection: To improve the precision of the model, the project selects a subset of the dataset where cataracts are definitively diagnosed. This subset includes detailed diagnostic notes that specify which eye is affected, enabling the system to localize the condition and provide more accurate results.

4. Enhanced Healthcare Accessibility: Automated detection systems address the shortage of ophthalmologists in remote and underserved areas. By deploying the model through telemedicine platforms or portable diagnostic devices, the project can make cataract screening accessible to populations with limited healthcare infrastructure.

5. Clinical Support and Integration: The tool is designed to assist healthcare providers by prioritizing patients who require further examination or surgical intervention. Integration with electronic health record (EHR) systems or telemedicine platforms ensures seamless adoption in clinical workflows, reducing the burden on medical professionals.

6. Advancing Research: This project contributes to the growing field of AI in healthcare by exploring the integration of image and text data for medical diagnostics. Insights gained can extend to developing AI systems for other ocular diseases like glaucoma or diabetic retinopathy, paving the way for comprehensive ocular disease detection systems.

7. Addressing Global Blindness: Cataracts are the leading cause of reversible blindness worldwide. Early detection and timely treatment can significantly reduce the prevalence of blindness caused by cataracts. This project aligns with global health initiatives aimed at combating avoidable blindness by providing a scalable, automated, and cost-effective solution.

VI. Requirement, Specification, and Methodology

Requirement

1. Problem Statement: The primary objective of this project is to develop an AI-based system for the detection of cataracts using the retinal dataset. The system aims to identify cataracts with high precision by analyzing both fundus images and associated diagnostic notes. By leveraging advanced machine learning techniques, the project seeks to automate
the diagnosis process, reduce dependency on manual screening, and improve accessibility to eye care, particularly in underserved areas.

2. Functional Requirements: To achieve this objective, the system employs **transfer learning** as

a key component for feature extraction from fundus images. Transfer learning leverages pre-trained convolutional neural networks (CNNs) to recognize patterns and features relevant to cataracts, significantly improving performance and reducing training time. Additionally, **autoencoders** are utilized to pre-process and denoise input images, ensuring that the model receives high-quality data for training and prediction. The final model is designed to classify images into two categories: "Cataract" and "Non-Cataract," delivering precise results that align with clinical expectations.

3. Non-Functional Requirements: For practical implementation, the system is designed with scalability in mind, enabling seamless integration into healthcare applications and telemedicine platforms. Low computational cost is a critical consideration to ensure the system can be deployed on portable devices like smartphones or handheld diagnostic tools, making it accessible to remote or underserved regions. Robust performance is also a priority, with the model trained on a balanced dataset and optimized to handle noisy or low-quality images effectively, ensuring reliability in real-world scenarios.

4. Data Requirements: The retinal dataset serves as the foundational resource for this project, offering a diverse collection of labeled fundus images. A subset of this dataset, specifically focusing on cataracts, is selected to train and validate the model. This subset includes diagnostic notes, which are integrated into the analysis to provide a holistic understanding of each case and to cross-validate the model's predictions. The combination of image-based and text-based data enhances the system's accuracy and enables it to deliver more reliable diagnostic outcomes.

Specification

1. Hardware and Software: To effectively develop and train the AI-based cataract detection system, the project requires a combination of advanced hardware and software resources. High-performance GPUs, such as the NVIDIA RTX 3080 or equivalent, are essential for handling the computational demands of training deep learning models on large datasets. These GPUs significantly reduce training time and improve efficiency. On the software side, the project relies on Python and its powerful libraries, including TensorFlow and PyTorch for building and training models, OpenCV for image processing, and scikit-learn for implementing and evaluating machine learning techniques.

2. Model Architecture: The system employs a robust architecture that integrates transfer learning and autoencoders to maximize performance. Pre-trained CNNs such as ResNet, VGG16, or EfficientNet are used to extract features from fundus images, leveraging their ability to recognize complex patterns from prior training on extensive datasets. This reduces the need for training from scratch and improves model accuracy. Autoencoders are utilized to denoise and enhance input images, ensuring that the classifier receives clean and meaningful representations. The final classification head comprises dense layers, which process the extracted features to predict binary outcomes: "Cataract" or "Non-Cataract."

3. Input and Output: The system accepts two primary inputs: pre-processed fundus images and corresponding diagnostic notes. The images provide visual evidence of ocular conditions, while the diagnostic notes supplement this with textual insights to cross-validate and refine predictions. The output is a binary classification indicating whether cataracts are present or absent, along with confidence scores that reflect the certainty of the model's prediction.

