Harshit Kumar

Boston, MA | kHarshit.github.io | kumar.hars@northeastern.edu | +1(857)693−9361

 github/kHarshit | linkedin/kHarshit | stackoverflow/6210807

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, Py Spark, GStreamer, Git, DVC, Docker, Kubernetes, Slurm, ONNX, Linux, HuggingFace
MLOps: AWS SageMaker, Azure AI, NVIDIA TensorRT, DeepStream, TAO, Intel OpenVINO, GitHub Actions, CI/CD

Experience

Deep Learning Research Co op - 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 - Khoury College of Computer Sciences, 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*.
- Executed 30+ camera *DeepStream pipeline profiling* to detect bottlenecks, optimizing for maximum *throughput*, minimizing *latency*, and devising efficient hardware distribution strategy for video stream processing across multiple machines.
- *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*.

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.

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.

Sentiment Analysis on Amazon SageMaker [github] *Apr 2019 - May 2019*
- Deployed sentiment analysis model on AWS Sagemaker using PyTorch, covering data processing, training using data on S3.
- Integrated custom inference code into web app using AWS Lambda, API Gateway, and IAM roles for seamless functionality.

Events & Achievements

- **Conferences:** Computer Vision Summit'23, 22, NVIDIA GTC'22, GTC'21, GTC'20, PyData'22, Google Cloud Summit'18.
- **Hackathons:** Smart India Hackathon'18 finalist, Rajasthan Hackathon 5.0, Rajasthan Hackathon 4.0.
- **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.
- **Top-15 answerer** of all time on **Stack Overflow** in PyTorch category (**10th** to earn **PyTorch Silver badge**).