INDIRA GANDHI DELHI TECHNICAL UNIVERSITY FOR WOMEN

(UNDER DELHI VIDE ACT 9 OF 2012, GOVT. OF NCT OF DELHI)
KASHMERE GATE, DELHI -110 006
HTTPS://WWW.IGDTUW.AC.IN/

CENTRE OF EXCELLENCE
ARTIFICIAL INTELLIGENCE
(COE - AI)

SUPPORTED BY

Department of Science and Technology, GoI

NEWSLETTER

2022 - 2023

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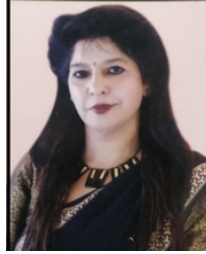# THE HON'BLE VICE CHANCELLOR'S MESSAGE

"The Purpose of Artificial Intelligence is to Re - Engineer the Human Mind"

We are absolutely privileged to live in an era of Artificial Intelligence and data abundance. The evolution of Deep Learning for Artificial Intelligence has led to incredible advances in nearly all fields of technology which promises an outstripping future. The indispensable necessity of Artificial Intelligence couldn't be more imposed upon in the recent trying times. Better healthcare, intelligent flying cars, improved access to financial resources and more informed allocation of state resources are just a few of what can be in the next decade.

With this mandate, IGDTUW has established Centre of Excellence - Artificial Intelligence with the support of Department of Science and Technology, GOI. I am happy that COE - AI is doing excellent work in niche research areas like Speech Technology, NLP, Computer Vision and other domains by applying latest AI Technologies including ML and DL. By bringing together a team of renowned Academicians, Researchers, Faculty and Students, the Centre of Excellence - Artificial Intelligence strives to create a congregation of ideas and intents at a single platform.

DR. (MRS.) AMITA DEV
HON'BLE VICE CHANCELLOR, IGDTUW

THE TEAM

Dr. (Mrs.) Amita Dev
Hon'ble Vice Chancellor, IGDTUW

Dr. Ranu Gadi
Nodal Officer,
DST CURIE COE AI Phase - II

Dr. SS Agrawal
Advisor, COE AI

Dr. Arun Sharma
Coordinator COE- AI

Dr. Poonam Bansal
Co- Coordinator, COE-AI

Dr. Ritu Jangra
Research Associate, COE-AI

Mr. Shambhu Sharan
Resident Engineer, COE-AI

Ms. Shreshtha Singh
Technical Assistant, COE-AI

Ms. Mahima Das
Technical Assistant, COE-AI

ABOUT COE - AI

IGDTUW has established Centre of Excellence in Artificial Intelligence with the support of the Department of Science and Technology, GOI. Under the magnanimous leadership of Dr. (Mrs.) Amita Dev, Honourable Vice Chancellor IGDTUW, avant-garde and state of the art infrastructure with computing facilities/Research Centers with modern AI-enabled infrastructure facilities to enhance functional efficiency for Teaching, Research, and Innovation purposes have been created under COE - AI.

It will Encourage, Engage and Involve student innovators, young research scholars, and faculty members to have heuristic knowledge on AI-based Technologies, Design and develop intuitive technological solutions and produce good quality research in the AI-related areas of projects, and benefit the most from AI in solving industrial and societal needs.

The Centre of Excellence (CoE) in Artificial Intelligence (AI) at IGDTUW, caters to the requirements of Undergraduate, Post-graduate, and Doctorate programs in the domains of AI, Machine Learning, and Deep Learning and various applications including Robotics, Drones, NLP and others.

The Centre serves as the perfect platform with the necessary hardware and software infrastructure to serve as a playground for the creative minds that solve real data driven problems at hand.

ACTIVITIES

2022-2023
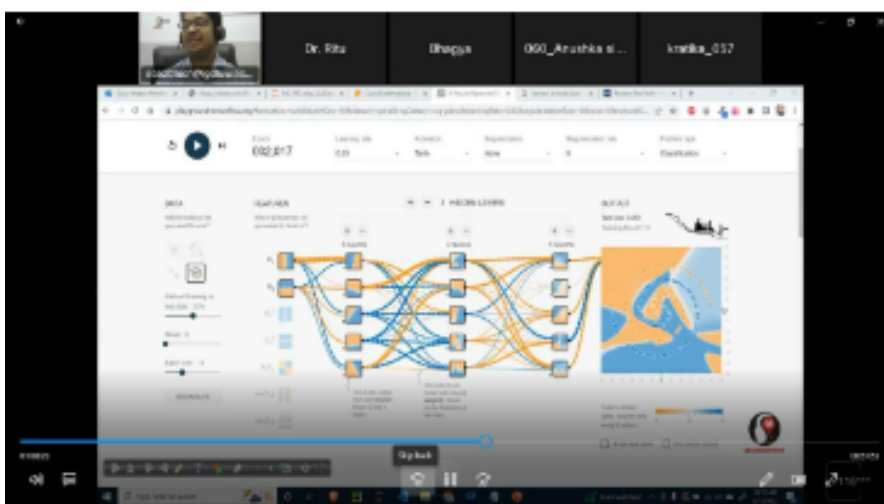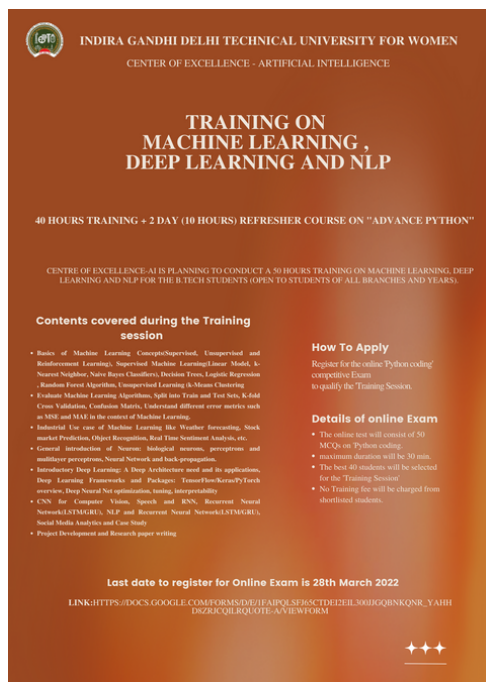
Six Weeks Internship Program on
"Python and Machine Learning"
(13th June 2022 to 25th July 2022)

A Six Weeks Hybrid Internship Program on "**Python and Machine Learning**" was conducted under the Centre of Excellence - Artificial Intelligence, IGDTUW from **6th June, 2022 to 18th July,2022**. The Summer Internship was organized under the generous patronship of Dr. (Mrs.) Amita Dev , Honorable Vice Chancellor, IGDTUW. The event was coordinated by Dr. Arun Sharma, Dean (Examination) and Professor. The Internship program was supported by the Department of Science and Technology (DST), GOI and Department of AI and Data Sciences as well as The AI Club, IGDTUW.