4. Evaluation Metrics: The performance of the system is assessed using a comprehensive set of evaluation metrics to ensure its reliability and robustness. Accuracy measures the overall correctness of predictions, while precision evaluates the model's ability to avoid false positives. Recall assesses its sensitivity to true positives, and the F1-score provides a balanced metric by combining precision and recall. The AUC-ROC (Area Under the Receiver Operating Characteristic Curve) is also used to evaluate the model's ability to distinguish between classes across various decision thresholds, ensuring its effectiveness in diverse scenarios.

Methodology

1. Data Pre-Processing: The first step in preparing the data for training involves normalizing the fundus images to ensure consistent pixel values, which helps improve the convergence during model training. The images are then resized to a consistent dimension (e.g., 224x224 pixels) that is compatible with pre-trained convolutional neural networks (CNNs) like ResNet or VGG16. This resizing ensures that all images have the same input size, which is critical for batch processing and model consistency. Additionally, autoencoders are applied to denoise the images, removing any unwanted noise or distortions that might hinder the model's performance. The autoencoders work by learning a compressed representation of the images, thereby emphasizing the key features relevant to cataract detection. Alongside the images, diagnostic notes are tokenized and vectorized to transform the textual data into a format suitable for analysis. This allows the system to process both the visual and textual data in parallel, leveraging complementary information for more accurate predictions.

2. Model Training with Transfer Learning: After pre-processing the data, the next step is to train the model using transfer learning. A pre-trained CNN such as ResNet, VGG16, or EfficientNet is chosen because these models have already been trained on large-scale datasets and have learned to extract useful features. By fine-tuning the pre-trained model, we replace its top layers with a custom classifier tailored for cataract detection. This classifier can adapt to the specific features and nuances of cataract-related images. The pre-trained weights are used to retain learned features from the large dataset, which enhances the model's ability to generalize to unseen data. This process reduces the training time significantly, as the model does not have to start from scratch and can build upon the knowledge embedded in the pre-trained model.

3. Training and Validation: Once the model architecture is defined and the data is pre-processed, the dataset is split into training, validation, and test sets. This allows for proper evaluation and generalization of the model. Data augmentation techniques, such as random rotations, flips, and

shifts, are applied to artificially expand the dataset and prevent overfitting by exposing the model to varied data. During training, the performance is monitored using validation metrics like accuracy, precision, recall, and F1-score. Early
stopping is employed as a regularization technique to prevent overfitting; the training process is halted if the model's performance on the validation set starts to degrade. These measures ensure that the model remains robust and generalizable while avoiding the pitfalls of overfitting to the training data.

VII. Timeline

1. Research Proposal and Planning:

- Define the scope and objectives for cataract detection using eye fundus images and diagnostic notes.
- Conduct a literature review on existing methods for cataract detection with deep learning and transfer learning.
- Formulate research questions and define the research methodology (dataset, model, evaluation).

2. Data Collection and Preprocessing:

- Gather the retinal dataset (fundus images).
- Preprocess the fundus images (resize, normalize, and denoise using autoencoders). - Tokenize and vectorize the diagnostic notes for analysis.

3. Literature Review:

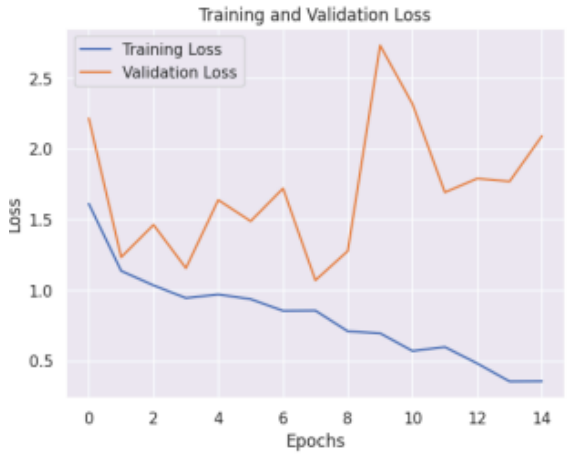
- Review existing studies on cataract detection using CNNs and transfer learning. - Summarize methods for integrating image and text data in medical image analysis. - Identify gaps in current methods and opportunities for improvement.

