Akshay Nuthanapati

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Education

- **National Institute of Technology, Warangal** — Warangal, India
  Bachelors in Mechanical Engineering, GPA: 7.47/10 — *Aug 2019 - May 2023*

Publications

Akshay Nuthanapati and Raj Dandekar (2023) *Involution And Beyond: Rethinking And Optimizing Transformer Architectures. Journal of Machine Learning Research (Under Review)*
Paper Link
Akshay Nuthanapati (2023) *E-Commerce Supply Chain: Blockchain, Smart Contracts A Packaging Perspective. Journal of Operations Management (Under Review)*
Paper Link

Industry Experience

- **ZenTree Labs** — Hyderabad, India
  Machine Learning Engineer — *Jun 2023 - Current*
  - Fine-tuned BERT for Text Classification (with an accuracy of **99.29%** and precision of **0.9899**) and Llama for Clinical Domain Adaptation.
  - Created a document retrieval tool for internal company usage using LangChain. Built a frontend for the same using react to create access endpoints for various levels of employees. Deployed a resume sceening tool based on **similarity search** of vector embeddings.
  - Trained and tested various machine learning models and deployed them using Amazon SageMaker.
  - Developed solutions to fine-tune generative models to achieve improved accuracy on specific tasks.

Research Experience

- **International Institute of Information Technology (CogSci Lab)** — Hyderabad, India
  Research Assistant - Prof. Bapi Raju S. — *Jan 2023 - Present*
  - Worked on Brain Decoding and Encoding under Prof. Bapi Raju to study language representations in the brain using fmri data analysis and language in the form of text, speech and images.
  - Experimented with various **image-based and mult-imodal Transformer models** (ViT, VisualBERT etc) to investigate their effectiveness in performing accurate fmri brain encoding. Project Link

- **International Institute of Information Technology (Signal Processing Lab)** — Hyderabad, India
  Research Assistant - Prof. Sachin Chaudhary — *Jan 2023 - Present*
  - Proposed a Deep Learning CNN algorithm to improve the performance of digit detection from IOT-based water analog meter. Trained the algorithm on a rich dataset of over 160,000 images collected from six water nodes and achieved significant improvement in **detection accuracy (98%)** over the previously implemented ML algorithm.
  - Implemented the OpenCV EAST text detector in an effort to make the algorithm more robust and generalized. Successfully implemented the algorithm for both 32-bit and 64-bit architectures of the IOT.

- **Deep Forest Sciences** — SF, CA
  Research Fellow — *Sep 2023 - Present*
  - Worked on implementing the MXMNET Model using Bessel functions as part of the opensource DeepChem library.
  - Implemented a graph convolution network to predict molecular properties such as solubility of various chemical compunds with an **accuracy of over (97%)**
  - Developing methods to implement **Neural Operators into Chemical Language Models** with Dr. Bharat Ramsundar.

Academic Projects

- **Knowledge Graph Completion with Graph Neural Networks**: Implemented graph neural network (GNNs) models including TransE, ComplEx and RotatE for triple prediction in knowledge graphs and evaluated them on Hits@K, Mean Rank (MR) and Mean Reciprocal Rank (MRR) metrics. Project Link
- **Predicting Drug Interactions with Graph Neural Networks**: Used the Graph Isomorphism Network on the ogbl-ddi dataset for drug-drug interactions and evaluated them on best val Hits@20 score over 2 runs. Project Link
- **Instance-Specific Augmenter with Representation Matching**: Designed an end-to-end learnable instance-specific augmentation module based on representation matching that can improve meta-learning task performance in a few-shot setting. Project Link
- **Neural Models for Granger Causality Detection**: Implemented a class of neural network based non-linear models for Granger causality detection which are capable of capturing long term dependencies between various time series. Project Link
- **Neural Machine Translation using Bahdanau Attention**: Built from scratch the implementation of a Neural Machine Translation in TensorFlow 2.0 using the Attention Mechanism in accordance with the paper 'Neural Machine Translation by Jointly Learning to Align and Translate' by Bahdanau et al. Project Link

Skills Summary

- **Languages**: Java, C++, Python, C, Javascript, SQL,R, Julia, Scala, Unix scripting
- **Tools**: Kubernetes, Docker, Springboot, GIT, JIRA, Matlab, XCode, Postgres
- **Libraries**: PyTorch, TensorFlow, Keras, PyG, JAX, CVXPY, PySpark, Numpy, Pandas

Honors and Awards

- Ranked in the **top 1** percentile across India among 1 million candidates during JEE Mains.
- Ranked in the **top 1** percentile of students across the state during the Telengana State Board Exams.
- Ranked first among batch of 500 students at High School Level ICSE 2017

Certifications

- Neural Networks and Deep Learning (Coursera)
- Computer Vision and Image Processing (Coursera)
- NLP with Classification and Vector Spaces (Coursera)
- Convolutional Neural Networks (Coursera)
- Robotics Specialization by University of Pennsylvania (Coursera)

Volunteer Experience

- Worked at the Hyderabad Archdiocese Social Service Society for around 120 hours to teach underprivileged children computer capabilities and skills.
- Received certificate of merit for outstanding contribution to the field of social service.

Extra-Curricular

- Was the General Secretary of the Literary and Debating Club of NITW where I conducted multiple events and won numerous debate competitions across the country.
- Secured the gold medal in freestyle swimming in a district-affiliated competition
- Received a gold medal for participating in the first international young envoys art exhibition.