Harshit Kumar

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Education

Northeastern University, Khoury College of Computer Sciences, Boston, MA   *Sep 2022 - Present*
MS in Artificial Intelligence   *GPA: 3.83/4.0*
Courses: Intro to Programming for Data Science, Foundations of AI, Algorithms, Programming Design Paradigm, Machine Learning, AI for Human Computer Interaction, Pattern Recognition and Computer Vision, Large Language Models

Guru Gobind Singh Indraprastha University, Delhi, India   *Aug 2016 - Sep 2020*
BTech in Computer Science and Engineering, top-4 in class   *GPA: 8.72/10.0*

Skills

Programming Languages: Python, C++, C, SQL, Java, R, JavaScript
Machine Learning: PyTorch, Tensorflow/Keras, OpenCV, scikit-learn, pandas, numpy, nltk, matplotlib, seaborn, plotly
Tools & Frameworks: Django, Flask, PySpark, GStreamer, Git, DVC, Docker, Kubernetes, Slurm, ONNX, Linux, HuggingFace
MLOps: Azure AI, AWS SageMaker, NVIDIA TensorRT, DeepStream, TAO, Intel OpenVINO, GitHub Actions, CI/CD

Experience

Graduate Teaching Assistant (Data Mining Techniques) - Khoury College, Boston, MA   *Jan 2024 - Present*
- Assisting in the instruction and evaluation of 60+ students in CS62220 Data Mining Techniques course.
- Conducting office hours to assist students in concepts like data mining, clustering, regression, ensemble methods.

Deep Learning Research Intern - The Jackson Laboratory, Bar Harbor, Maine   *Jul 2023 - Dec 2023*
- Applied *Explainable AI* methods: *Saliency Maps, Integrated Gradients, Kernel SHAP* on DNA sequence data using *PyTorch Captum*, leveraging Slurm for job scheduling and model training on High Performance Computing (HPC) clusters.
- Researched 5+ model interpretability methods for *Graph Neural Networks* such as *GNNExplainer, GraphSVX*.
- Generated 12 *benchmark synthetic datasets* for graph classification tasks for biomedical networks using *PyTorch Geometric*.
- Conducted quantitative assessments with cross-entropy and AUC-ROC evaluate attribution scores against ground truth, optimizing 160+ model architecture configurations *(GCNConv, GraphConv, dropout, L2 regularization)* through *grid search*.

Graduate Teaching Assistant (Programming for Data Science) - Khoury College, Boston, MA   *Jan 2023 - Apr 2023*
- Resolved queries from students in DS5010 Intro to Programming for Data Science course under Prof. Kylie Bemis.
- Graded Python programming and data science assignments and quizzes of 50+ students.

Machine Learning Engineer - Vehant Technologies, Noida, India   *Aug 2020 - Aug 2022*
- Implemented *10+ People and Traffic Analytics* solutions - line crossing, crowd counting, abandoned object detection, tracking, pose estimation, license plate recognition, leading to acquisition of *4 new Smart City contracts* within a year.
- *Optimized* *multi-GPU inference* end-to-end pipeline *1.5 times* for real-time surveillance with *Mixed Precision, Quantization*.
- *Deployed* and trained *8+ deep learning models (YOLO, Faster R-CNN, Mask RCNN, ResNet, etc)* using *PyTorch, Tensorflow, Nvidia TensorRT, DeepStream SDK, TAO, Intel OpenVINO, ONNX, MLFlow, Docker*.
- Preprocessed, wrangled, analyzed, and trained models on large person and vehicle datasets.
- Integrated MLFlow and DVC, Data Version Control, to handle data handling training pipelines.

AI (NLP) Intern - Arbunize Digital Media Pvt Ltd, Delhi, India   *Jun 2018 - Aug 2018*
- Leveraged *text-processing* techniques, including *Named Entity Recognition* (NER), to parse resumes with *nltk, scikit-learn*.
- Extracted skills from resume and applied *random forest, gradient boosting* with 0.89 F1-score to predict job title.
- Developed *Multinomial Naive Bayes*, *Support Vector Machine* (SVM) classifiers with 0.85 R2 across 4 MBTI personalities, utilizing natural language processing techniques like word embeddings, TF-IDF, *dimensionality reduction* (PCA).

Projects

Visual Question Answering with Generative AI [github]   *Dec 2023 - Present*
- Integrated Hugging Face pre-trained tokenizers, Visual Transformer for images, and LLMs for generating answers.
- Fine-tuned multimodal VQA model on 7k DAQUAR dataset, employing transfer learning and data augmentation.
- Achieved 0.3 WUPS with RoBERTa and BEiT outperforming all 4 model combinations viz. ViT, DEiT with BERT, GPT.

Transformer Architecture Implementation and Machine Translation [github]   *Jan 2024 - Present*
- Developed the Transformer architecture from scratch, incorporating attention mechanisms, greedy decoding, beam search.
- Conducted training of the Transformer model on the Multi30k dataset for translating German to English.

Image captioning using Encoder-Decoder [github]   *Jan 2019 - Feb 2019*
- Developed image captioning app based on Neural Image Caption model and reached BLEU-4 of 28.
- Designed ResNet152 CNN as encoder and LSTM as decoder, and deployed model on Django server.

Certifications

- **Certifications:** PyTorch Scholarship (**Deep Learning Nanodegree**), Deep Reinforcement Learning Nanodegree, and Bertelsmann Scholarship (**Data Analyst Nanodegree**) by being in **top 3% out of 10k** applicants.