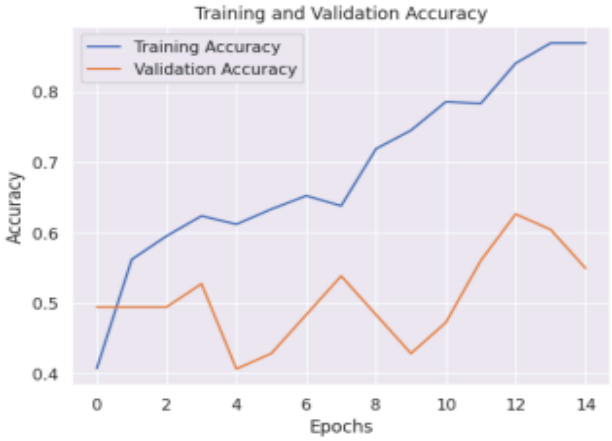
4. Model Selection and Development:

- Choose transfer learning models (e.g., ResNet, VGG16) for feature extraction from fundus images.
- Use autoencoders to enhance image quality and remove noise.
- Fine-tune a custom classifier for cataract detection using both image and text data.

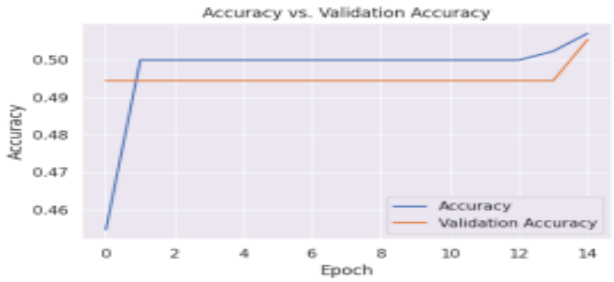
5. Evaluation and Validation:

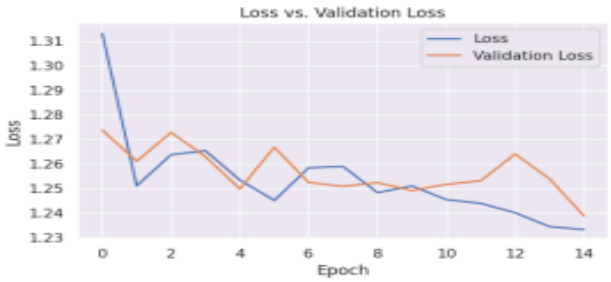
- Evaluate model performance using accuracy, precision, recall, F1-score, and AUC-ROC.
- Apply cross-validation and split the dataset into training, validation, and test sets. - Compare the model's performance with baseline methods and validate on unseen data.





Training vs Validation Accuracy and Loss InceptionV3 based Model Architecture





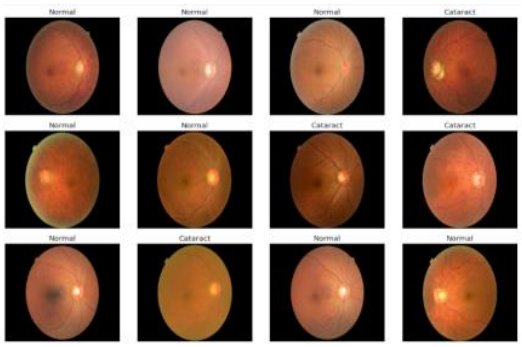
Training vs Validation Accuracy and Loss

CNN Model

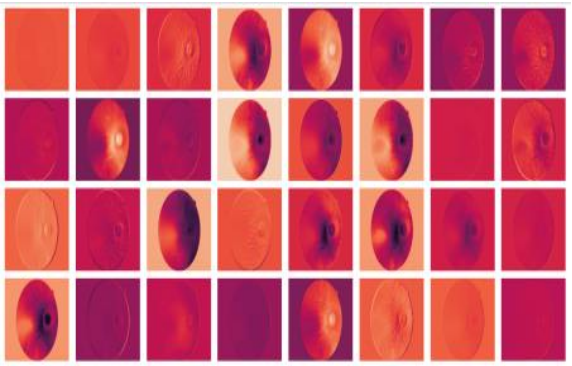
6. Analysis and Discussion:

- Analyze model performance, including strengths and limitations.
- Compare results with other cataract detection systems.
- Propose future enhancements such as integrating additional data or using advanced techniques like reinforcement learning.

VIII. Screenshots



IX.



