HARDIK PRABHU — CURRICULUM VITAE

Research Associate
Computing and Data Sciences, Centre for Mathematical Modelling
FLAME University, Pune, India - 412115
 (+91) 9420726940   •   hardik.prabhu@gmail.com
 hardikprabhu.github.io   •   **in** hardik-prabhu   •   HardikPrabhu

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RESEARCH INTERESTS

My research interests are centred around the intersection of generative modelling, model interpretability, and deep learning techniques, aiming to advance fields such as anomaly detection and explainable AI, among various other applications. I am enthusiastic about exploring the amalgamation of deep generative models, interpretability, and representation learning to come up with impactful innovations in critical fields where model accountability and transparency are desired.

EDUCATION

Chennai Mathematical Institute (CMI)   **Chennai, India**
Master of Science in Data Science, CGPA : 8.38/10   *Aug 2019 - May 2021*

D.G Ruparel College, Mumbai University   **Mumbai, India**
Bachelor of Science in Mathematics, CGPA : 8.75/10   *Aug 2016 - April 2019*

EXPERIENCE

FLAME University   **Pune, India**
Research Associate   *Jan 2023 - Present*

- Led projects focusing on multiple areas including Explainable AI, Generative Modelling, and Genetic Algorithms.
- Served as a Teaching Assistant for courses related to Computational Modelling and Machine Learning
- Actively mentored undergraduate students on their research projects, and guided them in the development and realization of their ideas.

CloudAEye, Inc.   **Fremont, CA, USA (remote)**
Machine Learning Engineer   *July 2021 - Oct 2022*

- Developed and deployed advanced deep learning and machine learning solutions specializing in anomaly detection within logs and metrics produced by cloud-native applications.
- Utilized deep learning techniques such as LSTMs, Variational Autoencoders (VAEs) and Normalizing Flows.
- Additionally, developed a root cause localization method utilizing a PageRank-like algorithm for microservices operating within intricate architectures.
- Conducted technical interviews to assess the proficiency of candidates applying for the ML Engineer role.

CMI Algolabs   **Chennai, India**
Research Intern   *May 2020 - Aug 2020*

- Created a Python-based tool for a software company for mapping functionality script to software documentation by applying Latent Dirichlet Allocation.

RESEARCH PUBLICATIONS

Refereed Conference and Workshop papers . . . .

[C.1] **Prabhu, H.** and Arjunan, P., 2022, November. eptk: energy prediction toolkit. In Proceedings of the 9th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation. (pp. 512-515).(**CORE Rank: A**)

Refereed Journal Articles . . . .

[J.1] **Prabhu, H.**, Sane, A., Dhadwal, R., Parlikkad, N.R. and Valadi, J.K., 2023. Interpretation of Drop Size Predictions from a Random Forest Model Using Local Interpretable Model-Agnostic Explanations (LIME) in a Rotating Disc Contactor. Industrial & Engineering Chemistry Research. (**SCI IF: 4.326, Q1**)

Accepted for Publication . . . .

Refereed Conference and Workshop papers . . . .

[C.2] **Prabhu, H.**, Valadi, J.K. and Arjunan, P., Explainable AI for Energy Prediction and Anomaly Detection in Smart Energy Buildings. In Proceedings of the 10th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation.

Book Chapters . . . .

[B.1] **Prabhu, H.**, Siarry, P., Valadi, J.K., Sane, A., & Dhadwal, R. (2024, expected). Metaheuristic and Evolutionary Algorithms in Explainable Artificial Intelligence. In J.K. Valdi, M. Ojha, K.P. Singh, & P. Siarry (Eds.), Advanced Machine Learning with Evolutionary and Metaheuristic Techniques (pp. XX-XX). Springer: Computational Intelligence Methods and Applications.

Upcoming works . . . .

[C.2] **Prabhu, H.**, Valadi, J.K. and Arjunan, P., 2023, Exploring 1D Wasserstein DCGAN for Effective Anomaly Detection in Smart Building Energy Time Series Data.

