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: Foundations of AI, Algorithms, Machine Learning, AI for Human Computer Interaction, 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, OpenCV, scikit-learn, xgboost, pandas, numpy, nltk, matplotlib, plotly
Tools & Frameworks: Django, Flask, PySpark, GStreamer, Git, DVC, Docker, Kubernetes, Slurm, ONNX, Linux, HuggingFace
MLOps: AWS SageMaker, Azure AI, Nvidia DeepStream, TAO, Intel OpenVINO, MLFlow, GitHub Actions, CI/CD

Experience

Graduate Teaching Assistant - Khoury College of Computer Sciences, Boston, MA *Jan 2023 - Present*
- Served as a teaching assistant for the CS62220 **Data Mining Techniques** course (Jan 2024 - Present) and the DS5010 Introduction to **Programming for Data Science** course (Jan 2023 - Apr 2023).
- Created assignments for 60+ students, covering topics like recommendation systems, clustering, ensemble methods.
- Conducted office hours and graded Python programming, statistics, and data science assignments and quizzes.

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*.

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*.
- Mentored 2 fellow teammates and gave technical sessions on *Edge AI* topics w.r.t. *Video Analytics* for Smart Cities.
- *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*.
- Integrated MLFlow and DVC, Data Version Control, and Kafka to handle data handling ML pipelines.

R&D Intern - Vehant Technologies, Noida, India *Jun 2019 - Jul 2020*
- Researched and fine-tuned models for 15+ multi-label *Pedestrian Attribute Recognition* i.e. clothing, age, gender, etc.
- Applied *Monocular Depth Estimation* methods for under-vehicle object detection with 90% accuracy with RGBD data.
- Solved *Semantic, Instance Segmentation* problems for Indian road scene understanding with DeepLab and Mask R-CNN.

Projects

Visual Question Answering with Generative AI [github]
- Integrated Hugging Face pre-trained tokenizers, Visual Transformer for images, and LLMs for generating answers.
- Achieved 0.3 WUPS with RoBERTa and BEiT outperforming all 4 model combinations viz. ViT, DEiT with BERT, GPT.
- To deploy fine-tuned multimodal VQA model model as REST API on flask server and AWS SageMaker.

Sentiment Analysis on Amazon SageMaker [github]
- 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.

Image colorization of historical paintings with GAN [github]
- Leveraged U-Net and pix2pix Convolutional Generative Adversarial Network, to colorize grayscale historical paintings.
- Utilized CIELAB color space conversion and Patch discriminator for enhanced image-to-image translation.

Certifications

- **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 Python, PyTorch category (**10th** to earn **PyTorch Silver badge**).