Harshvardhan **Srivastava**

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Education

Indian Institute of Technology , Kharagpur — CGPA 9.03/10
B.Tech in Electrical Engineering with Minors in Computer Science — *July 2017 – May 2021*

DAV Public School, Kota — 94.2%
All India Senior Secondary Examination (CBSE) — *2017*

Sri Sathya Sai Vidya Vihar, Vijaipur — CGPA 10/10
All India Secondary Examination (CBSE) — *2015*

Technical Skills

Languages: Python, C/C++, Java , HTML/CSS , SQL , Oracle PL/SQL , LateX
Developer Tools: Git, Docker, Kubernetes , AWS, Visual Studio, PyCharm , IntelliJ , Eclipse
Libraries and Frameworks: Open CV, NumPy, Pandas, Scikit-learn, Matplotlib, TensorFlow, Keras, PyTorch

Publications

Articles

[1] Arka Mitra, **Harshvardhan Srivastava**, and Yugam Tiwari. "IIT_kgp at FinCausal 2020, Shared Task 1: Causality Detection using Sentence Embeddings in Financial Reports". In: *CoRR* abs/2011.07670 (2020). arXiv: 2011.07670. URL: https://arxiv.org/abs/2011.07670.

[2] Harshvardhan Srivastava. "Misogynistic Meme Detection using Early Fusion Model with Graph Network". In: *SemEval Colocated with ACL 2022 (Under Review)* (2022).

[3] Harshvardhan Srivastava. "Zero Shot Crosslingual Eye-Tracking Data Prediction using Multilingual Transformer Models". In: *CMCL 2022 (Under Review)* (2022).

Work Experience

Grazitti Interactive — *Panchkula*
Machine Learning Intern — *April 2021 - July 2021*

- Developed an end-to-end NLP engine for Topic-Modelling and Question-Answering of sentence, paragraph, and document level texts and create relevant efficient search query extractions.
- Designed custom weighted word vectors to include context specific words using FastText by Facebook and word vector using GloVe embeddings.
- Deployed testing of the model on a live project and created REST APIs for the above functionalities.
- Implemented effecient query searching to get the fastest response from REST and improved it from 5 seconds to 0.4 seconds.

Samsung RDI — *Bengaluru*
Visual Intelligence Intern — *May 2020 - July 2020*

- ***Burst Image Denoising :***
- Refined an algorithm to apply CNN for deep burst denoising of a burst image dataset and by extending the CNN with parallel recurrent networks that integrate information of all frames in the burst set. Used Attention Mechanism enhanced Kernel Prediction networks .
- Evaluated and compared results with SFD (PSNR = 32.78) and MFD (PSNR = 34.32) to process temporal data with RNN .
- Stabilized the image dataset using Lucas Kanade Optical Flow method to find correspondence with the successive frames .
- ***Super Low Light Video Denoising :***
- Used images in the bayer domain instead of RGB to enhance the quality of the output video .
- Modified the loss function to enable temporal consistency in the output and to annihilate deflickering due to frame changes in the video.
- Achieved SOTA comparable results with PSNR (Peak Signal to Noise Ratio) matching 29.8 and SSIM (Structural Similarity Index) to be 0.87.

Indian Institute of Science , Bengaluru — *Bengaluru*
Summer Research Fellow — *May 2019 - July 2019*

- ***Dynamic and Robust Server Allocation using Apache Kafka :***
- Created a multi-node multi partition Kafka Cluster to store the data from live streams to verify the robustness of the created cluster in case of failure ,channeled data from Twitter real time streams to the created cluster .
- Collected , analysed native Kafka performance metrics ;Tweaked parameters to improve Kafka scalability , throughput management.
- Learnt ZAB (Zookeeper Atomic Broadcast Protocol) - the current implemented follower and leader management system and its similarities and improvements over Paxos Algorithm or Raft Consensus Algorithm.