The internship was attended by a total of 290 students including UG students and Research Scholars. The Summer Internship was aimed to provide a concise introduction to the fundamental concepts in Machine Learning including Python Programming, NumPy, Pandas, Data Visualization and Data Cleaning. The internship was segregated into three modules - Python and Data Pre Processing, Machine Learning and Project Work. The participants gained knowledge in Machine Learning principles through a lot of practical applications covering industrial case walk-through and real-time applications. Numerous Industrial Experts and Professionals, Academicians and Researchers aided and shared their insight and understanding on Python and Machine Learning along with practical applications with real life problems. The internship ended with successful and working project presentations from all participants.

Six Weeks Internship Program on

"Computer Vision and Deep Learning"

(13th June 2022 to 25th July 2022)

A Six Weeks Hybrid Internship Program on "Computer Vision and Deep Learning" was conducted under the Centre of Excellence - Artificial Intelligence, IGDTUW from 6th June, 2022 to 18th July, 2022. The Summer Internship was organized under the patronship of Dr. (Mrs.) Amita Dev, Honorable Vice Chancellor, IGDTUW. The event was coordinated by Dr. Poonam Bansal, HOD,

AI & DS. The Internship program was supported by the Department of Science and Technology (DST), GOI and Department of AI and Data Sciences as well as The AI Club, IGDTUW. The internship was attended by a total of 135 students including UG students, PG students and Research Scholars. The Summer Internship was launched with an objective to introduce foundational aspects of Computer Vision and Deep Learning including Working with Images and Videos, Image Transformation, Image classification, Image segmentation and Video Transformation, etc.

The Internship also included practical hands-on experience on eight projects based on face recognition, Emotion Detection and Object detection using Keras/TensorFlow and PyTorch with appropriate case studies. The internship was segregated into three modules - Computer Vision, Deep Learning and Project Work. Copious Industrial Experts and Professionals, Academicians and Researchers shared their knowledge in the field of Computer Vision and Deep Learning along with their applied concepts. The internship ended with successful and working project presentations from all participants.

4TH INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND SPEECH TECHNOLOGY AIST 2022

9th - 10th December, 2022

In 2022 the 4th International Conference on Artificial Intelligence and Speech Technology, AIST 2022 was conducted on 9th - 10th December, 2022. The event was financially sponsored by American Express and Department of Science and Technology, GoI. The technical Sponsors of the AIST 2022 event were IBM , IEEE and UniMAP, Malaysia. The two day event witnessed a total presentation of 98 papers from the domain of Artificial Intelligence and Speech technology, NLP, Image Processing. The notable guests of the event were Chief Guest, Dr. Nisha Mendiratta, Advisor & Head WISE – KIRAN, DST- GoI, Prof. Pramod Pandey, VC, Deccan University, Pune ,Prof Milan Stehlik, John Kepler University, Austria, Dr. Tanja Shultz, Univ. of Bremen, Germany, Dr. Sachin Gulati, Director, Campus Hiring, American Express, Prof Syed Zulkarnain , Universiti Malaysia Perlis, Malaysia etc. The event garnered as a platform for sharing new and innovative ideas in the form of excellent research.

The day I of the event started with welcoming of the guests followed by Prof. Arun Sharma, Conference Convener – AIST 2022 delivering an introduction to the happenings involved in the conduction of AIST 2022. This was followed by an address by Dr S S Agrawal, Technical Program Chair, AIST2022. He elaborated upon the evolution of Artificial Intelligence and the developments made in the field of Speech technology till the current era. Next, Dr. Satoshi Nakamura, Honorary Chair, AIST 2022 addressed the gathering and congratulated the Organizing Team with best wishes for the successful conduction of the conference.

AIST 2022

There were multiple activities planned for the Day I of the event including Keynote Sessions by Dr. Tanja Shultz, Univ. of Bremen, Germany, Prof. Chandra Sekhar S., IISC Bengaluru , and Prof Syed Zulkarnain , Universiti Malasia Perlis, Malaysia. A panel discussion from the team of American Express including Dr. Sachin Gulati, Director, Head of India Campus Recruitment and Yogda Anand, Manager, India Campus Recruitment. The panel discussion was immensely interactive and accessible for the audience as the panel members conducted a one-on-one conversation with the audience members.

The day 2 of the event again witnessed an excellent start with a Keynote Session by Prof Milan Stehlik, John Kepler University, Austria. The session was chaired by prof. Arun Sharma, Conference Convener, AIST 2022. The last Keynote Session was conducted by Dr. Satoshi Nakamura, NAIST, Japan.

AIST 2022

A total of 98 papers were presented via 10 Technical Sessions authored by eminent researchers not only from all across India but also from countries like USA, Germany, Turkey, Malaysia, chaired by esteemed researchers and faculties of reputed organizations. Prof. Samudra Vijay, IITG , , Prof. S.K. Dhurandher (NSUT), Prof. Vishal Bhatnagar (NSUT), Dr. Devender Kumar (NSUT), Dr. Chandra Prakash (NIT Delhi), Dr. Manju Khari (JNU), Dr. Swaran Lata (DeitY) , Prof. Meena Tushir (MSIT), Dr. Karunesh Arora, (CDAC Noida), Dr. Ravinder Kumar (SVSU), and Dr. Deepak Garg (Bennett University).

After the successful completion of all tracks the valedictory session was held with immense zeal. The Chief Guest of the valedictory event was Dr. Nisha Mendiratta, Advisor & Head WISE – KIRAN, DST- GoI. She addressed the audience and praised the involvement of increasing number if women in the evolution of Artificial Intelligence in everyday applications. She emphasized upon the importance of educating Women and encouraging their engagement in AI Evolution.

