Mayank Mishra

Senior Undergraduate
Electrical Engineering Department
Indian Institute of Technology, Delhi

Website: https://mayank31398.github.io/
Email: mayank31398@gmail.com
GitHub: https://github.com/mayank31398
LinkedIn: https://www.linkedin.com/in/mayank31398
Google Scholar: https://scholar.google.com/citations?user=YsbtW6cAAAAJ&hl=en

ACADEMIC DETAILS

Year	Degree	Institute	GPA
2016-2020	B.Tech, Electrical Engineering (Power & Automation)	Indian Institute of Technology, Delhi	8.302/10
2016	Higher Secondary School (CBSE)	Delhi Public School	94%
2013	High School (CBSE)	Delhi Public School	10/10

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 921** in **JEE Advanced 2016**.
- Secured **All India Rank 682** in **JEE Mains 2016**.

PUBLICATIONS

- **Adversarial Approximate Inference for Speech to Electroglottograph Conversion** — ***Prof. Prathosh AP, Dept. of EE, IIT Delhi***
  - Optimized the **Speech to Laryngograph encoder using adversarial training** for the network using informative priors
  - Created a **cosine based loss function for enforcing amplitude invariance** between ground truth and network output
  - Used a **variational inference approach** for learning optimal representations for speech signal to infer the EGG signal
  - Demonstrated the advantages of using **informative priors** over Gaussian priors in the variational autoencoder setting
  - Utilized **continuous wavelet transforms using Ricker wavelets** for robust peak picking

  Published in *IEEE Transactions on Audio, Speech and Language Processing (TASLP)* - IEEE preprint, Arxiv preprint and filed patent for the same

- **Variational Inference with Latent Space Quantization for Adversarial Resilience** — ***Prof. Prathosh AP, Dept. of EE, IIT Delhi***
  - Implemented a defense mechanism capitalizing on the expressive power of **regularized latent space generative models**
  - Trained **Variational Autoencoders** with a **K-Lipschitz** encoder to ensure closeness of similar images in the latent space
  - Proposed a mechanism for defending neural networks against adversarial examples using **latent space quantization**
  - Demonstrated the efficacy of the proposed mechanism against multiple attack types (black and white box) and methods

  Submitted to *Association for the Advancement of Artificial Intelligence (AAAI)* - Arxiv preprint

- **Nuclear Power Plants: A Thermodynamic Overview**
  - Presented a thorough literature survey on the thermodynamics of nuclear power plants
  - Studied the thermodynamics of nuclear power plants and presented an extensive mathematical analysis for the same
  - Studied also the current ongoing research in nuclear fission and fusion and wrote a review article on the same

  Submitted to *Progress in Nuclear Energy (Elsevier)* - link to the manuscript

INTERNSHIPS

- **SAMSUNG R&D Institute, Noida / Biz Solutions (May, 2019 - July, 2019)**
  - Implemented a new user authentication system using smartphone sensors for **real-time authentication**
  - Used **LSTM based Variational Autoencoders** for projecting the obtained time-series on a lower dimensional manifold
  - Implemented **few-shot learning** to learn user profiles with minimal data points in an **online learning** environment
  - Created and deployed an android application on several devices and optimized the battery consumption of the same

PROJECTS

- **Real-time Visual Respiration Rate Estimation with Dynamic Scene Adaptation (Feb, 2019 - May, 2019)** ***Prof. Prathosh AP, Dept. of EE, IIT Delhi***
  - Used **Computer Vision** based techniques for estimating the respiration rate from the video footage of an individual
  - Used the proposed algorithm to correctly identify the patients suffering from **pneumonia (fast breathing)**
  - Implemented and optimized the algorithm to run on **Raspberry Pi** for detection in real-time in hospitals
- **Bias Correction in Deep Neural Networks (Aug, 2018 - Nov, 2018)** ***Prof. Prathosh AP, Dept. of EE, IIT Delhi***
  - Worked on reducing dataset bias in neural networks for better generalization without training on multiple datasets
  - Trained an **Auxilliary Classifier GAN (ACGAN)** to generate images conditionally given the class from MNIST dataset
  - Used the original MNIST images and the conditionally generated images from the ACGAN to train a CNN classifier
  - Tested this classifier on a hand-written digits dataset collected in classroom and achieved state of the art performance
- **Lecture Summarization using Deep Learning (Feb, 2019 - May, 2019)** ***Prof. Prathosh AP, Dept. of EE, IIT Delhi***
  - Trained **Convolutional LSTMs** for summarizing video lectures of various online courses
  - Used **Computer Vision** techniques to find edge maps, optical flows and difference of consecutive frames of the videos
  - Used the engineered features for increased accuracy over conventional recurrent networks trained using raw frames
  - Implemented a **WPF software** in C# to summarize the video lectures and generate lecture notes in PDF format
- **Touch-Point Prediction using Deep Learning (May, 2018 - Dec, 2018)** ***Prof. Brejesh Lall, Dept. of EE, IIT Delhi***
  - Worked on improving touch-screen latency for the **SAMSUNG Flip** device without explicitely changing the hardware
  - Trained and benchmarked **Fully Connected, RNNs and LSTMs** and analyzed the performance of the said algorithms
  - Implemented the said algorithms on the device yielding a low error rate with no significant impact on performance
- **Braille Tutoring Application (Jan, 2018 - May, 2018)** ***Prof. M. Balakrishnan, Dept. of CS, IIT Delhi***
  - Implemented tutorials and games using Python for comprehensive learning of Braille by visually challenged students
  - Created a **Linux based secondary software** for the tutor to add customized exercises or games in the application
  - Deployed the application on a **Beaglebone-based Refreshable Braille Device**
  - Worked on providing tactile output, sound and an external **Arduino** based serial LCD display through the Braille device
  - Tested the application with visually challenged students in the **National Association for Blind**
- **Identifying the Diabetic Neuropathic Patients using Machine Learning (Sep, 2017 - Dec, 2017)** ***Prof. Tapan Kumar Gandhi, Dept. of EE, IIT Delhi***
  - Trained **bi-directional LSTMs** for the identification of Diabetic Neuropathic patients using foot pressure data
  - Implemented a **WPF software** in C# to record data using an **Arduino** based pressure mat
- **Crystal Ball Interface to view 3D Objects (Aug, 2017 - Dec, 2017)** ***Prof. M. Subodh Kumar, Dept. of CS, IIT Delhi***
  - Implemented a crystal ball interface using **OpenGL** in C++ for viewing 3D objects saved in .obj file format

COURSES UNDERTAKEN

Machine Learning, Advanced Machine Learning, Information Theory, Data Structures, Computer Architecture, Embedded Systems Design Project, Probability and Stochastic Processes, Linear Algebra and Differential Equations, Calculus, Micro Economics, Signals and Systems, Control Engineering, Digital Electronics, Analog Electronics

TECHNICAL SKILLS

- **Programming Languages**: Python, Java, C++, C#
- **Machine Learning Frameworks**: TensorFlow, PyTorch, Keras, sklearn
- **Softwares**: Visual Studio, Android Studio, Eclipse, Vivado, Linux, MATLAB, Simulink, Unreal Engine 4, Autodesk 3ds Max
- **Interests**: Deep Learning, Quantum Computing, Information Theory

EXTRA-CURRICULAR

- **Institute Academic Mentor, Linear Algebra and Differential Equations (Jan, 2018 - May, 2018)**
  - Selected as an Academic Mentor for Linear Algebra on the basis of exceptional academic performance.
  - Held weekly tutorial sessions for academically weak students, and counseled them to improve performance.