Arsh Verma

@ arshverma@gmail.com +91 9958557300 linkedin.com/in/arshverma

Work Experience

Associate Machine Learning Scientist - 2 at Wadhwani AI

Aug 2021 – Present Delhi, India

- Managers: Dr. Makarand Tapaswi, Dr. Alpan Raval
- **Research Interests**: Deep Learning for Computer Vision, AI for Healthcare, Multi-Model Learning.
- Led discussions and provided insights regarding the ML feasibility for **establishing new use cases and expanding the current solutions** with Ministry of Health and Family Welfare (MoFHW) and top medical institutions in India.
- Appointed as the direct **reporting manager** for 3 associates and 4 interns.

AI for Radiology (ML Lead)

Jan 2022 – Present

- Developed an ML model with **mean AUROC of 90%** (3% gain over SOTA) for analysis of 17 **Chest X-ray** abnormalities, including Heart Failure, Rib Fracture and Lung Tumour, in collaboration with the MoFHW, for deployment on the eCollabDDS, the national digital diagnosis platform which serves 20 million patients annually across India.
- Developed **TB screening** model using Chest X-rays for the National Health Mission, which manages 0.5 Million TB positive cases annually. With **80% Specificity at 90% Sensitivity**, the tool betters the WHO performance recommendation.
- Developed a **Silicosis screening** model using Chest X-rays with the govt. of Rajasthan. Domain adaptation techniques allow the model works on poor quality photographs of X-rays, delivering **84% Specificity at 90% Sensitivity**.
- Used **RoentGen**, a stable diffusion model by Stanford University, to generate synthetic Chest X-rays using LLM generated prompts to supplement data for rare classes in the long-tailed distribution.
- Applied **B-Cos Networks**, a train-time explainability method, to improve the interpretability of our model by 15% on the hit-rate metric compared to post-hoc methods like GradCAM. Work is in progress to improve the model further for deployment.
- **Interacted with medical experts** to understand the data and choose data processing strategies, and drive the product direction.
- Developing capabilities to **deploy models on a mobile** application for inference on smartphone photographs of Chest X-rays.
- Leading the curation of the **largest dataset of smartphone Chest X-ray photographs**, taken from computer screens and physical X-ray films, accounting for multiple environment variables like glare, perspective, lighting conditions etc.
- Responsible for the end-to-end ML cycle: problem formulation, data procurement, annotation processes, model training, deployment, and client deliverables.
- Developed a modular codebase which serves as a template for all image classification projects at WadhwaniAI. It has reduced model development time from two months to one week.

AI for Dermatology (ML Lead)

Jul 2022 – December 2022

- Developed a model to classify **14 skin conditions** most prevalent in India and a **Monkey Pox** screening solution using open source data for deployment on eSanjeevaniOPD, the national tele-consultation platform currently serving 10 million people annually. Our work will be presented at The World Congress of Dermatology 2023.
- Oversaw ML modelling, ensuring fair evaluation, reviewing code and coordinating tasks with other associates on the projects.
- Added functionality for out-of-distribution detection and uncertainty quantification of our models.

Research

Generalized Cross-domain Multi-label Few-shot Learning for Chest X-rays Aimen A., **Verma A.**, Tapaswi M., Krishnan N. C.,
at Winter Conference on Applications of Computer Vision (WACV), 2024 **(Under review)**

How Can We Tame the Long-Tail of Chest X-ray Datasets? **Verma A.**,
at International Conference on Computer Vision Workshop on Computer Vision for Automated Medical Diagnosis (CVAMD), 2023

Can we Adopt Self-supervised Pretraining for Chest X-Rays? **Verma A.** and Tapaswi, M.,
at Machine Learning for Health (ML4H) Symposium 2022

Education

Indraprastha Institute of Information Technology, Delhi

B.Tech. (Hons.), Computer Science & Engineering

August 2017 – June 2021

- **CGPA:** 9.04/10
- **BTech Project:** Reading Signboards for the Visually Impaired (see Projects section below)
- **Coursework:** Deep Learning, Advanced Machine Learning, Trustworthy AI Systems, Meta Learning, Probabilistic Graphical Models, Data Mining, Natural Language Processing, Probability & Statistics, Linear Algebra.

Projects

Impact of Generative AI tools on Software Development

Advisor: Dr. Pankaj Jalote (Founding Director and Distinguished Professor at IIIT Delhi)

July 2023 – Present — IIIT Delhi

- Mentoring 3 groups of 2 students each in independently developing the same software using ChatGPT, Copilot and classical software engineering practices.
- Studying the change in effort, productivity and creative thinking of software developers using Generative AI tools.

Reading Signboards for the Visually Impaired

Advisor: Dr. Chetan Arora (Associate Professor at Indian Institute of Technology (IIT), Delhi)

Jan 2020 – Jun 2021 — IIIT Delhi

- Led the Scene Text Recognition task of the Mobility Assistant for the Visually Impaired (MAVI) project.
- Prepared a bi-lingual dataset of Indian navigation signboards (English & Hindi texts) with challenges like skew, blur and shadow.
- Achieved 32% improvement in word accuracy and 42% improvement in normalized edit distance score over the baselines on our custom bilingual test set using models trained on synthetic and custom data.
- Ported the end-to-end model to a hardware compatible format for deployment on a wearable device for the visually impaired.

Customer and Sales Management System (CSMS)

Advisor: Dr. Pankaj Jalote (Founding Director and Distinguished Professor at IIIT Delhi)

Jan 2020 – Jun 2020 — IIIT Delhi

- Studied **open source software (OSS)** development processes including software development life cycle and licenses.
- Created a mobile app CSMS for small scale companies. Currently being used by 48 employees.
- Features like user login, attendance, leave tracker, location monitoring, appointment scheduling, and document upload.
- **Technologies:** React Native, Firebase, Cloud, Expo.

Awards and Achievements

- **[2022]** GRE General Test- Quant: 169/170, Verbal: 161/170.
- **[2018, 2020, 2021] Dean's Award for Excellence in Academics** Awarded to top 5% students each year.
- **[2018] Dean's Award for Excellence in Sports**: Awarded to one individual each year.
- **[2016]** SAT I- 1500/1600. SAT II- Math II: 800/800, Physics: 800/800.

Positions of Responsibility

Reviewer, Machine Learning for Health Conference 2023

Sept 2023

Subreviewer, Joint International Conference on Data Science and Management of Data 2023

Aug 2022

Head Teaching Assistant

Aug 2020 - Dec 2020, and Jan 2021 - May 2021 — IIIT Delhi

- Graduate level ML course offered by Dr. Jainendra Shukla and Dr. Saket Anand resp. in the Monsoon and Winter semester.
- Managed a team of 7 TAs each for the course taken by 150 undergraduates, postgraduates and PhDs.

Teaching Assistant

Aug 2020 - Dec 2020 — IIIT Delhi

- **Software Development using Open Source** course, by Dr. Pankaj Jalote, taken by 41 undergraduates and post-graduates.
- This was the first offering of this course - inspired by my team's project work.
- Assisted with **course planning**; **delivered lectures** on open source tools; managed all course logistics and evaluations.

President, The 65th Square (Chess Club) and Evariste (Math Club)

Sep 2017 - Jul 2020 — IIIT Delhi

Volunteer Experience

Student Mentor

Aug 2019 - May 2021 — IIIT Delhi

- Mentored 8 first year undergraduate students in each academic year.

Coordinator, Summer Camp

May 2018 - June 2019 — IIIT Delhi

- Organized the annual Summer Camp for 200 under-privileged school students with 40 volunteers.