The event ended with great zeal and enthusiasm laying the foundation of 5th International Conference on Artificial Intelligence and Speech Technology, AIST 2023. The AIST 2022 conference was a great way for professionals to stay up-to-date with the latest advances in artificial intelligence and speech technology, exchange ideas with their peers, and explore new collaborations and partnerships.

AIST 2022

AI/ML MONTH
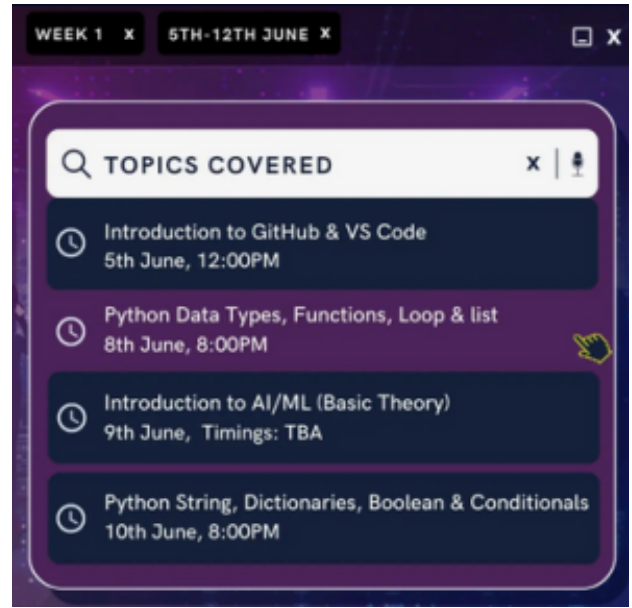
The AI/ML Month saw the celebration of a month long immersive AI experience where over 200 students got hands-on lectures and sessions centered around AI and ML, as well as got the opportunity to build a plethora of ML powered projectsThe first week of the month-long tech endeavor kicked off with an introductory online session on GitHub and VS Code on 5th June. This talk was helmed by Mr. Kartik Mathur who is the founding member and academic head of Coding Blocks. Then Ms. Nitasha Dhingra took over the introduction to various Python basics on 8th and 10th June. Ms. Dhingra is an upcoming SDE at Google, and has previously served as a summer analyst at Goldman Sachs. Bringing the initial week of AI/ML month to a grand conclusion, we had an eye opening session on Introduction to AI and ML conducted by Ms. Vaishnavi Dwivedi. She is the creator of MichiSpotlight, a GitHub FIeld Expert and an incoming MSIS at UT Austin. Every session saw an eager participation by the audience. Week 2 saw its commencement on 14th June, with a session highlighting the roadmap to be followed during AI/ML development as well as the relevant future scope of the field. This talk was delivered by Mr. Avisek Lahiri who is a Research Software Engineer at Google, California. Following this on 18th June, the very acclaimed Data Scientist, Mr. Mohit Uniyal delivered a spectacular lecture on Exploratory Data Analysis which went in depth into the nuances of EDA in the AI world. Data Visualisation and Data Cleaning were the next hot topics that were tackled by Mr. Prateek Narang on 19th June. Mr. Narang is the Founder and Instructor at Coding Minutes and Scaler Academy. The second week thus came to a grand conclusion with the assignment of a mini project and countless hours of informative lectures and experiences. The third week of this tech galore was dedicated to the detailed exploration and study of the various AI/ML Algorithms that have been developed till date. To aid us in the process of strengthening the mentees' foundation in this essential subject, we were joined by Mr. Shubham Singhal who is a greatly celebrated mentor at Coding Blocks. Mr. Singhal delved deep into the mathematics of each algorithm along with providing real life examples and simulations. Two comprehensive sessions were held on 21st and 23rd June to further elucidate this backbone topic behind development of AI centric projects.

AI/ML MONTH

Next we saw the various keynote speakers deliver eye opening lectures on the Industrial Perspectives on the Applications of AI and ML. these sessions were graced by the presence of Ms. Amandeep Kaur a Mitacs Globalink research Scholar as well as Mr. Priyansh Kedia who is a Data Science expert at CRED. These sessions were held on 29th June and 2nd July, which saw a stupendous participation by the audience. The speakers received a myriad assortment of doubts by the attendees, as well as saw the birth of some very pertinent industry relevant ideas pitched by the audience.
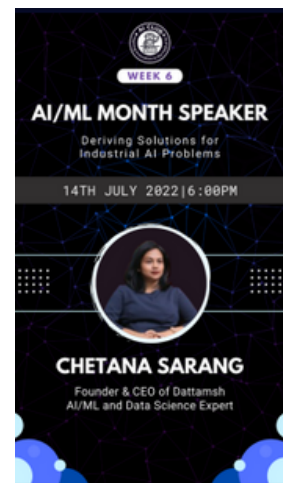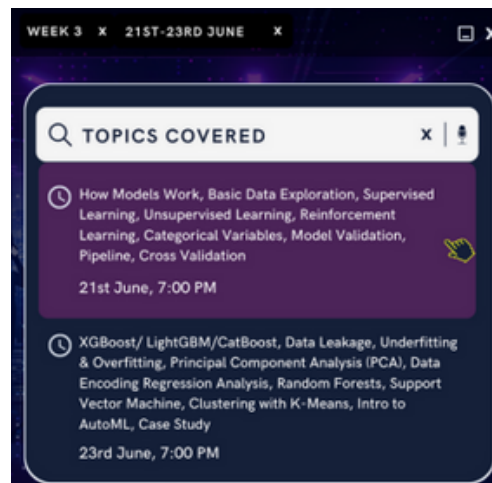
Spirits were high as we entered the penultimate week of this grand tech galore. With the rise in Start-Up culture in India, it was imperative to have Mr. Sarthak Srivastava on board to discuss the Applications of AI in Startups on 7th July. Mr. Srivastava was the perfect fit for this event as he himself is the founder and CEO of a successful startup called CODEBUGGED. Following this, we received the honour to witness Mr. Harsh Sharma deliver an unforgettable and cerebrally stimulating talk on Neural Networks on 10th July. Armed with his years of experience as a Microsoft certified Corporate Trainer and Public Speaker, Mr. Sharma provided a detailed insight into Neural Networks, since they consist the backbone of all subsequent AI innovations of this era. This week saw its conclusion after experiencing and realising the industrial as well as academic scope of AI.

