Saankhya Subrata Mondal

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Education

Indian Institute of Science — *Bengaluru, India*
Master of Technology in Artificial Intelligence, GPA: **8.5/10** — *Oct. 2020 - Jul. 2022*
- **Advanced Courses** — *Pattern Recognition and Neural Networks, Machine Learning for Signal Processing, Advanced Deep Learning*
- **Other Courses** — *Linear Algebra, Probability, Data Structures and Algorithm, Digital Image Processing, Data Analytics, Computer Vision*

Visvesvaraya National Institute of Technology — *Nagpur, India*
Bachelor of Technology in Electronics and Communication Engineering, GPA: **8.31/10** — *Jul. 2015 - Jul. 2020*

LVH College — *Nashik, India*
12th Maharashtra State Board, Percentage: 89.69% — *Mar. 2015*

Symbiosis School — *Nashik, India*
10th CBSE Board, Percentage: **97.2%** — *Mar. 2013*

Experience

Samsung R&D Institute India — *Bengaluru, India*
Intern — *Jun. 2021 – Aug. 2021*
- Interned with the IoT (Internet of Things) analytics team and worked on predictive maintenance of smart air conditioners (ACs).
- Trained ML algorithms to predict errors caused due to coolant leakages using a dataset of smart AC's sensor readings.
- Improved precision to 0.7 for the binary classification task thereby reducing instances of unnecessary maintenance checks.

Publication

- **S. Mondal**, "Implementation of Human Face and Spoofing Detection Using Deep Learning on Embedded Hardware," 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Kharagpur, India, 2020, pp. 1-7. [PAPER LINK]

Projects

Melanoma Detection [PROJECT LINK] — *Oct. 2021 - Nov. 2021*
- Trained a **Cycle Generative Adversarial Network** to perform image to image translation between benign and malign skin lesion images.
- Performed data augmentation by generating synthetic malign samples and balanced the highly imbalanced SIIM-ISIC Melanoma dataset.
- Fine-tuned pre-trained EfficientNet weights for the binary classification task and obtained ROC-AUC of **0.89** on the test set.

Reddit Flair Detection [PROJECT LINK] — *Jan. 2022 – Feb. 2022*
- Web-scraped data from a Reddit API and performed basic natural language preprocessing for Reddit flair classification task.
- Used a **pre-trained BERT model** to obtain a F1-Score of 0.64 for the nine-class classification task.

Solving Differential Equations using Machine Learning [PROJECT LINK] — *Aug. 2021 – Present*
- Applied Neural networks to learn the data-driven solution of a system of ordinary differential equation (ODE) that are known to respect a given physical law.
- Using the **Physics Informed Neural Network (PINN)** approach, solved the Poisson Equation that satisfies the physical constraints: the ODE and the boundary conditions.
- Attained mean squared error of the order of 10^{-6} on the test set.

Stock Market Index Prediction [PROJECT LINK] — *Sep. 2021*
- Implemented multivariate time-series forecasting on the NASDAQ-100 index based on stock prices of companies part of it.
- Developed a dual-stage attention based encoder-decoder model and attained **99%** improvement over baseline architecture.

Human Face Spoofing Detection [PROJECT LINK] — *Aug. 2019 – Apr. 2020*
- Proposed a Convolutional Neural Network (CNN) model to **prevent attacks on face recognition systems** caused by human face spoofing.
- Trained the model using **just 13k training samples** collected from the web and attained an accuracy of **93%** on the custom-prepared test set.
- Ensured that the model is lightweight for implementation on a Raspberry Pi device for real-time spoofing detection using a webcam.
- Tested the model on video frames of the samples from the HKBU-MARs anti-spoofing dataset and achieved **87%** accuracy.

Graph Neural Networks for Recommendation Systems [PROJECT LINK] — *Nov. 2021 – Dec. 2021*
- Used **Graph Neural Networks** to create a recommendation system and learn the joint embeddings of each user and item.
- Trained the model to predict the rating of an item by a user by utilizing information from two graphs - user-user graph and user-item graph.
- Carried out experiments on two real-world datasets - Ciao and Epinions dataset and obtained mean absolute error of **0.71** and **1.04** respectively.

Natural Language Inference [PROJECT LINK] — *May 2021 – Jun. 2021*
- Designed **Long Short-term Memory (LSTM)** models for recognizing textual entailment, contradiction, or neutrality between a pair of sentences.
- Applied attention mechanisms and sentence matching techniques to accomplish an accuracy of 83% for the three-class classification task.

Music and Speech Classification [PROJECT LINK] — *Mar. 2021 – Apr. 2021*
- Established an unsupervised method to classify music and speech samples using their spectrogram-generated feature frames.
- Modeled their distributions using two 5-component Gaussian Mixture Models (GMMs) and obtained a test classification accuracy of **97%**.

Skills

Languages Python, C, C++, MATLAB
Libraries Tensorflow, Numpy, scikit-learn, Pytorch, OpenCV, nltk, Pandas, HuggingFace
Softwares Anaconda, RStudio, Tableau
Technical Data Science, Machine Learning, Deep Learning, DSA

Extra-curricular Activities/Achievements

- I am serving as a **student mentor** for 3 M.Tech in AI junior students under the student mentor programme by the Department of CSA, IISc.
- I was selected to attend the **Google Research Week 2022** which had talks on Machine Learning and AI.