Harsh Maheshwari

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EDUCATION

Georgia Institute of Technology, *Atlanta, US*
*Master of Science in Computer Science (Specialization: **Machine Learning**)*   *Aug. 2021 – Present.*
***Advisor: Dr. Devi Parikh**; Expected Graduation: May 2023*

Indian Institute of Technology, Delhi, *New Delhi, India*
B.Tech in Electrical Engineering; GPA: 8.27/10.0   *Jul. 2015 – May. 2019*

PUBLICATIONS and PREPRINTS

1. **CoSIR: Optimal control of SIR epidemic dynamics by mapping to Lotka-Volterra System**, *under review at **NeurIPS'21**, presented at **CHIL'21 Workshop** and **ICLR'21 Workshop MLPCP***
   <u>Harsh Maheshwari</u>, Shreyas Shetty, Nayana Bannur, Srujana Merugu

2. **Style-Attention-based Compatible Outfit Generation**, *Under review at BMVC'21*
   <u>Harsh Maheshwari*</u>, Lucky Dhakad*, Debopriyo Banerjee, Niloy Ganguly, Arnab Bhattacharya

3. **Audience Creation for Consumables - Simple and Scalable Precision Merchandising for a Growing Marketplace**,
   Shreyas S, <u>Harsh Maheshwari*</u>, Avijit Saha*, Samik Datta*, Shashank Jain, Disha Makhija, Anuj Nagpal, Sneha Shukla, Suyash*

4. **A Flexible Data- Driven Framework for COVID-19 Case Forecasting Deployed in a Developing- world Public Health Setting**,
   Sansiddh Jain, Avtansh Tiwari, Nayana Bannur, Ayush Deva, Siddhant Shingi, Vishwa Shah, Mihir Kulkarni, Namrata Deka, Keshav Ramaswami, Vasudha Khare, <u>Harsh Maheshwari</u>, Soma Dhavala, Jithin Sreedharan, Jerome White, Srujana Merugu, Alpan Raval

5. **Adaptive COVID-19 Forecasting via Bayesian Optimization**, *CODS-COMAD'21*
   Nayana Bannur, <u>Harsh Maheshwari</u>, Sansiddh Jain, Shreyas Shetty, Srujana Merugu, Alpan Raval

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WORK EXPERIENCE

Graduate Research Assistant, *Georgia Institute of Technology*
Advised by: Dr. Devi Parikh   *Aug. 2021 – Present.*

- Working on problems related to creative multi-modal generative models.

Data Scientist II - Flipkart, *Bengaluru, India*
Largest E-Commerce platform in India with over 200M users   *July. 2019 – July. 2021*

- *Complete The Look* (Prof. Niloy Ganguly - IIT KGP, Dr. Arnab Bhattacharya - Flipkart):
– Generating **fashion-compatible** and **diverse** outfits for a 'hero' product for Indian users and their preferences.
– Designed an architecture and algorithm to learn outfit compatibility conditioned under a 'style'.
– Designed a **beam search** variant using **determinantal point process** to introduce diversity **across outfits**.
– Implemented SOTA **fashion-compatibility, apparel segmentation, category classification** models and a flask web tool to get annotations.

- *Candidate Generation and Ranking* (Samik Datta, Dr. Adiya Rachakonda - Flipkart):
– Customized **Bayesian Personalised Ranking based Matrix Factorisation** framework for Flipkart homepage recommendation
– Designed multiple **Lamda MART** & LR based rankers for Flipkart home and product page.
– Improvement in overall conversion by 2bps (units/visits) and 16bps (units/visitor) - *won an internal **project award** for on this work*

Covid19 Volunteer - DSIndiaVsCovid19, Wadhwani AI,
A consortium of volunteer technologists to support public authorities in managing COVID-19   *March. 2020 – July. 2021*

- *Forecasting* (Dr. Srujana Merugu - Google Research, Dr. Alpan Raval- Wadhwani AI, Dr. Mohit Kumar- Udaan.com):
– Developed an **ML framework** for infectious disease forecasting based on **SEIR epidemiological model variants**
– Achieved less than 10% MAPE error on the forecasts for COVID-19 by estimating parameters via **Bayesian optimization**.
– *Impact:* The system is being used for COVID-19 medical preparedness in war rooms of heavily impacted Indian cities.

- *Controlling an Epidemic* (Dr. Srujana Merugu - Google Research, Wadhwani AI):
– Proposed a control framework by mapping the SIR model to the well studied **Lotka-Volterra** system and **control-Lyapunov** theory.
– The framework permits **design of non-pharmaceutical interventions** that limits the overall disease burden on an isolated region.

Internships

Videoken, *Bengaluru, India*
Computer Vision, Deep Learning *May. 2018 – July. 2018*

- Constructed a classifier which used patches of images, inspired by **patchGAN's discriminator**, to classify slides from software demo frames in a video by using **spatial pyramidal pooling** to deal with images of different sizes.
- Built an OpenCV based semi-automated image segmentation tool using **Django Framework** to reduce human efforts for annotating images by employing object tracking. Used to create annotated dataset quickly.

Projects

BoardSnapped, *Advised by: Dr. Prathosh AP*
Video summarisation *Dec. 2017 – July. 2018*

- Formulated educational video summarization problem as a keyframe detection problem.
- Achieved classification accuracy of **99.3%** and keyframe detection acc. of **97.38%** with precision & recall of **74%** & **77%** by using **CNNs** and **bi-directional convolutional LSTM** models. *Received highest grade by the panel*.

Skin Segmentation from NIR Images, *Advised by: Dr. Prathosh AP*
Segmenting skip pixels from Near Infrared Images *April. 2018 – Dec. 2018*

- Generated skin segmentation dataset for NIR Images using a **pix2pix** like **conditional GAN** from RGB images.
- Trained **ResNet38** and **PSPnet** to segment human skin pixels from NIR Images to achieve high dice coefficient.

SKILLS & INTERESTS

Research Interest: Computer Vision, Creative AI

Deep Learning Frameworks: PyTorch, TensorFlow, Keras

Languages: Python, C++, Java

Courses: Deep Learning, Big Data Systems, Mathematical Foundations of ML, Introduction to Machine Learning, Advanced Machine Learning, Computational Learning Theory and Mind, Information bottleneck Theory of Deep Learning, Information Theory, Data Structures and Algorithms, Probability, Linear Algebra

SCHOLASTIC ACHIEVEMENTS

- Awarded **Best Project Award** at Flipkart for a recommendations ranking project (*2020*)
- Among 11 finalist teams in 4-stage National level AI/ML Challenge - Flipkart GRiD (*2019*)
- **Huawei Seeds for the Future:** Among **4 students** from India selected for a 2-week training program in **China**, studied Chinese Language and Culture in BLCU, Beijing and picked up hands-on experience of **5G**, **IoT** and **Cloud Computing** in Huawei Headquarters, Shenzhen (*2018*)
- **All India Rank 834** in IIT-Joint Entrance Exam Advanced among **1.4 million** students. (*2015*)
- **NSEP top 1%:** Certified for being in **top 1%** out of 37837 in National Standard Examination in Physics (NSEP) organised by Indian Association of Physics Teachers (IAPT) (*2015*)