Bringing the month-and-a-half long run of our event to a banging conclusion, we had an incredible panel of speakers on board for our finale week. Mr. Harsh Sharma led the way by delivering another comprehensive session on Neural Networks on 11th July. Subsequently we had Ms. Chetana Sarang who is the founder and CEO of Dattamsh, an acclaimed Data Science Expert as well as Corporate Trainer, proceed to conduct a session on "Deriving Solutions for Industrial AI Problems", on 14th July. To keep with the spirit of any tech motivated series, we were joined by Ms. Shruti Nagpal who demonstrated a hands-on session on Facial Analysis on 16th July. She is currently serving as a researcher at Sony AI and her expertise lies in Machine Learning and Computer Vision which enabled her to be the ideal teacher for this session.

After receiving an overwhelmingly positive feedback from our audience and involved students, AI/ML Month came to an impressive conclusion. Everybody involved departed the event with a sense of accomplishment as well as a few innovative AI and ML powered projects added to their skillsets. This event's successful run was a testimony to the eager talent of countless students who are keen to innovate, ideate and create.

EXPERT SESSION
RECENT TRENDS in AI RESEARCH

The AI Club of IGDTUW organized an online session on "Recent Trends in AI Research" on the 16th of October 2022 at 3PM. The effervescent field of Artificial Intelligence is always riddled with countless new inventions, research, trends and developing algorithms. We were honored to have Dr. Pawan Whig join us to further elucidate and shine light upon the dynamic terrains of Machine Learning, AI and its related fields.

Dr. Pawan Whig is currently serving as the Dean of Research (AI, ML) at VIPS-TC. He has also been a part of the IT industry since the last decade and a half. As a member of the International Association of Engineers Hong Kong, ISTE, IEEE, IEI and Computer Society of India, he has published technical articles in more than 50 national and international journals that delve deeper into a wide area of research fields like Analog Signal Processing, Sensor Modeling, Water Quality Monitoring Applications and Simulation & Design. With a plethora of academic achievements and certifications under his belt, our collaboration with an industry expert of Dr. Whig's caliber went on to become a resounding success. Dr. Whig began the session with a comprehensive quantitative analysis of the spread and growth of AI in the global market along with a country wise and domain wise break-up. This was followed by a discussion and evaluation of the critical need to build a competitive and ethical AI Economy and brainstorming on ways to make AI more accountable. Next the session moved towards the upcoming popularity of advanced tools like Edge Computing and Quantum Computers in AI and how indispensable their role will become in unleashing the full potential of Artificial Intelligence

To provide more clarity about the brawn of AI and enhance its functionality, Dr. Whig provided a case study about the "City Brain" project developed in the Chinese city of Hangzhou which monitors every vehicle on the city roads which has gone forth to reduce traffic by 15%. For the penultimate agenda of the talk, Pawan sir walked the audience through an elaborate roadmap on "How to Write a Research Paper" with crystal clear pointers and expert tips to elucidate the workflow of the process. Finally the informative session was concluded with a cerebrally stimulating "Question & Answer" round which tackled the attendees' inquisitiveness and gave them more clarity with regards to the nuances of the topic under discussion. The session saw an incredible participant turnout of over 50 students. The audience was extremely interactive and they built a quick rapport with the speaker throughout the course of the 90 minute long talk, which was especially visible during the QnA round.

A session on Competitive Programming

By Mr. Utkarsh Gupta

The Centre of Excellence - Artificial Intelligence in collaboration with AI Club of IGDTUW successfully organized an offline session on "Competitive Programming" on 2nd November 2022 at 4PM, in the college premises. Competitive Programming serves as an essential and intriguing backbone of coding. It is imperative that any budding programmer eager to keep up with the trends of this aspect of Computer Science, would require appropriate guidance and impetus. We were honored to have Mr. Utkarsh Gupta join us to provide a cerebrally stimulating session that further elucidated and shone light upon this seemingly complex subject.

Mr. Utkarsh Gupta's proficiency in CP allowed him to bag AIR 1 in Google Kickstart, achieve AIR 1 on CF, become a Grandmaster on Codeforces as well as earn a 7 star rating on CodeChef. To further add to his flourishing galore of coding excellence, he had previously interned as a Software Engineer at Uber, and is currently serving as a Software Engineer at Graviton Research Capital LLP. To top it all off, he also creates educational content on his YouTube channel with a whopping 60k+ subscribers who benefit from his precious insights. With a plethora of academic and extracurricular achievements under his belt, our collaboration with a coding maestro of his stature went on to become a resounding success.

Mr. Utkarsh Gupta started off with a quick ice breaker to gauge the audience's familiarity with Competitive Coding. Throughout the session, one of his main goals were to debunk the fear and abate the seemingly intimidating complexity that is attached to CP.

Mr. Gupta strived to make the session interactive and stimulating. One of the most memorable moments were when he picked a volunteer from the audience and proceeded to play a number game where he applied a strategy which ensured his victory everytime. This harmless trick helped highlight how numerological strategies and logical deductions are the keystones of CP. He then proceeded to introduce CodeForces as a valuable platform for budding competitive programmers, he gave handy tips on how to navigate the platform and make the most out of it.

The students were then introduced to a myriad of opportunities that open up in CP, the speaker mentioned coding competitions like Google Kickstart, Facebook Hacker Cup, International Collegiate Programming Contest (ICPC), etc; that can prove to become a coder's most memorable experiences and can result in extremely fruitful results like internship and hiring offers.

He concluded the session by sharing a fun anecdote about his team during a contest where they brainstormed and tackled the pressure of time, and eventually went on to ace the competition. FInally he graciously clarified a plethora of doubts from the audience who were left even more intrigued and encouraged to try their hand at competitive programming. The session saw an incredible participant turnout of over 150 students. The audience was extremely inquisitive and they were engaged in multiple back-and-forth by Mr. Gupta to build a cleaner understanding of the topic.

HELLO AI

ABOUT HELLO AI

Dazzling December saw the advent of "Hello AI",an engrossing event comprising an enriching series of sessions covering all the basics of AI, and furthermore progressing onto higher levels.

