# Nishit Neema

M Tech(CSA), **IISc**


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## Courses

**Intelligent Systems**
· Deep Learning for NLP
· Advance Deep Representative Learning
· Machine Learning
· Reinforcement Learning
· Probability and Statistics
· Linear Algebra and Optimization
**Systems**
· Computer Architecture
· Compiler Design
**Algorithmic**
· Design and Analysis of Algorithm
· Computational Geometry

## Skills

**Languages and Tools**
· C · C++ · Python · Pytorch · Hugging Face · Data Structures and Algorithm
**Machine Learning Models**
· Linear Regression · Logistic Regression · Support Vector Machine · PCA · Decision Tree · Ensemble Methods
**Deep Learning**
· CNN · RNN · LSTM · GRU · U-Net · GNN
**Computer Vision/Generative AI**
· Variational Autoencoder · GAN · Diffusion Model · Score based Model · DDIM · CLIP · Text to Image
**Natural Langugage Processing**
· Vector Representation of words · Transformers · Attention · BERT · GPT · BART · ELECTRA

## Responsiblities

- Placement Coordinator of IISc
- Teacher Assistantship for DSA course
- Captain of department Football team

## Achievements

- GATE CSE 2022 **All India Rank 37**
- 200+ Programming Questions
- Madhya Pradesh Medhavi Chaatra Yojna Scholarship

## Hobbies

- Playing Tennis, Cricket and Football
- Exploring new places

## Education

**M.Tech, Computer Science and Automation** **8.6/10**
*Indian Institute of Science(IISc), Bangalore* July'22 - present

**B.E., Computer Science** **8.3/10**
*Institute of Engineering and Technology(DAVV), Indore* 2018 - 2022

**10th, 12th CBSE Board** **10/10, 92/100**
*Chameli Devi Public School, Indore* 2016, 2018

## Research Paper

ICASSP-2024 **Momentum-Imbued Langevin Dynamics(MILD)**
In this paper, we introduce a novel sampling scheme that can be combined with pre-trained score-based diffusion models to speed up sampling by a factor of at least five number of function evaluations (NFEs).

## Research Area

**Leveraging Friendly Neighbourhood for Diffusion Model**
*Prof Chandra Sekhar Sellamantula*
- Diffusion models take some noise as an input and iteratively convert that into a new sample from a distribution on which the model was trained.
- Images are more structured than noise, which the model can leverage to learn a more robust transformation. The process can be made efficient by identifying closely related datasets or a "friendly neighbourhood" of the target distribution.

## Projects

**Protein-Protein Interaction using Graph Attention Network** Sep'23
*Graph Neural Network(GNN), Masked Attention*
- Proteins rarely carry out their tasks in isolation but interact with other proteins present in their surroundings to complete biological activities.
- I have used a graph attention network (GAT) to study the interaction between proteins and classify them into one or more among 121 classes.

**Generative Modeling using Variational Autoencoder** Sep'23
*KL Divergence, ELBO, Posterior Inference, Sampling*
- Implemented a Variational Autoencoder from scratch that was trained on the AFHQ dataset. Generated new images that follow the same distribution.
- Further performed a classification on the latent obtained and compared that with the classification done using CNN. I found out that VAE learns better representation.

**Applying Transformer for Neural Machine Translation** Aug'23
*Positional Encoding, Cross-Attention, KQV matrix*
- Implemented a Transformer from scratch that converts English sentences into Hindi. Followed the same architecture as in the "Attention is all you need" paper.
- Used the IIT Bombay English-Hindi Parallel Corpus dataset.

**Teaching a GAN what not to learn** May'23
*GAN, Negative Sampling*
- GANs were originally farmed as unsupervised generative models that learn to follow a target distribution. Later efforts project it to the semi-supervised setting.
- In this project, I followed the "Rumi GAN" paper to train the GAN on the MNIST dataset, giving even digits as negative samples.

**Sentiment Analysis using Hierarchical Attention** Aug'23
*Context Understanding, Document Representation, LSTM*
- Designed a model that takes sentiment as an input and outputs the probability of that sentiment belonging to the output class.
- Since sentiments are generally more than just a sentence, so I build the hierarchical attention that works on word level first and then on sentence level.

**Reduced Matrix Multiplication and Anticipated-Expression Elimination** Dec'23
*Computer Architecture, Compiler Design*