

Vaibhav Sahu

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EDUCATION

University of Pennsylvania

Master of Science in Scientific Computing - GPA: 3.76/4

Philadelphia, PA

Aug. 2022 – May 2024

Indian Institute of Science

Bachelor of Science in Physics - GPA: 8.2/10

Bangalore, India

Aug. 2016 – June 2020

EXPERIENCE

Graduate Research Assistant

Prof. Talid Sinno, University of Pennsylvania

May 2023 – Present

Philadelphia, PA

- Measured the Performance of Neural Network Potentials at predicting the Energy Landscape of Materials
- Trained Symmetry Preserving Neural Network Potentials on the DeePMD framework for Copper systems
- Ran 1000s of Molecular Dynamics simulations on LAMMPS using high capacity H100 and A100 GPUs on the cloud for analyzing the Performance of Neural Network Potentials

Research Engineer

Simyog Technology Pvt. Ltd.

April 2021 – July 2022

Bangalore, India

- Achieved a 22% speedup by optimizing the Matrix-Vector Product (detected bottleneck) by parallelizing it to speed up computational solvers to perform EMI/EMC simulations of IC boards
- Implemented experiments on achieving the best way to custom parallelize 1000s of Matrix-Vector operations in the solver
- Implemented a concurrent GMRES algorithm for the computational solver, resulting in a 40% speed improvement using contiguous memory operations
- Single-handedly established a pipeline for simulating Black-box measurement-based Integrated Circuit models using Neural Networks within TensorFlow, which also resulted in a publication

PROJECTS

Playing Hangman with Transformers | *PyTorch, Hugging Face, NumPy*

- Devised a pre-training task in the form of a multiclass classification for the transformer to learn guessing letters in hangman
- Pre-trained Google CANINE on a corpus of 380k words to achieve optimal performance of 56% game winning accuracy
- Devised a Reinforcement Learning based fine-tuning task for better performance
- Fine-tuned the model to achieve 63% winning accuracy within 6 wrong guesses and 87% accuracy within 10 wrong guesses

Extracting Lexical Stylistic Notions From Words Using LLMs | *PyTorch, Hugging Face, NumPy, Scikit-learn*

- Performed Literature Review on Extracting Directions attributing to features, such as Complexity and Formality of Text
- Improved the Performance of LLM-based Contextual Word Embeddings on extracting lexical features and using them to classify phrases using cluster-based Anisotropy removing - accuracy improved from 64% to 83%
- Fine-tuned LLMs to do document-level classification for these features
- Used ML models to make new similarity measures that performed better than cosine similarity

Synthetic Data Classification with GPT | *Python, OpenAI-API, Pandas*

- Synthetic Data is a neat way to avoid privacy issues and cheap to generate
- Generated data by prompting GPT to generate queries by tuning the temperature setting
- Engineered prompts to classify these disputes into 3 categories
- Used Few-shot In-context learning to achieve $\approx 95\%$ accuracy

Masked Face identification using One-Shot Learning | *Python, PyTorch, NumPy, OpenCV*

- Applied transfer learning on Inception-ResnetV1 deployed as a Siamese Network for one-shot face identification to achieve 91% accuracy of the LFW Dataset
- Generated database of masked faces using LFW Dataset and Image Editing using OpenCV
- Retrained the models to achieve 82% accuracy on masked faces

TECHNICAL SKILLS

Languages: Python, C/C++, MATLAB

ML Frameworks: PyTorch, Tensorflow, SQL, Spark, PyTorch, Scikit-learn, Hugging Face, OpenAI-API

Other Frameworks: pandas, NumPy, Matplotlib, Seaborn, OpenMP, AWS, Azure

Courses: Deep Learning, Computer Vision, Big Data Analytics, Applied Machine Learning, Natural Language Processing

Conceptual Skills: Machine Learning, Large Language Models, Natural Language Processing, Parallel Computing, Data Science

CERTIFICATIONS

Generative AI with Large Language Models

[Certificate](#)

Introduction to Machine Learning in Production

[Certificate](#)

DeepLearning.AI: Deep Learning Specialisation

[Certificate](#)

Fundamentals of Parallelism on Intel Architecture

[Certificate](#)