

# Simmi Mourya

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## EDUCATION

- **University of Pennsylvania** Philadelphia, PA  
*Master of Science in Computer and Information Science, GPA: 3.74/4.0* **Graduating May 2021**
- **Coursework:** Analysis of Algorithms, Internet & Web Systems, Software Systems (Audit), Advanced Machine Perception, Comp. Linguistics, Computer Vision, Machine Learning. **Teaching Assistant:** CIS 581- Computer Vision, C++ Programming
- **Cluster Innovation Center, University of Delhi** Delhi, India  
*Bachelor of Technology in Information Technology, GPA: 8.2/10* Aug. 2013 – July 2017

## SKILLS

- **Software:** Java, Apache: (Spark, Storm, Bench), Oracle BDB, PHP, HTML/CSS, Javascript, SQL, MongoDB, Jenkins, ArcGIS
- **Research:** Python, **PyTorch**, FastAI, Keras, Scikit-Learn, Numpy, Pandas, Caffe, Cython, Python/C API, MATLAB
- **Accepted Talks:** "Scientific Computing using Cython: Best of both worlds!" - EuroScipy '18, Europython '17, Pycon India '17

## RESEARCH PROJECTS

- **Computer Vision:** Built an **attention mechanism** in form of **Region Proposal network (RPN)** as a backbone for **MaskRCNN**. Implemented **vectorized ROIAlign** for FPN-ROI Mapping. Developed **YOLO** (end-to-end) for **object detection**, with a **Non Maximum Suppression** post-processing module. Built a semi-automated **optical flow based tracker** for videos.
- **Learning Visual control for Car Racing:** Implemented a **Fully connected Deep Q-network** and achieved an average reward of 210.92 for 10 evaluation steps. The best performing model had 70,475 parameters and trained for **only 570 episodes**.
- **NLP:** Developed a **Bilingual Named Entity Recognition** using Bi-LSTM CRF, Self Attention.

## EXPERIENCE

- **University of Pennsylvania** Philadelphia, PA  
*Graduate Research Assistant* May 2020 - Present
  - **Multimodal Question Answering framework:** Working on intersection of NLP and Computer Vision. Developing a novel task framework for Goal-Step inference and Step membership inference using multimodal Wikihow data. Also contributing towards extending the tasks for 1 million HowToVideos dataset.
- **ESRI** Delhi, India  
*Software Developer* May 2019 - July 2019
  - **ArcGIS Python API:** Developed framework for **Multispectral support for Pixel classification** in **ArcGIS** Python API. Developed Pyramid scene parsing backbone support of **object segmentation** for the API.
  - **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**.
- **IIIT Delhi** New Delhi, India  
*Research Associate* Feb 2018 - March 2019
  - **Article:** Mourya, S., Kant, S., Kumar, P., Gupta, A. and Gupta, R., 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.
  - **R&D:** Designed and deployed LeukoAnalyzer - Exploits fusion of Discrete Cosine Transform (DCT) domain features extracted via CNN with Optical Density space features for detection of cancerous white blood cells from blood slides.  
**LeukoGAN:** A Dual representative adversarial network based on U-Net ACGAN to generate synthetic Cancer data.
- **Predible Health** Bangalore, India  
*Software Developer* August 2017 - December 2017
  - **Development:** Developed **U-Net** based framework for Lung nodule segmentation from 3D CT scans (LIDC-IDRI dataset). 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.
- **Google Summer of Code** Portland State University  
*Software Developer Intern* May 2016 - August 2016
  - **Cyvlfeat:** Designed and developed 12 new features for a **high-performance Python/Cython wrapper** of computer vision library, VLFeat. Emulated the wrapper from **MATLAB MEX** scripts. (Added algorithms specializing in image understanding and local features extraction and matching such as LBP, SIFT, hierarchical k-means, SLIC).

## SOFTWARE PROJECTS

- **Search Engine:** Built a scalable web crawler hosted on Amazon AWS complete with a crawler, indexer, pagerank, and a front end. Worked majorly on developing a **TF-IDF** and **Map-Reduce** Based Indexer based scalable Indexer. Also worked on DevOps for Gradle, EMR, Hadoop, EMRFS and minor Hadoop DevOps for PageRank. (Team size: 4)
- **Multi-threaded web server and Service framework:** A Java based web **HTTP 1.1 compliant web server** developed from scratch. Later merged it with a custom-built web service framework which emulates the behaviour of **Java Spark**.