Shivani Shimpi

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Experience

- **University of Cambridge** — Cambridge, UK
  Research Project Lead & ML Engineer — *Jan'20 - Sep'20*
  - **Study Conception**: Conceived the study and devised project plans alongside the Research Guide.
  - **Management**: Managed the Machine learning and Application development teams and helped them deploy the software for clinical trials in parallel collaboration.
  - **Natural Language Processing**: Devised the language pipeline, using recurrent neural networks (LSTM and GRU) and transformers (BERT).
  - **Deep Learning**: Used Deep Learning in NLP to process the patterns that depict coherence in speech, ideas, and written words which signify patients at greater risk who develop psychological disorders.
  - **Ensemble Learning**: Multimodally fused the language, audio, and visual modalities.

  Student Researcher — *Feb'19 - Sep'20*
  - **Study Conception**: Depression severity prediction based on an internationally accepted Diagnostic and Statistical Manual of Mental Disorders (DSM)-V.
  - **Frontalization**: Used a real-time frontalization model for video inputs using Generative Adversarial Networks.
  - **Prediction System**: Programmed depression prediction system based on frontalized video inputs. Established correlations between the emotions and associated them with DSM-V score to predict depression severity.
  - **Evaluation Metrics**: The devised model was 96.42% accurate with a precision value of 0.91.

- **University of Arkansas at Little Rock** — Arkansas, USA
  Summer Researcher — *Jun'19 - Jul'19*
  - **Disciplines**: Worked on several interdisciplinary projects in domains like Machine Learning, Information Science, Natural Language Processing, and Computer Vision.
  - **Management**: Managed two teams of 15 individuals including undergraduates, post-graduates, and doctoral students as a technical project lead, reviewed their work, and provided weekly assignments.
  - **Named Entity Resolution**: Devised intelligent word recognition (IWR) to target handwritten and print script or cursive text one word at a time with K-nearest neighbours and levenshtein distance optimization algorithms.
  - **Deep Learning & Computer Vision**: Implemented a real-time frontalization model using GAN for video inputs that was then provided to the sentiment prediction model which predicted the emotion variational graph.
  - **Teaching Assistance**: Taught undergraduate, post-graduate, and doctoral students, and Professors alongside Dr. Mariofanna Milanova at a Deep Learning Workshop from NVIDIA. Solved doubts and assisted in assignment completion.

- **University of Mumbai** — Mumbai, IND
  Teaching Assistant — *Jan'19*
  - **Mentoring**: Mentored over 100 engineering students from all disciplines for a Machine Learning coursework.
  - **Concepts Taught**: Explained the mathematical concepts behind Support vector machines with Linear and Gaussian kernels, Genetic Algorithms, Generative Adversarial Networks (GANs), Deep Neural Networks, Mask-RCNN, and Sequence Models.
  - **Tests and Assignments**: Created Programming assignments based on TensorFlow. Organized doubt-solving sessions further maintaining a healthy environment for discussions. Conducted hands-on code tests and review assignments to foster logic building and intuition.

Publications

2020   Multimodal Depression Severity Prediction from medical bio-markers using Machine Learning Tools and Technologies *(Cornell University Press)*

Scholastic Achievements

2017   Secured an **All India Rank 1079** in **JEE Advanced** (previously IIT-JEE) among 0.15 million candidates

2018   Won the inter-collegiate research convention **Aavishkar'18** from more than 2000 projects from 700 colleges

Relevant Courses & Certifications

End-to-End Machine Learning on GCP *(Google Cloud)* | Machine Learning *(Stanford University)* |
AVR Programming and Wireless Robotics *(Intel)* |Discrete Time Signal Processing *(MITx.org)* |
Natural Language Processing Specialization *(Deeplearning.ai)*

Projects

- **Multimodal Depression Severity Prediction**: Proposed a novel Custom CM Ensemble approach for estimating the severity of depression based on a multi-class classification model based on the language, audio, and visual modalities. The approach attempted to detect, emphasize, and classify the features of depression based on the low-level descriptors for verbal and visual features, and the context of the language features when prompted with a question. Our model achieved a precision value of 0.88 and an accuracy of 91.56%.
- **Personal Website (Digital Portfolio)**: The project is a website built using HTML, CSS, and JavaScript (including jQuery) designed to be fully responsive on all devices including mobile phones, tablets, and desktops.
- **POS Tagging using HMM and Viterbi Algorithm**: The model was built upon ambiguous and unambiguous words using the transmission, emission, and tag counts, further forming the transmission and emission probability matrices using Hidden Markov Models. These transmission and emission matrices were then fed into the Viterbi Algorithm which achieved an accuracy of 95.31%.
- **Customer Segmentation**: Designed a predictive model using the baseline single-layered neural network, bayesian optimization gaussian process, and bayesian optimization search that divided the customers into groups based on common characteristics allowing companies to market to each group effectively and appropriately. The model predictions were 77.78% accurate having an F1-score of 0.77.
- **Interactive Chat Assistant**: Programmed using NLTK using TF-IDF vectorizers and Cosine Similarity.
- **Automated Security Imaging**: Implemented Mask-RCNN with attention mechanism to detect prohibited objects during security scanning by using the GDXray and OPIXray datasets. The study aimed to automate the security imaging. Our model was 92.34% accurate with a precision value of 0.87.
- **Way Finding Robot**: Programmed the Gale-Shapely algorithm in AVR micro-controller and simulated it using the Proteus ISIS simulator. Computed a self-locating matrix through MATLAB image processing, and executed algorithm for mobility and navigation of the robot.

Conferences

- **SciPy conference at IIT Bombay, Mumbai, India** 2018
  Reviewed and studied technical papers on Machine learning, Game theory, and Deep Learning

- **Artificial Intelligence Summit at TechFest IIT Bombay, Mumbai, India** 2018
  Discussed future of AI into NLP with technical heads of companies like Samsung and Amazon

- **Industry 4.0 Conference at IIT Bombay, Mumbai, India** 2020
  Held up several intriguing discussions about the future of Industry 4.0 and Big Data Analytics

Education

- **University of Mumbai** IND
  Bachelor of Engineering | Department of Computer Engineering *Aug'18 – May'22 (Expected)*

Skills and interests

Languages	Python, Octave, Bash, JavaScript, C/C++
Frameworks	TensorFlow, Keras, PyTorch, PyCaret, ReactNative
Softwares	Adobe XD, Weka, Tableau
Domains	Machine Learning, Deep Learning, Natural Language Processing, Data Visualization
Tools	Google Cloud Platform (Apache Beam, BigQuery, Cloud ML Engine), LaTeX, Wolfram Mathematica, MATLAB