- An introductory session was conducted on the 10th of december by Ms. Tusharika Mehta , a former SDE intern at Servicenow'22, brushing upon the fundamentals of tech platforms by delivering conceptual clarity on an assortment of fundamental technical tools. The platforms covered included Github, VS Code, Anaconda and Google Colab.
- A proceeding session on the same day was helmed by Ms. Amritaya Ray, an upcoming SWE intern at JP Morgan Chase & Co. She elaborated upon the basics of Python thoroughly, in a beginner-friendly approach .
- The following session was conducted on 11th December by Ms. Tusharika Mehta. She acquainted the students with highly prevalent and most used libraries in Python, namely the NumPy and Pandas library; and wrapped up the previously continued concepts from the basics of Python.
- On 18th December, after a few days of break for the students to imbibe the previously acquired knowledge, Ms. Arushi Garg, an upcoming Product Intern at Adobe, introduced the learners to the concept of Exploratory Data Analysis (EDA) and Data Visualization, thus helping them analyze and investigate data sets and summarizing their main characteristics.
- A hands-on session exploring the depths of EDA was delivered by Ms. Jhanvee Khola who is an upcoming SWE intern at Google, along with Ms. Arushi Garg. Held on 20th December, this session enabled students to receive some practical training on how to apply EDA to accurately process and analyse available data

- Lastly, bringing the month long run of our learning series to a grand end, Ms. Manvi Kaur and Ms. Khushi Punia conducted an immersive session introducing the audience to ML and ML Models, as well as demonstrating the hands-on component of the same, on 23rd and 24th December. Ms. Kaur is an upcoming intern at Salesforce and Ms. Punia will be interning with Microsoft this summer.

This comprehensive learning series was an endeavor by AI Club to stimulate an environment of AI centric development and awareness amongst the students of IGDTUW. The successful interactions, hands-on sessions and immediate doubt clarifications carried out throughout the run of this event, proved to become a major stepping stone for everyone who was involved.
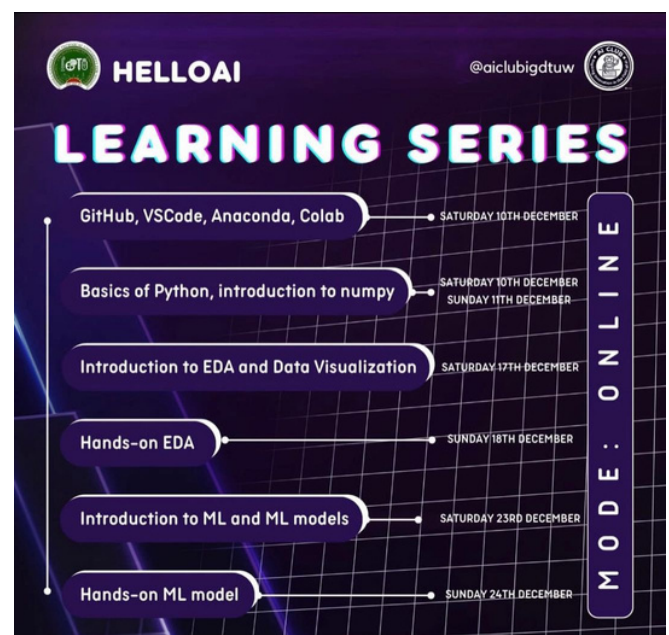
Data Storytelling: Effective Representation of Data Analysis and Visualisation

by Mr. Mohit Chaurasiya

Organised on: 24th January 2023
Venue: IGDTUW Auditorium
Number of attendees: 250+

AI Club hosted Mr. Mohit Chaurasiya for our session on Data Storytelling: Effective Representation of Data Analysis and Visualisation. Mr. Mohit has been closely linked with machine learning and has a strong

background in data mining. He is currently a ResearchAssociate at the Harvard Center for Geographic Analysis, an Undergraduate Researcher at the Geographic Insights Laboratory at Harvard University, and an Undergraduate Research Intern at NUS, Singapore. Being a Spatial-Informatics major and a data science enthusiast, he has a natural curiosity to understand, learn and apply data science techniques to find new, innovative, and efficient solutions to real-life problems.

Mr. Mohit walked the audience step by step into effective data analysis and visualisation. He emphasised on making visualisation of analysed data better for effective decision making. Starting with the scatterplots he progressed on with his presentation walking the audience around on the further effective improvement of graphs for clarity and better perception.

Sharing his experience as a mentor at the MIT Policy Hackathon, Mr. Mohit expounded on numerous recommendations and pointers for the audience to assist them thrive in the hackathon. He illustrated the importance of data visualisation and presentation as a stepping stone to rising amongst the top projects. He explained the various parameters of judging the project and the key to build a project that caters to the needs of the target audience.

Focusing on the theme of the hackathon, "Technologies for Sustainable Development", Mr. Mohit shared his experiences in the form of various case studies regarding the theme. He elucidated about the steps of finding out results during covid pandemic from raw data, suppose the number of deaths per minute separated by mere commas in a file. Using this case study as a basis, he gave a walkthrough in making the solution more structured and concrete by adopting different techniques of visualisation. He further expanded to the techniques giving examples such as colour coding of a map to show which part of the country was most affected by the pandemic and the problems that were associated and are of primary concern under the G20 Summit Sustainable Development Goals.

A session on Tensorflow.js & how to use it to improve ML/AI projects

by Mr. Yajas Sardana

Organised on: 25th January 2023
Venue: IGDTUW Auditorium
Number of attendees: 350+

Mr. Yajas Sardana led a presentation at the AI Club IGDTUW, walking the audience through the uses of Tensorflow.js and how to use it to improve their projects. A Linkedin TopVoice, he is one of the top content creators and public speakers who guides students to hone their technical skills and ace interviews. He has a strong professional background, which includes participating in numerous hackathons and having success at each one. Earlier, he served as an SDE intern for Microsoft and also worked with Cure.fit as an SDE intern. In terms of his skillset, he is extremely knowledgeable when it comes to technology-related matters and is well-versed in various programming languages. Mr. Sardana gave a presentation on Tensorflow.js, an AI-based tool that has the potential to power your ML projects and give them the edge over others. More than 150 people attended the seminar which showcased the wide range of applications that can be achieved through this powerful technology. He demonstrated the efficient employment of Tensorflow.js into projects helping the implementation of best practices for data automation, model tracking, performance monitoring, and model retraining into the project.