Projects

Lexical Complexity Prediction using Multi-Head Attention Enhanced BiLSTMs
Kharagpur

SemEval 2021 Task 1 | NLP *Jan 2021 - April 2021*

- Designed a novel architecture to tackle single and multi word complexity prediction . Predicting lexical complexity accurately can enable a system to better guide a user to an appropriate text, or tailor a text to their needs.
- Extracted many features such as POS tag, number of hypernyms, hyponymns in order to treat multi word tokens as compositional.
- Obtained Pearson scores of 0.742 on single token performance and scores of 0.832 for multi token performance which fetched us *14th* position from a total of 186 teams worldwide.

Operationalising Individual Fairness with Pairwise Fair Representations
Kharagpur

Term Project | AI and Ethics *Jan 2020 - April 2020*

- Implemented and designed a fairness graph and PFR model to address unfairness in the outcome of decisions involving individuals like race, gender , income group etc. Tuned parameters k(for kth quantile) and p(for p nearest neighbours) for maximum value of AUC score.
- Evaluated the influence of outcomes of individuals with metrics like Consistency , and group effects like Disparate mistreatment and Disparate Impact which is used to quantify the fairness level in the surveying metric and equality measures in community.
- Utilized well known datasets like COMPAS , Crimes and Communities and used race as a protected attribute.
- Obtained accuracy scores of 66.1% as compared to the original 69.56% and reduced the positive prediction rate for African Americans .

Autonomous Ground Vehicle Research Group
Kharagpur

Undergraduate Researcher *May 2018 - July 2019*

- As a member of Controls team , I was responsible for analyzing and enhancing the stability , path prediction and lane detection.
- Worked on model predictive control for an autonomous vehicle and established the model detecting rollover of a vehicle and prediction of position of bot using Kalman Filter and Road Segmentation using unsupervised K-Means Clustering, Mean Shift algorithm.
- Designed mounts for various sensors to be integrated in Mahindra E2O for Mahindra Driverless Car Challenge.

Speed Breaker Detection
Kharagpur

Undergraduate Research Project *Aug 2020 - Dec 2020*

- Created a dataset of Speed Breaker images by collecting images from the IIT Kharagpur Campus and implemented various image augmentations to generate 20,000 images.
- Designed and implemented a deep learning model which detects Speed Breaker at 20 frames per second on Intel i5 processor.
- This module is integrated with the car system which slows the by applying break whenever a Speed Breaker is detected.

Unified Agricultural Rental System
Kharagpur

Term Project | Techno Entrepreneurial Leadership *Aug 2019 - Dec 2019*

- Created an Android based application that helps farmers of India and facilitates them with agricultural equipment in a rental fashion.
- Created Blog functionality to help farmers access relevant and useful information.
- Added a chatbot based system for efficient query searching for equipment information retrieval.

Honors & Awards

International

2019	**Second Prize**, 27th Intelligent Ground Vehicle Competition	*Oakland University*
2020	**Round 2 Qualified**, Facebook Hacker Cup	*Facebook*

Domestic

2019	**SRFP Fellowship**, Indian Academy of Sciences	*India*
2018	**Department Change**, IITKGP	*Kharagpur*
2017	**All India Rank 2895**, JEE Advanced	*India*
2017	**All India Rank 1237**, JEE Mains	*India*
2016	**KVPY Fellowship**, SA Stream	*India*
2015	**INMO Qualifed**, amongst 900 students selected nationwide	*India*
2015	**State Rank 1**, NSTSE	*India*
2014	**State Representative**, National Children's Science Congress	*India*

Relevant Coursework

Computer Science : Algorithms , Computer Architecture and Operating System, Programming and Data Structures , Social Computing, Image Processing
ML/AI : Artificial Intelligence , Natural Language Processing , Regression and Time Series Models, AI and Ethics
Mathematics : Linear Algebra for AI and ML , Transform Calculus , Probability and Stochastic Processes, Linear Algebra for AI, Stochastic Process and Simulations