Future Enhancement

In the future, this project can be expanded to include the detection of additional ocular diseases such as diabetic retinopathy, and macular degeneration. By leveraging the full scope of the retinal dataset, the system can evolve into a comprehensive diagnostic tool capable of identifying multiple eye conditions from a single fundus image. Incorporating advanced deep learning architectures, optimized for medical imaging, can further enhance the accuracy and scalability of the system.

Another promising enhancement involves integrating this diagnostic tool with telemedicine platforms and portable imaging devices. This integration would enable remote screenings in underserved areas, where access to specialized ophthalmologists is limited. By offering real-time analysis and reporting, the system could support community-level eye health programs and streamline referrals for patients requiring urgent care. Additionally, incorporating user-friendly interfaces and mobile app compatibility would improve accessibility for both healthcare providers and patients.

Future iterations of the project could also include personalized recommendations for treatment and follow-up care. By integrating patient demographic data and medical histories, the system could provide tailored suggestions for management, such as surgery or lifestyle adjustments. Furthermore, the tool could incorporate explainability features to highlight regions of interest in fundus images, increasing trust and usability among clinicians. These advancements would not only expand the scope of the system but also solidify its role as an essential aid in modern ophthalmology.

X. Outcomes

1. Accurate Cataract Detection: The project delivers an AI model capable of accurately detecting cataracts using fundus images and diagnostic notes. The integration of multimodal data ensures improved precision, reducing the likelihood of misdiagnosis.

2. Streamlined Diagnostic Process: By automating cataract detection, the system reduces the burden on healthcare professionals, enabling quicker and more efficient screening processes. This allows clinicians to focus on critical cases and manage their time effectively.

3. Enhanced Accessibility to Eye Care: The project provides a cost-effective diagnostic solution, particularly benefiting remote or underserved regions with limited access to specialized ophthalmologists. This contributes to equitable healthcare delivery.

4. Support for Early Intervention: Early detection of cataracts ensures timely treatment, significantly reducing the risk of severe vision impairment or blindness. This aligns with global efforts to combat preventable blindness.

5. Foundation for Comprehensive Ocular Diagnostics: The project establishes a foundation for expanding the system to detect other ocular diseases like glaucoma, diabetic retinopathy, and AMD.

This positions the system as a versatile tool for general eye health diagnostics.

6. Research Contribution: The outcomes contribute to advancements in AI-driven healthcare by demonstrating the potential of integrating imaging and textual data for medical diagnostics. The insights can guide future research in similar domains.

7. Real-World Application Potential: The system is scalable for integration into telemedicine platforms, mobile applications, and community-level health programs. This facilitates practical implementation and widespread adoption in real-world scenarios.

8. Patient-Centric Impact: By empowering patients with early diagnoses and actionable insights, the project improves their overall health outcomes, quality of life, and confidence in accessing advanced medical technologies.

PROJECT REPORT

OCULAR DISEASE DETECTION USING TRANSFER LEARNING AND CUSTOM CNN MODEL

I. Team Details

II. Supervisor Details

III. Introduction

Cataracts are a common and significant cause of vision impairment globally, contributing to nearly half of the world's cases of blindness. This condition arises when the lens of the eye becomes cloudy due to protein accumulation or other structural changes, resulting in blurred or hazy vision. While cataracts predominantly affect older adults, they can also develop due to factors like diabetes, eye injuries, or genetic predispositions. Early detection and timely treatment are crucial, as cataracts are highly treatable through surgical intervention. However, the diagnostic process remains challenging in resource-limited settings, where access to trained ophthalmologists is often scarce. The advent of digital imaging techniques, such as fundus photography, has revolutionized ocular diagnostics. Fundus photography captures high-resolution images of the retina, optic nerve, macula, and lens, providing valuable insights into ocular health. These images play a crucial role in detecting cataracts and other ocular diseases. When combined with artificial intelligence (AI) and machine learning (ML) algorithms, fundus imaging enables the development of automated systems capable of diagnosing cataracts with precision. Such systems hold immense potential to bridge gaps in healthcare delivery, particularly in remote and underserved regions. This project leverages the use of a dataset titled, 'Retina_dataset', a comprehensive collection of labeled fundus images and

diagnostic notes, to train an AI model for cataract prediction. The dataset is annotated by trained professionals under rigorous quality control.

