Bricks with Clay*

The Quarterly Newsletter of MFSDSAI @ IITPkd

This is the second issue of the quarterly newsletter of the Mehta Family School of Data Science & Artificial Intelligence at IIT Palakkad. The newsletter features important events in the school and the achievements of the members in the quarter. This edition also features conversations with a newly joined faculty member and a B.Tech student who recently completed an internship.

~ Events ~

1. Talk by Prof. Sriraam Natarajan, University of Texas at Dallas

Apr 2025

The Distinguished Researcher talk by Prof. Sriraam Natarajan on **AI-in-the-loop for healthcare** dealt with recent progress that allows for more reasonable human interaction where the human input is taken as "advice" and the learning algorithm combines this advice with data. These algorithms were presented in the context of several healthcare problems – learning from electronic health records, clinical studies, and surveys. Prof. Sriraam also interacted with faculty and students prior to the talk.

2. Florence Nightingale Data Science Talk Series - 2nd talk

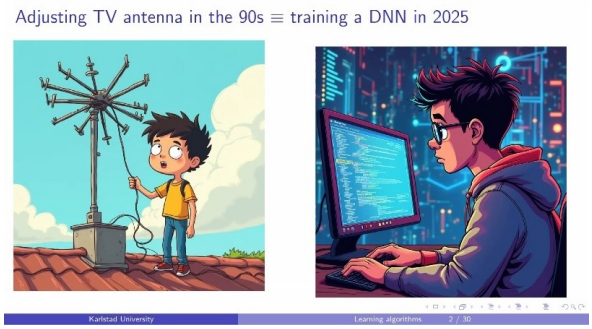
Apr 2025

Into its fifth year, the Florence Nightingale Data Science Talk Series is aimed at bringing together the brightest minds and eminent speakers from diverse domains within the realm of Artificial Intelligence (AI), Deep Learning (DL), and Machine Learning (ML). The second talk in the series was delivered by the school faculty, **Dr. Swapnil Hingmire** and **Dr. Mrinal Das** on **Demystifying LLMs via a journey through the dots** wherein they discussed the recent sensation around LLMs such as ChatGPT and provided insight into what they basically are and how they have been built.

Past talks in the series are listed here.

3. Online Talk by Dr. Arunselvan Ramaswamy, Karlstad University, Sweden

Jun 2025



The talk by Dr. Arunselvan on **Optimization and optimality in deep learning: an anti-fragile approach** featured a modification to SGD called the Stochastic Gradient Pemantle Descent (SGPD). Dr. Arunselvan discussed the resulting properties of SGPD with respect to (local) optimality, demonstrating that it is comparable to Adam, sometimes even better, when it comes to the ease of use and optimality.

*an allusion to the famous Sherlock Holmes quote, "Data! data! data!, I can't make bricks without clay" by Arthur Conan Doyle.

~ Outreach ~

1. Talk by Dr. Sahely Bhadra at Govt. Engineering College, Sreekrishnapuram

Apr 2025

Dr. Sahely Bhadra delivered a talk on **Warping resilient robust anomaly detection for multivariate time series** at GEC Palakkad, Sreekrishnapuram, detailing a method that eliminates warp distortions and efficiently captures the normal pattern in the data, and incorporates graph structure and node embedding learning to capture temporal and intervariable dependencies with unique sparse adjacency matrix learning mechanism.

2. Talk by Dr. Garima Shakya at NIT Calicut

Apr 2025

Dr. Garima Shakya delivered an outreach research talk titled **Multi-agent Systems for Social Good** at the Department of Computer Science and Engineering, NIT Calicut.

3. Talk by Dr. K. R. Sahasranand at ASET, Palakkad.

Jul 2025

Dr. Sahasranand delivered a talk titled **Predicting with Patterns: exploring the geometry of data** at the Department of Computer Science and Engineering, Ahalia School of Engineering and Technology, Palakkad.

4. Invited Talk by Dr. Abhinandan Prasad at IndoSys 2025

Jul 2025

Dr. Abhinandan Prasad delivered an invited talk titled **COUNSEL: Cloud Resource Configuration Management using Deep Reinforcement Learning** at the 7th Indian Symposium on Computer Systems, Bangalore. The talk discussed a deep reinforcement learning-based framework to handle the dynamic workloads and efficiently manage the configurations of an arbitrary multi-component cloud service.

~ Welcome! ~

The school extends a hearty welcome to
the new B.Tech, M.Tech, MS, and PhD students!