In addition, the session also demonstrated the important features considering evaluations of the projects during the hackathon. He spoke about how some projects that reach to the top get to that extra mile of invention. Mr. Sardana emphasized on the fact that ultimately it is the presentation of the project which matters the most. Putting what you have done, what you intended to do and what the future scope of the project forward is what takes your project forward.

Additionally, Mr. Sardana emphasized on the importance to focus on the feasibility of a solution when creating problem statements. This helps ensure that the project will be achievable and have an impact on those who need it most. Moreover, making sure that your audience understands the reachability of your proposed solution increases its power and importance.

HACKOVERFLOW 2.0
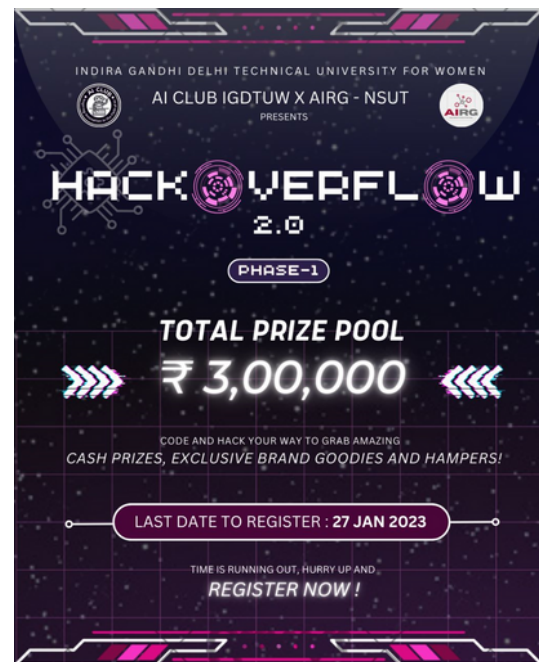
Organized on: 31st January 2023
Venue: IGDTUW Auditorium

1100+ registrations

150+ submissions

20 semi finalists

3 winners

The Finale of Hackoverflow 2.0 was organised on 31st January 2023, from 10 AM to 5PM, at the IGDTUW Auditorium. All semi-finalists and participants during the week-long technical event were invited to attend. The first phase of Hackoverflow 2.0 came to a resounding conclusion with its Final Presentation round, which saw an impressive foray of technically adept prototypes and teams battle it out for the top spots in the Hackathon.

The day began on a high note where the atmosphere was charged with anticipation and curiosity. We had an extremely prestigious line-up of judges in attendance. Mr. Prateek Narang who is the Co-Founder of Coding Minutes and former SWE at Google, as well as Mr. Kartik Mathur who is a Founder and Academic Head at Coding Blocks, were some of the industry experts who graced our event with their presence on the judge panel. Furthermore, we had big names of the academic and coding world, like Priyansh Agarwal, Yajas Sardana, Amisha Aggarwal, Deekshita Verma, Sakshi Roy, Astha Bansal, Titiksha Sharma, Ayon Roy and many more act as mentors for the presenting teams as well.

The top 20 Semi-Finalists took turns to present their AI powered innovations to tackle real world problems in a sustainable manner, in the spirit of our theme to honour the upcoming G20 Summit to be held in Delhi in 2023. Each team pitched an elaborate and comprehensive presentation, giving a thorough breakdown of their solutions. The jury provided detailed insights to each team which would enable participants to elevate their project to the next level. After careful deliberation by our panel of judges and mentors, a unanimous decision was made to select and honour the top teams with grand prizes for the Hackathon. Additionally, we also commemorated the Early Bird submissions for successfully building prototypes within a limited timeframe.

The top performers were felicitated in an elaborate prize distribution ceremony where the various esteemed keynote guests of the event presented them with trophies, merchandise and goodies provided by our event sponsors and partners. The presence of our collaborators from AIRG-NSUT aided in the smooth progression of the event as well. The Finale round saw various innovative ideas and inventions that hold immense potential to make tangible changes in the world. With this AI Club hopes to strive towards sustainable technology and provide a beneficial platform for aspiring tech enthusiasts and developers.

EXCHANGE of
MEMORANDUM OF UNDERSTANDING
between
IGDTUW and IBM

On 20th February, 2023 an Memorandum of Understanding (MoU) Exchange ceremony was hosted at IGDTUW campus. The MoU was exchange between IGDTUW, Delhi and IBM.

Prof. (Mrs.) Amita Dev, Honourable Vice Chancellor graced the event with her presence along with Ms. Claudia Cortes Romanelli, Director, WW Geos & Markets at IBM, Corporate Social Responsibility, Dr. Mani Madhukar, IBM Research, and Mr. Rihan Suri, Pro VC, DSEU.

The MoU served as a milestone for the enhancement of collaboration between IBM and IGDTUW, Delhi to serve together in garnering skills, curriculum development and research. The potential areas of interests are artificial Intelligence, Cloud, Security, Data Science, Internet of Things, Design Thinking etc. With the collaboration of IBM, IGDTUW has previously conducted International Conferences and has launched various levels of technical courses with hands on training sessions. The new exchange is expected to support more students and faculty members in developing hands on skills on new technological areas.

PROJECTS
AND
PUBLICATIONS

ONGOING PROJECTS

Title: Sanskrit-Hindi Machine Translation System (Sanskrit Knowledge Accessor)

The Project involves two modules:

1. Creation of Parallel corpora for Sanskrit-Hindi Language pair
2. Development of Sanskrit to Hindi Machine translation system using Deep learning techniques.

Methodology

- In the Proposed architecture, firstly the creation of parallel corpora is performed.
- Pre-processing is performed on the corpus including cleaning and splitting the text.
- Cleaning text involves removing all non-printable characters, punctuation markers, changing uppercase letters to lowercase and removing any remaining tokens that are not alphabetic or numeric.
- Split text involves sort the sentences in a batch based on sentence pair by length and break similar-length sentences into mini-batches.
- Tokenization of the input text will be performed.
- After processing the source words are fed to the deep neural network model for training and results into the target translated text.

Automatic Speech Recognition using Deep Learning and Speaker Identification

- ASR using WENET toolkit on IIT Madras Indian English language with Language Model and without Language model: language model training of data and testing it for speech recognition and increase the dataset using NPTEL Indian English data.
- ASR using CNN and its variants using Librispeech-English and IITM Indian English, Hindi language: implementation of continuous speech recognition using MFCC and CNN residual networks
- Phonetic and Phonological study of Indian English and Sanskrit language: papers are written on phonetic study of Indian English and Sanskrit language.