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measures, ensuring the reliability of its labels. It includes 4 distinct categories of ocular conditions: Normal (N), Glaucoma (G), Cataract (C), and Retina diseases (R). The proposed system combines fundus image analysis with text-based diagnostic data to identify cataracts more effectively. By focusing on a subset of cases where the presence of pathology and the affected eye are definitively annotated, the model aims to achieve high diagnostic precision. This approach not only enhances the reliability of predictions but also addresses the critical need for accessible, automated detection. Ultimately, the system aspires to support clinicians by streamlining the diagnostic process, reducing the burden of manual screening, and enabling timely interventions that can significantly improve patient outcomes. By advancing the application of AI in healthcare, this project contributes to the broader effort to combat preventable blindness. The integration of innovative technology with clinical expertise exemplifies a step forward in ensuring equitable access to high-quality eye care for all populations.

IV. SDG

The project aligns with the following United Nations Sustainable Development Goals (SDGs):

1. SDG 3: Good Health and Well-Being

- Achieve universal health coverage and access to quality healthcare. The project enables early detection of cataracts, preventing vision loss and ensuring timely medical intervention.
- Strengthen early warning and risk reduction in healthcare. The AI-based system contributes to the early diagnosis of eye diseases, enhancing healthcare outcomes.

2. SDG 4: Quality Education

- Ensure learners acquire knowledge of sustainable development and innovative technologies. The project provides a case study for students and professionals in AI, fostering learning in healthcare technology.

3. SDG 9: Industry, Innovation, and Infrastructure

● Enhance scientific research and technological innovation. The project employs advanced AI technologies, fostering innovation in the medical field.

● Increase access to information and communication technologies. The scalability of the system ensures it can be integrated into portable devices, improving accessibility in remote areas.

V. Scope

This project aims to develop an AI-based system for automated ocular disease detection using fundus images and diagnostic notes. By leveraging the Retinal dataset, the model focuses on accurate identification of cataracts among various ocular diseases. The system is designed to enhance accessibility to early diagnosis, support clinicians in decision-making, and reduce the burden of preventable blindness.

1. Automated Detection of Cataracts: The primary goal is to build a machine learning model that can accurately detect cataracts from fundus images. By analyzing features such as lens opacities, the model can identify the presence of cataracts without manual intervention. Combining imaging data with diagnostic notes improves the diagnostic confidence and accuracy of predictions.

2. Utilization of Dataset: The dataset provides a rich collection of fundus images annotated for various ocular conditions. This ensures the availability of high-quality training data. By focusing on cases specifically labeled as cataracts, the project utilizes this resource effectively to build a robust model.

3. Focused Data Selection: To improve the precision of the model, the project selects a subset of the dataset where cataracts are definitively diagnosed. This subset includes detailed diagnostic notes that specify which eye is affected, enabling the system to localize the condition and provide more accurate results.

4. Enhanced Healthcare Accessibility: Automated detection systems address the shortage of ophthalmologists in remote and underserved areas. By deploying the model through telemedicine platforms or portable diagnostic devices, the project can make cataract screening accessible to populations with limited healthcare infrastructure.

5. Clinical Support and Integration: The tool is designed to assist healthcare providers by prioritizing patients who require further examination or surgical intervention. Integration with electronic health record (EHR) systems or telemedicine platforms ensures seamless adoption in clinical workflows, reducing the burden on medical professionals.

6. Advancing Research: This project contributes to the growing field of AI in healthcare by exploring the integration of image and text data for medical diagnostics. Insights gained can extend

to developing AI systems for other ocular diseases like glaucoma or diabetic retinopathy, paving the way for comprehensive ocular disease detection systems.

7. Addressing Global Blindness: Cataracts are the leading cause of reversible blindness worldwide. Early detection and timely treatment can significantly reduce the prevalence of blindness caused by cataracts. This project aligns with global health initiatives aimed at combating avoidable blindness by providing a scalable, automated, and cost-effective solution.

VI. Requirement, Specification, and Methodology

Requirement

1. Problem Statement: The primary objective of this project is to develop an AI-based system for the detection of cataracts using the retinal dataset. The system aims to identify cataracts with high precision by analyzing both fundus images and associated diagnostic notes. By leveraging advanced machine learning techniques, the project seeks to automate the diagnosis process, reduce dependency on manual screening, and improve accessibility to eye care, particularly in underserved areas.

2. Functional Requirements: To achieve this objective, the system employs transfer learning as a key component for feature extraction from fundus images. Transfer learning leverages pre-trained convolutional neural networks (CNNs) to recognize patterns and features relevant to cataracts, significantly improving performance and reducing training time. Additionally, autoencoders are utilized to pre-process and denoise input images, ensuring that the model receives high-quality data for training and prediction. The final model is designed to classify images into two categories: "Cataract" and "Non-Cataract," delivering precise results that align with clinical expectations.