~ Publications ~

- "Efficient 3D kernels for molecular property prediction", Ankit, Sahely Bhadra, Juho Rousu, *accepted to* **Bioinformatics**, 2025.
- "On Linear Field Size Access-Optimal MDS Convertible Codes", M. N. Krishnan, M. Vajha, V. Ramkumar, G. Y. Sai, and X. Kong, **IEEE International Symposium on Information Theory (ISIT)**, 2025.
- "Streaming Codes for Multi-Hop Relay Networks With Burst Erasures", V. Ramkumar, M. N. Krishnan, and M. Vajha, **IEEE International Symposium on Information Theory (ISIT)**, 2025.
- "Error Exponents for Robust Hypothesis Testing with Abstention", M. Managoli, K. R. Sahasranand, V. M. Prabhakaran, **IEEE International Symposium on Information Theory (ISIT)**, 2025.
- "Word-Diffusion: Beyond Memorization: Training-Free Style Mixing for Variability in Handwritten Text Generation Using Writer Embedding Injection in Pretrained Diffusion Models", A. Gaurav, S. Chanda, and N. C. Krishnan, *accepted to* **International Conference on Document Analysis and Research (ICDAR)**, 2025.
- "Extracting Temporal commonsense from Text", Lekshmi R Nair, Arun Sankar, and Koninika Pal, **IR-RAG@SIGIR**, 2025.
- "Validating Numerical assertions for Knowledge Graph", Mohammed Taufeeq and Koninika Pal, *accepted to* **The 34th ACM International Conference on Information and Knowledge Management**, 2025.

~ Achievements ~

- Ankit was awarded an **ISMB/ECCB 2025 Conference Fellowship** for presenting his work on Efficient 3D kernels for molecular property prediction.
- Dr. Narayanan C. Krishnan received the **Author Service Award by Springer Nature** for the editorial services of Knowledge and Information Systems Journal, 2025.
- Dr. Narayanan C. Krishnan received the **ANRF International Travel Support** to present his work at IGARSS 2025.
- Dr. Abhinandan Prasad received the **Certificate of Appreciation** for the Service in the ACM Chapters & Membership Committee.
- Dr. Narayanan C. Krishnan has secured research project funding from **Vehant Technologies India**.

Congratulations, Ankit, CK, and Abhinandan!

Congratulations to the graduating class of M.Tech Data Science, 2025.

~ Research Corner ~

In conversation with **Dr. Abhinandan Prasad** who joined the school faculty recently. He works on Systems AI/ML.

Q. *What excites you the most – teaching or research?*

A. A tricky question. For me, both are equally exciting. Both present intellectual challenges and at the same time complement each other.

Q. *A few words on your research interests?*

A. My current interests lie in optimizing systems for AI/ML workloads. I work on Cloud technologies. My work concentrates on optimizing the performance of AI/ML workloads during Cloud and Edge pre and post deployment. Every ML model ultimately runs on the system and with other applications. On a larger canvas, my work is part of MLOps.

Q. *Tell us about your academic background.*

A. I was an Marie-Curie Action fellow and completed my Ph.D. from University of Goettingen, Germany and completed my Master's from IIIT Bangalore in 2011. I did my B.E (Computer Science) from NIE Mysore.

Q. *What subjects do you plan to teach/offer in the long run?*

A. Currently I am teaching MLOps. I plan to offer courses on Software 2.0 for ML covering modern software development with design patterns targeted towards building AI/ML applications.

Q. *How should our students equip themselves for the fast-moving industry today?*

A. Today tools such as ChatGPT, Claude are evolving at an insane speed. We are entering an end-to-end automation era. The future jobs will require skill sets that cannot be acquired by these tools and skill sets that leverage these tools to get the job done. Hence, it is extremely necessary for our students to understand the concepts deeper and implement their idea through programming. Programming is the paint brush of AI/ML canvas.

Q. *Is this a childhood ambition come true (being in teaching/research) or did you have some other ideas back then?*

A. My childhood dream was to explore computers. I never thought I would be into academics. My software engineering job provided the skill set and idea to explore research and teaching.

Q. *Apart from academics, what do you enjoy?*

A. I enjoy reading books, listening to music, and of course, discussing over a cup of coffee.

Q. *Do you have any new ideas for the school or for our students?*

A. I envision our school to develop tomorrow's leaders who use technology to touch the life of the common man. For this, we need to look for new collaborations across and inside the institute and with industry. Collaborativeness will help us to discover the purpose of our research and equip us with the knowledge of state-of-the-art technologies. For students my suggestion is: *Please talk and discuss your ideas. Do not work in silos.*

As mentioned above, Dr. Abhinandan would be happy to discuss over a cup of coffee. One can find him in his office on the second floor of Dr. APJ Abdul Kalam block.