[J.2] **Prabhu, H.**, Ravishankar, C., Ganesan, A., Bhosale, H., Parlikkad, N.R, Siarry, P. and Valadi, J.K.,2023, Enhancing Random Forest Model Prediction of Gas Holdup in Internal Draft Air-Lift Loop Contactors: Leveraging Genetic Algorithms for Hyperparameter Tuning and SHAP for Interpretability.

RESEARCH AND DEVELOPMENT PROJECTS

Energy Prediction Toolkit: An Open-source Python Package

Environment: Python   *May 2021 - Dec 2021*

Energy Prediction Toolkit (eptk) is a Python package for implementing and benchmarking energy use prediction models on a collection of large datasets using standard performance metrics. The package includes a variety of predictive models along with a set of configurations that were picked from the top performers in the ASHRAE - Great Energy Predictor III competition hosted on Kaggle. The package provides methods for engineering additional features (temporal, weather and rolling stats) from the datasets. The package also provides ensembling techniques such as meta-regressors, Bayesian optimization and subsampling to combine multiple models. A custom cross-validator is employed which is used for benchmarking models on Time-series data.

Doc2Script: Mapping Functionality Scripts to Software Documentation

Environment: Python *May 2020 - Aug 2020*

A Python-based solution, developed for a software company, employing Latent Dirichlet Allocation (LDA), a probabilistic topic modelling approach, to establish connections between functionality scripts and pertinent documentation available on the company website. This tool facilitates the precise mapping of scripts to corresponding HTML documentation, thereby optimizing the process of functionality testing.

TEACHING EXPERIENCE

o **Teaching Assistant, FLAME University:** CSIT 331, Machine Learning I (Jan 2023 - May 2023)
   Delivered engaging classroom lectures and interactive tutorials covering a range of topics, including fundamental introductions to statistics, comprehensive discussions on Decision Trees and Clustering Algorithms, and coding tutorials.
o **Teaching Assistant, FLAME University:** CSIT 121, Computational Modeling (Jan 2023 - May 2023)
   Delivered engaging classroom lectures and interactive tutorials on optimization using gradient descent algorithm.

PERSONAL PROJECTS

Application of Bayesian Optimization for Hyper-parameter Tuning

Executed the application of Gaussian Process methodology to fine-tune the hyperparameters of a Convolutional Neural Network (CNN) that was specifically designed for the task of recognizing hand gestures.

Reinforcement Learning Algorithms to Solve Gridworld Problems

Trained an agent to travel a M x N grid from any arbitrary cell to the terminal cell, and avoid obstacles placed in between by applying various RL algorithms such as Policy Iteration, Monte Carlo Simulations, SARSA, Q learning, Temporal Difference and Semi-gradient Approaches.

CERTIFICATION AND SKILLS

Custom Models, Layers, and Loss Functions with TensorFlow

Cerificate Issued by DeepLearning.AI *Jan 2022*

Custom and Distributed Training with TensorFlow
Cerificate Issued by DeepLearning.AI *August 2022*

Programming Languages: Python, R and LaTeX

Python Packages: Pytorch, Tensorflow, Scikit-learn, Numpy, Pandas, Pymoo.

Relevant Graduate Coursework: Advanced Machine Learning, Bayesian Data Analysis, Multivariate Statistics, Reinforcement Learning.

REFERENCES

o **Dr. Pandersamy Arjunan** (Research advisor)
Assistant Professor, Robert Bosch Centre for Cyber-Physical Systems (RBCCPS), Indian Institute of Science, Bangalore, India
mkusamy@gmail.com

o **Dr. Jayaraman Valdi** (Research Advisor)
Distinguished Professor, Department of Computing and Data Sciences,
FLAME University, Pune, India
valadi@gmail.com

o **Dr. Venkatesh Vinayak Rao** (Graduate Research Advisor)
Principal Engineer, HERE Technologies, India
vvtesh@gmail.com