3. Non-Functional Requirements: For practical implementation, the system is designed with scalability in mind, enabling seamless integration into healthcare applications and telemedicine platforms. Low computational cost is a critical consideration to ensure the system can be deployed on portable devices like smartphones or handheld diagnostic tools, making it accessible to remote or underserved regions. Robust performance is also a priority, with the model trained on a balanced dataset and optimized to handle noisy or low-quality images effectively, ensuring reliability in real-world scenarios.

4. Data Requirements: The retinal dataset serves as the foundational resource for this project, offering a diverse collection of labeled fundus images. A subset of this dataset, specifically focusing on cataracts, is selected to train and validate the model. This subset includes diagnostic notes, which are integrated into the analysis to provide a holistic understanding of each case and to cross-validate the model’s predictions. The combination of image-based and text-based data enhances the system's accuracy and enables it to deliver more reliable diagnostic outcomes.

Specification

1. Hardware and Software: To effectively develop and train the AI-based cataract detection system, the project requires a combination of advanced hardware and software resources. High-performance GPUs, such as the NVIDIA RTX 3080 or equivalent, are essential for handling the computational demands of training deep learning models on large datasets. These GPUs significantly reduce training time and improve efficiency. On the software side, the project relies on Python and its powerful libraries, including TensorFlow and PyTorch for building and training models, OpenCV for image processing, and scikit-learn for implementing and evaluating machine learning techniques.

2. Model Architecture: The system employs a robust architecture that integrates transfer learning and autoencoders to maximize performance. Pre-trained CNNs such as ResNet, VGG16, or EfficientNet are used to extract features from fundus images, leveraging their ability to recognize complex patterns from prior training on extensive datasets. This reduces the need for training from scratch and improves model accuracy. Autoencoders are utilized to denoise and enhance input images, ensuring that the classifier receives clean and meaningful representations. The final classification head comprises dense layers, which process the extracted features to predict binary outcomes: "Cataract" or "Non-Cataract."

3. Input and Output: The system accepts two primary inputs: pre-processed fundus images and corresponding diagnostic notes. The images provide visual evidence of ocular conditions, while the diagnostic notes supplement this with textual insights to cross-validate and refine predictions. The output is a binary classification indicating whether cataracts are present or absent, along with confidence scores that reflect the certainty of the model’s prediction.

4. Evaluation Metrics: The performance of the system is assessed using a comprehensive set of evaluation metrics to ensure its reliability and robustness. Accuracy measures the overall correctness of predictions, while precision evaluates the model’s ability to avoid false positives. Recall assesses its sensitivity to true positives, and the F1-score provides a balanced metric by combining precision and recall. The AUC-ROC (Area Under the Receiver Operating Characteristic Curve) is also used to evaluate the model's ability to distinguish between classes across various decision thresholds, ensuring its effectiveness in diverse scenarios.

Methodology

1. Data Pre-Processing: The first step in preparing the data for training involves normalizing the fundus images to ensure consistent pixel values, which helps improve the convergence during model training. The images are then resized to a consistent dimension (e.g., 224x224 pixels) that is compatible with pre-trained convolutional neural networks (CNNs) like ResNet or VGG16. This resizing ensures that all images have the same input size, which is critical for batch processing and model consistency. Additionally, autoencoders are applied to denoise the images, removing any unwanted noise or distortions that might hinder the model's performance. The autoencoders work

by learning a compressed representation of the images, thereby emphasizing the key features relevant to cataract detection. Alongside the images, diagnostic notes are tokenized and vectorized to transform the textual data into a format suitable for analysis. This allows the system to process

both the visual and textual data in parallel, leveraging complementary information for more accurate predictions.

2. Model Training with Transfer Learning: After pre-processing the data, the next step is to train the model using transfer learning. A pre-trained CNN such as ResNet, VGG16, or EfficientNet is chosen because these models have already been trained on large-scale datasets and have learned to extract useful features. By fine-tuning the pre-trained model, we replace its top layers with a custom classifier tailored for cataract detection. This classifier can adapt to the specific features and nuances of cataract-related images. The pre-trained weights are used to retain learned features from the large dataset, which enhances the model's ability to generalize to unseen data. This process reduces the training time significantly, as the model does not have to start from scratch and can build upon the knowledge embedded in the pre-trained model.