Behavioral analysis using Hyperspectral Imaging

Hyperspectral imaging is a technique that enables imaging of a scene in hundreds of contiguous, narrow wavebands, with a bandwidth of approximately 10 nm in the visible and infrared regions of electromagnetic spectrum. Hyperspectral imaging has been effectively used in numerous remote sensing applications. Due to its non-destructive and non-invasive properties HSI has shown its potential in the field of food quality inspection, forensic science, medical surgeries and diagnosis, art and historical conservation application, security and defense. Human emotion and behavior analysis is the new emerging field where HSI is being applied. Hyperspectral imaging can be used to detect the behavior of human body and in turn the human emotion based on the power of material discrimination from their faces. Human emotional state like stressful, happy etc. can be detected using HSI. Early mental and physical stress detection can prevent many stress related health problems. Change in human behavior is strongly linked to other physical and physiological activities of a human body. Facial tissue oxygen saturation is a valid and reliable physiological indicator of different human emotions. HSI is a contactless, non-invasive technique that can be used to identify human behavior, by extracting physiological features, which can be further be classified using appropriate machine learning and deep learning approaches.

ONGOING PROJECTS

Deep feature extraction for document forgery detection with convolutional autoencoders

Objective: Unsupervised deep learning approach for ink mismatch detection in hyperspectral document images using spectral features.

- Approach: CAE-LR approach is proposed that uses Convolutional Autoencoder (CAE) for feature extraction and utilizing them for ink mismatch detection through Logistic Regression (LR).
- Results: We evaluated the performance of CAE-LR on UWA writing ink hyperspectral images dataset for blue and black inks.
- Artificially similar color inks of different types (2~5) were mixed in varying proportions to detect ink mismatch. Additionally, results are compared with three
- machine learning algorithms with variants of each, CNN, and five state-of-art methods used by the researchers.
- Experimental results illustrated that the CAE-LR outperforms all the above mentioned approaches by achieving the state of art results, which depicts the efficacy of unsupervised deep learning approach for ink mismatch detection in hyperspectral document images.

Automatic Approach for Real-Time Facial Recognition using Deep Neural-Network (RTFR-DNN)

Primary objectives:

To design a robust Face recognition system which is efficient and provides good matching rates even under the poor resolution, noisy, variations in pose, resolution, and faces covered with masks, etc. The project will follow the following the time line with the specified modules

1) Building of Image Corpora
2) Image Pre-processing and Labelling
 Forensic Dataset Implementation:
• ROI Selection and extraction using viola jones
• After detection, crop the detected images using built-in python function
• Data Augmentation will be performed.
• Organizing dataset into individual directories and split into train and Test.
3) Feature Extraction
4) Building and Training AI based FRS
5) Deployment and Testing in Real- Life Scenario

This research proposes a feature fusion approach which combines the handcrafted features and non-handcrafted features extracted using deep learning models.

PATENTS

TomCrop: A Deep Learning Architecture for Tomato Leaf Disease Detection
Status: Granted
Patent Number: 414312
Dr. Ritu Rani, Rashmi Gandhi, Dr. Amita Dev, Dr. Arun Sharma

Tomatoes are an important crop in mineral salt and vitamin C-rich agricultural areas. Plant health is important for crop output growth in terms of quantity and quality. However, in order to meet these goals, crops must be disease-free or adapted to detect infections early. In this study, extensive experimentation was carried out for the detection of Tomato leaf disease using pre-trained models.

There are two major steps involved in this process:

feature extraction and classification. In this paper, two different models are proposed using the pre-trained models for the detection of tomato lead disease detection. In the first model, the pre-trained models (Inception3, MobileNet, Resnet50, Xception, Densenet121, VGG16 and EfficientNetB0) are used as the convolutional base for feature extraction and then a stack of fully-connected layers followed by a softmax layer as classifiers that are fed by the features extracted from the pre-trained models. Through empirical analysis it is observed that the MobileNet model perform better than the remaining models, thus the hyperparameter tuning of the proposed model with MobileNet as feature extractor is also done for various optimizers Adam, SGD, Adagrad, Adadelta and RMSprop and the results have been analysed. Also, the experimentation of the MobileNet model has been for the various batch sizes 32, 64 and 128 has also been done. In the second model, TomCrop: A deep learning architecture has been proposed which involves fine-tuning of the pre-trained model MobileNet by unfreezing some of the layers of the convolutional base and retraining the network with a lower learning rate and Adam optimizer. The results obtained from the proposed deep learning architectures are then compared in terms of precision, recall, F1 score. The experimental results and comparative analyses testify the efficacy of the proposed system over existing systems for tomato leaf disease detection.

Ink Mismatch Detection In Hyperspectral Document Images
Garima Jaiswal, Dr. Arun Sharma, Dr. Amita Dev, Sumit Kumar Yadav
Status: Published
Application Number: 202211017017

Hyperspectral imaging - non-destructive approach that assists in finding the unique features of an image under investigation through their unique spectral signatures. It captures multiple narrow-band images at the electromagnetic spectrum, which is difficult through conventional imaging. Hyperspectral imaging captures the spectral and spatial features of the object or image under analysis based on the distinct spectral signatures. It captures the images from hundreds to thousands of continuous spectral bands that assist in analyzing the images. Hyperspectral imaging is an emerging well known for solving many complex and challenging problems in remote sensing and computer vision. However, its capacity for detecting forgery in the document images is not much highlighted. The paramount aspect of detecting forgery in a handwritten document involves detecting if some part of the text was changed, obliterated, or overwritten by a different pen. Supervised machine learning classifiers have not been much explored in this aspect. This paper presents seventeen supervised machine learning classifiers-KNN classifiers (Fine, Medium, Coarse, Weighted, Cosine), SVM classifiers (Linear, Polynomial, Gaussian), Decision Trees (Fine, Medium, Coarse), and Ensemble Methods (Bagged, Boosted, Subspace Discriminant) for illustrating the importance of hyperspectral images for ink mismatch detection in handwritten document images. It is observed that the medium Gaussian SVM outperforms the other supervised machine learning classifiers in terms of accuracy since they are empowered by various kernel functions that map the data to higher dimensional space and provides a clear separation line. Moreover, the impact of ink mixing proportions is illustrated. As the proportion of one ink surpasses the other, the classifier overlooks the one with a smaller proportion as it has minimal impact. Though on mixing three, four, or five inks in equal ratios, the classifier predicts correctly.

