Simmi Mourya

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Education

- **University of Pennsylvania** — Philadelphia, PA
  Master of Science in Computer and Information Science — *Aug 2019 - May 2021*
  - **Coursework**: OS, Networked Systems, Analysis of Algorithms, Internet & Web Systems, Advanced Machine Perception, Comp. Linguistics, Computer Vision, Machine Learning. **Teaching Assistant:** CIS-581: Computer Vision
- **Cluster Innovation Center, University of Delhi,** — New Delhi, India
  Bachelor of Technology in Computer Science and Applied Mathematics — *Aug. 2013 - July 2017*

Experience

- **Moderna Inc.** — Seattle, WA
  Applied Scientist II, AI/ML team — *Present*
  - Architected and implemented robust **ML infrastructure** to handle end-to-end **data preprocessing**, transformation, **and model training** processes, significantly enhancing the efficiency and scalability of **training next-generation LLMs**. Leveraged extensive experience in AWS and Docker to ensure seamless deployment and operational excellence.
  - Created tools for multiple organizations to leverage Large Language Models in order to enhance their workflows, integrating custom plugins including **retrieval, OCR, data analysis, and dynamic API routing**.
  - **Enhanced model performance** significantly by designing an automated evaluation for retrieval tasks, utilizing LLMs for generating a diverse set of test cases, thereby effectively doubling the test creation process.

- **Amazon, Packaging Innovation** — Seattle, WA
  Machine Learning Engineer — *Jul 2021 - March 2023*
  - Developed and deployed a **multimodal** deep learning model integrating product images and textual data to optimize packaging, achieving a **36% reduction in outbound packaging weight** and **eliminating over 1,000,000 tons** of material. Applied advanced techniques to address class imbalance (Borderline SMOTE, Near-miss Under Sampling, and Focal Loss), improving model performance by up to 30%, significantly reducing carbon footprint and material costs, and supporting Amazon's net zero carbon goal by 2040.
  - Implemented, tested, and deployed a packaging automation feature to enable shipping packages in vendor provided containers. The initiative is projected to generate Amazon **$280 million** in annualized savings towards packaging, transportation and labor cost in **16** fulfillment centers across **NA & EU**.

- **University of Pennsylvania** — Philadelphia, PA
  Graduate Research Assistant — *May 2020 - Dec 2020*
  - **Advised by Chris Callison-Burch**: Worked on **intersection of NLP and Computer Vision**. Developed a novel task framework for Goal-Step inference, Step membership inference using multimodal Wikihow data. *(PyTorch)*
- **ESRI** — New Delhi, India
  Applied Scientist I — *May 2019 - July 2019*
  - **ArcGIS Python API**: Developed Multispectral (near infrared) support for **Pixel classification** in **ArcGIS**.
  - **Spatial Dataframes**: Optimized validation checks in arcgis.geometry package using pre-compiled Cython binaries. This processes **0.1 million** entries in less than **2 ms**, which earlier took **45-55 ms**. *(Python, Cython)*
- **IIIT Delhi** — New Delhi, India
  Lead Applied Scientist — *Feb 2018 - March 2019*
  - Demonstrated deep experience in the complete model development cycle, including **dataset construction**, **training, tuning, evaluation, performance profiling, and monitoring. Owned and Published multiple datasets**: Mourya S., et al. (2019). ALL Challenge dataset of ISBI 2019 (C-NMC 2019) (Version 1) [dataset]. The Cancer Imaging Archive.
  - **Article**: Mourya S., et al. (2018). LeukoNet: DCT-based **CNN** architecture for the classification of **normal versus Leukemic** blasts in B-ALL Cancer.
  - **Accepted Challenge**: Classification of Normal versus Malignant Cells in B-ALL White Blood Cancer Microscopic Images, challenge selected at IEEE ISBI '19, Venice, Italy. *(Python, PyTorch)*
  - **LeukoGAN**: A Dual representative adverserial network based on **U-Net ACGAN to generate synthetic Cancer data**.
- **Predible Health** — Bangalore, India
  Applied Scientist I — *August 2017 - December 2017*
  - Developed **U-Net** based framework for Lung nodule **segmentation from 3D CT scans**. Also developed **classifiers** to analyze nodule level malignancy and emphysema. Built POC for identifying cancerous lung nodules from Radiomics data. Streamlined prototyping and testing via parallelization of the **data pre-processing pipeline**. *(Python)*
- **Google Summer of Code** — Portland State University
  Computer Vision Research Intern — *May 2016 - August 2016*
  - **Cyvlfeat**: Developed high-performance Cython wrapper: Designed 12 new features for a computer vision library (**VLFeat**), **bridging the gap between cutting-edge research and practical product development**, and contributing to the **open-source community** with high-impact software releases.

Research Projects

- **Computer Vision**: Built an **attention mechanism** in form of **Region Proposal network** (RPN) as a backbone for **Mask RCNN**. Implemented **vectorized ROIAlign** for FPN-ROI Mapping. Developed **YOLO** (end-to-end) for **object detection**, with a Non Maximum Suppression post-processing module.