3. Training and Validation: Once the model architecture is defined and the data is pre-processed, the dataset is split into training, validation, and test sets. This allows for proper evaluation and generalization of the model. Data augmentation techniques, such as random rotations, flips, and shifts, are applied to artificially expand the dataset and prevent overfitting by exposing the model to varied data. During training, the performance is monitored using validation metrics like accuracy, precision, recall, and F1-score. Early stopping is employed as a regularization technique to prevent overfitting; the training process is halted if the model's performance on the validation set starts to degrade. These measures ensure that the model remains robust and generalizable while avoiding the pitfalls of overfitting to the training data.

VII. Timeline

1. Research Proposal and Planning:

- Define the scope and objectives for cataract detection using eye fundus images and diagnostic notes.
- Conduct a literature review on existing methods for cataract detection with deep learning and transfer learning.
- Formulate research questions and define the research methodology (dataset, model, evaluation).

2. Data Collection and Preprocessing:

- Gather the retinal dataset (fundus images).
- Preprocess the fundus images (resize, normalize, and denoise using autoencoders).
- Tokenize and vectorize the diagnostic notes for analysis.

3. Literature Review:

- Review existing studies on cataract detection using CNNs and transfer learning.
- Summarize methods for integrating image and text data in medical image analysis.
- Identify gaps in current methods and opportunities for improvement.

4. Model Selection and Development:

- Choose transfer learning models (e.g., ResNet, VGG16) for feature extraction from fundus images.
- Use autoencoders to enhance image quality and remove noise.
- Fine-tune a custom classifier for cataract detection using both image and text data.

5. Evaluation and Validation:

- Evaluate model performance using accuracy, precision, recall, F1-score, and AUC-ROC.
- Apply cross-validation and split the dataset into training, validation, and test sets.
- Compare the model's performance with baseline methods and validate on unseen data.

Training vs Validation Accuracy and Loss
InceptionV3 based Model Architecture
Training vs Validation Accuracy and Loss
CNN Model

6. Analysis and Discussion:

- Analyze model performance, including strengths and limitations.
- Compare results with other cataract detection systems.
- Propose future enhancements such as integrating additional data or using advanced techniques like reinforcement learning.

IX. Future Enhancement

In the future, this project can be expanded to include the detection of additional ocular diseases such as diabetic retinopathy, and macular degeneration. By leveraging the full scope of the retinal dataset, the system can evolve into a comprehensive diagnostic tool capable of identifying multiple eye conditions from a single fundus image. Incorporating advanced deep learning architectures, optimized for medical imaging, can further enhance the accuracy and scalability of the system.

Another promising enhancement involves integrating this diagnostic tool with telemedicine platforms and portable imaging devices. This integration would enable remote screenings in underserved areas, where access to specialized ophthalmologists is limited. By offering real-time analysis and reporting, the system could support community-level eye health programs and streamline referrals for patients requiring urgent care. Additionally, incorporating user-friendly

interfaces and mobile app compatibility would improve accessibility for both healthcare providers and patients.

Future iterations of the project could also include personalized recommendations for treatment and follow-up care. By integrating patient demographic data and medical histories, the system could provide tailored suggestions for management, such as surgery or lifestyle adjustments. Furthermore, the tool could incorporate explainability features to highlight regions of interest in fundus images, increasing trust and usability among clinicians. These advancements would not only expand the scope of the system but also solidify its role as an essential aid in modern ophthalmology.

X. Outcomes

1. Accurate Cataract Detection: The project delivers an AI model capable of accurately detecting cataracts using fundus images and diagnostic notes. The integration of multimodal data ensures improved precision, reducing the likelihood of misdiagnosis.

2. Streamlined Diagnostic Process: By automating cataract detection, the system reduces the burden on healthcare professionals, enabling quicker and more efficient screening processes. This allows clinicians to focus on critical cases and manage their time effectively.

3. Enhanced Accessibility to Eye Care: The project provides a cost-effective diagnostic solution, particularly benefiting remote or underserved regions with limited access to specialized ophthalmologists. This contributes to equitable healthcare delivery.

4. Support for Early Intervention: Early detection of cataracts ensures timely treatment, significantly reducing the risk of severe vision impairment or blindness. This aligns with global efforts to combat preventable blindness.