PATENTS

Speech enabled smart Library Management System and methods for using the system
Shambhu Sharan, Dr. Amita Dev, Dr. S.S. Agrawal, Dr. Arun Sharma, Dr. Poonam Bansal
Status: Published
Application Number: 202211054198

The patent relates to a data management system and in particular, relates to speech enabled information retrieval in a library management system. A library is a collection centre for the physical and/or digital files such as books, periodicals, newspapers, CDs etc. Collecting, reorganizing, storing and use to these files have been the major function for a library for a long time. Usually, a user needs to interact with at least one library staff and that too after waiting for his turn in a queue in order to retrieve very small information such as number of books issued in a particular period or number of pending fines etc. Therefore, there is a need of a smart library management system that provide an easier and faster way to retrieve a user's own information using own voice and utilise at least some of the service of the library without the help of a library staff. The key features of the proposed patent include:

1. Automatic authentication, without remembering any username/password, based on patron's voice biometric.
2. Multiple language support i.e., automatic detection of language spoken by the patrons for querying the system.
3. Conversion of patron's spoken query into structured query language using natural language processing module.
4. Responding to the patron's query in respective language using speech synthesis module.
5. Detection of spoofed voice to protect the patron's profile from being misused.
6. Anytime anywhere accessibility using different self-service kiosks and smartphones.
7. Automatic functioning of the kiosks on detecting patrons within the proximity and turning off in absence of the patrons.

This system will help the library patrons utilize the library services more efficiently.

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IMMINENT ACTIVITIES

Imminent Activities

Summer Internship 2023
Date: June, 2023 - July, 2023

Centre of Excellence - Artificial Intelligence is planning to conduct two summer internships both comprising of 50 Hours Training on Machine Learning, Deep Learning and Natural Language Processing for the B.Tech students (Open to students of all branches and years).

The first summer internship of Python and Machine Learning will consist of Data Preprocessing and core concepts of machine learning. the enrolled students will also be guided by industrial experts throughout the series lectures and project development.

The second internship will be based upon Computer Vision and Deep Learning. The focus group for the second summer internship will be UG, PG students and PhD Research Scholars.

The students will gain practical trainings on numerous projects throughout the session. the internship will also involve Social Media Analytics and Case Study Project Development and Research paper writing. During the internship students are required to make a project with the team members of maximum three participants. At the end of the internship, a project competition will be organized for demonstrating the projects. Innovative Projects may also get a chance for seed funding and mentorship for further development and commercialization/patent of their project from Anveshan Foundation. The projects with research flavour will be guided by the Faculty Mentors for writing a Research paper. University will support the Registration Fee (upto Rs. 5000/-) for presenting the Paper in the Conference. If a paper is accepted for SCOPUS Journal, students will also get a Cash reward. at the end of the Internship, participants will get an Internship Certificate.
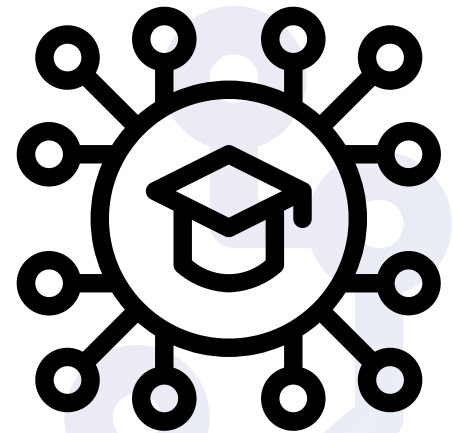
G-20 Hackathon: Hackoverflow Phase-2
Date: May-June 2023

After an overwhelming participation in Hackoverflow 2.0 Phase-1, we are ecstatic to organise Hackoverflow Phase-2. This would commence by sessions from domain experts , who will brief as well as dive deep into the requisite skills for hackathons, followed by mentorships for the participating teams. The problem statements would include insights from the G20 summit. Inculcating positive competitive spirit and holistic development would be our goal.
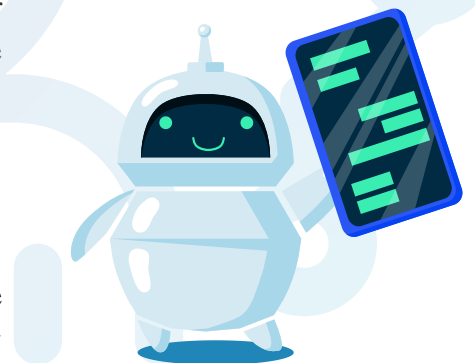
⋙ 5th International Conference on Artificial Intelligence and Speech Technology AIST 2023

December, 2023

After the grand success of four versions of International Conference on Artificial Intelligence and Speech Technology (AIST 2019, AIST 2020, AIST 2021, and AIST 2022), Indira Gandhi Delhi Technical University for Women, Delhi is all set to ready for hosting its fourth version i.e. 5th International Conference on Artificial Intelligence and Speech Technology (AIST 2023) at IGDTUW Campus, Delhi. Last four Conferences witnessed a number of Expert Researchers, Academicians and Industry Practitioners in AI and Speech Domain from premier Institutions in India and abroad including Japan, Australia, France, Germany, Hungary, Czech Republic, Myanmar, Uzbekistan, Austria, Vietnam and others. Conference will involve Paper presentations, Tutorials and Key Note Speeches by Eminent Personalities on these technologies. All accepted and presented papers of the conference by duly registered authors will be submitted to IEEE Xplore for Publication.

<p align="center">Technically Supported by</p>

⋙ Special Invited Talks, Hands on Technical Sessions and Guest Lecture Series

Centre of Excellence - Artificial Intelligence will host numerous guest lecture series and special invited talks by various Industrial and Academic experts. The series and sessions will be aimed at finer understanding of trending technologies, and a platform to exchange relevant ideas in the domain of Artificial Intelligence, Speech Technology, Deep Learning etc. This will aid the students, research scholars and even faculties of IGDTUW to develop a prime understanding as well as keeping up with latest trends about the field of Artificial Intelligence with a practical implication.

IMMINENT ACTIVITIES