~ Intern's turn ~

In conversation with **Diksha Prasad**, our B.Tech student who recently completed an internship at Microsoft.

Q. *Congratulations on the internship! What did you work on?*

A. Thank you. I spent about eight weeks in Microsoft Innovation Hub working on a project called Docu-Pilot which is ultimately an automatic loan processor programmed for companies.

Q. *Tell us about the selection process.*

A. The selection process itself was not too difficult; there were three interview rounds: one for coding, second for aptitude and technical, and the third was HR round.

Q. *What kind of questions did you get in the interview?*

A. Most of the questions were related to DSA during the technical interview like sorting, stacks, trees, and a few on lists as well. A few questions based on arrays were also asked during the coding round. Aptitude was more generic, and there were a few questions like what my views on AI, what aspect of technology excites me, etc.

Q. *Can you give us an example of a question you struggled with?*

A. To be honest, I don't quite remember all the questions asked during my interview but one question I got stuck on was a matrix based question where I was asked to print all elements of the matrix in spiral form.

Q. *How did you prepare for the interview?*

A. I have been working on DSA and a few machine learning and deep learning concepts as they were a part of my B.Tech syllabus. Apart from the concepts taught in class, I haven't done any external preparations.

Q. *Do you have a favourite area/subject?*

A. During my internship, I spent most of my time working on AI and agentic AI, so I think I like that field and also Data Analytics as I found it quite interesting.

Q. *What are your plans after this internship and B.Tech?*

A. After B.Tech I currently plan on working for about a year and then pursue my Masters.

Diksha would be happy to answer further queries from the readers; reach out to her on her student email.

~ Editor's dime for the quarter~

What do we mean by "understanding" something? We can imagine that this complicated array of moving things which constitutes "the world" is something like a great chess game being played by the gods, and we are observers of the game. We do not know what the rules of the game are; all we are allowed to do is to ***watch*** the playing. Of course, if we watch long enough, we may eventually catch on to a few of the rules. ***The rules of the game*** are what we mean by ***fundamental physics***. Even if we knew every rule, however, we might not be able to understand why a particular move is made in the game, merely because it is too complicated and our minds are limited. If you play chess you must know that it is easy to learn all the rules, and yet it is often very hard to select the best move or to understand why a player moves as he does. So it is in nature, only much more so; but we may be able at least to find all the rules. Actually, we do not have all the rules now. (Every once in a while something like castling is going on that we still do not understand.) Aside from not knowing all of the rules, what we really can explain in terms of those rules is very limited, because almost all situations are so enormously complicated that we cannot follow the plays of the game using the rules, much less tell what is going to happen next. We must, therefore, limit ourselves to the more basic question of the rules of the game. If we know the rules, we consider that we "understand" the world.

How can we tell whether the rules which we "guess" at are really right if we cannot analyze the game very well? There are, roughly speaking, three ways. First, there may be situations where nature has arranged, or we arrange nature, to be simple and to have so few parts that we can predict exactly what will happen, and thus we can check how our rules work. (In one corner of the board there may be only a few chess pieces at work, and that we can figure out exactly.)

A second good way to check rules is in terms of less specific rules derived from them. For example, the rule on the move of a bishop on a chessboard is that it moves only on the diagonal. One can deduce, no matter how many moves may be made, that a certain bishop will always be on a red square. So, without being able to follow the details, we can always check our idea about the bishop's motion by finding out whether it is always on a red square. Of course it will be, for a long time, until all of a sudden we find that it is on a ***black*** square (what happened of course, is that in the meantime it was captured, another pawn crossed for queening, and it turned into a bishop on a black square). That is the way it is in physics. For a long time we will have a rule that works excellently in an over-all way, even when we cannot follow the details, and then some time we may discover a ***new rule***. From the point of view of basic physics, the most interesting phenomena are of course in the ***new*** places, the places where the rules do not work—not the places where they ***do*** work! That is the way in which we discover new rules.

The third way to tell whether our ideas are right is relatively crude but probably the most powerful of them all. That is, by rough ***approximation***. While we may not be able to tell why Alekhine moves ***this particular piece***, perhaps we can ***roughly*** understand that he is gathering his pieces around the king to protect it, more or less, since that is the sensible thing to do in the circumstances. In the same way, we can often understand nature, more or less, without being able to see what ***every little piece*** is doing, in terms of our understanding of the game.

— Richard Feynman, **The Feynman Lectures on Physics** (1963), Volume 1, Chapter 2, Section 1.

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