5. Foundation for Comprehensive Ocular Diagnostics: The project establishes a foundation for expanding the system to detect other ocular diseases like glaucoma, diabetic retinopathy, and AMD. This positions the system as a versatile tool for general eye health diagnostics.

6. Research Contribution: The outcomes contribute to advancements in AI-driven healthcare by demonstrating the potential of integrating imaging and textual data for medical diagnostics. The insights can guide future research in similar domains.

7. Real-World Application Potential: The system is scalable for integration into telemedicine platforms, mobile applications, and community-level health programs. This facilitates practical implementation and widespread adoption in real-world scenarios.

8. Patient-Centric Impact: By empowering patients with early diagnoses and actionable insights, the project improves their overall health outcomes, quality of life, and confidence in accessing advanced medical technologies.

School	Year	FDP Title
SOL	2023	SPSS Techniques
SOL	2023	SPSS Techniques
SOL	2023	SPSS Techniques
SOL	2023	Faculty Development Program
SOL	2023	One Week Online (Interdisciplinary) Faculty Development Programme on “Research Methodology”
SOL	2023	One Week Faculty Development Programme on ‘Emerging Challenges of Criminal Justice System: Way Forward’
SOL	2023	Understanding Open Educational Resources, OER
SOL	2023	Research Methodology

PATENTS

Pen with Calculator

Dr. Niranjan Kumar Mishra, Dr. Piyush Charan Dr. Anurag S. Tomer Dr. Joeeta A. Tomer Sonnis Bharat Singh Sheshang Degadwala Dr. Rohit K. Verma	390493-001

A compact writing instrument featuring a digital calculator.
Allows quick arithmetic calculations while taking notes.
Runs on low-power battery with ergonomic button layout.
Useful for students, engineers, and professionals.

Portable Computer Tab

Dr. Umesh Kumar Singh Dr. Tarun Kumar Rajak Dr. Piyush Charan Dr Krishna Kumar Singh Dr. Sushil Kumar Jamariar Mr. Ajay Kumar Mrs. Shabana Sheikh	393644-001

Lightweight tablet computer for work and educational purposes.
Combines processing power with portability and touchscreen input.
Supports connectivity and cloud-based applications.
Useful for professionals and students on the go.

RESEARCH PUBLICATIONS

Ensemble Learning Based Model for Student's Academic Performance Prediction Using Algorithms

Deepti Thakral	Ensemble Learning Based Model for Student's Academic Performance Prediction Using Algorithms

- Predicts academic outcomes using ensemble ML methods.
- Combines multiple algorithms for better generalization.
- Analyzes behavioral and academic performance metrics.
- Assists educators in early intervention and guidance.

TALKS DELIVERED BY FACULTIES

- Expert talk on IEEE Awareness
- Fractal Patterns and Structures at GIST Engineering College, East Godavari, India
- Guest Lecture on "Fractal Patterns and Structures" at Vasireddy Venkatadri Institute of Technology, Guntur, AP, India
- Session Chair at International Conference on Advances in computation, communication and information Technology.MRIIRS, Faridabad.
- Dr. Yogita Sharma - Panelist on How to plan a Lesson alligned with NEP2020 and NCF
- Dr. Sunil Kadyan represented SoMC, MRU by chairing a session in the Marketing track of the International Conference on Global Business Transformation: Now, Next and Beyond theme at SIBM Symbiosis International University Hyderabad.(30-31 Jan 2024)

- Dr Pragati Chauhan - Represented SoMC at the Marketplace Simulation US- Train the Trainer workshop scheduled in Paris, France
- Online workshop on Business Model Canvas (BMC) conducted by Dr Pooja Kapoor organised by Echelon Institute of Technology, Faridabad on 30th May 2024
- Dr. Yogita Sharma - Developed a 4 Week course on "Relevance of mental well-being for a healthy entrepreneurial journey" for UNESCO: OE4BW. The Course is on Self Pace Learning and starting from May 27-June 27, 2024. SDG 3: Good Health & Well-being
- Prof. (Dr.) Yogita Sharma has developed a 4-week course on "Relevance of mental well-being for a healthy entrepreneurial journey" for UNESCO: OE4BW. The course is on self-paced learning and will run from May 27 to June 27, 2024.
- Dr Pragati Chauhan - Resource person for lecture on Business Simulation with students of Bbw Hochschule, a private state recognised university, Berlin, Germany Invited Talk on "A New Extension of F- kannan contraction and some related novel results on fixed point with applications