Udit Paul

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Education

University of California Santa Barbara **Expected: December 2023**
Doctor of Philosophy (Ph.D.), Computer Science

University of Cape Town **June 2018**
Master of Science (M.S.), Electrical Engineering

Research Interests

Inquisitive computer scientist engaged in measuring and evaluating the quality of internet access for different user groups. Presently concentrating efforts on characterizing digital inequality through the collection and analysis of large-scale internet measurement data sets to identify disenfranchised communities. Long-term research objective is to identify and understand factors that contribute to internet disparity amongst communities and develop solutions that would enable stakeholders mitigate the persistent digital gap.

Selected Publications

- **Udit Paul**, Jiamo Liu, Mengyang Gu, Arpit Gupta and Elizabeth Belding, "The Importance of Contextualization of Crowdsourced Active Speed Test Measurements", Proceedings of the ACM SIGCOMM Internet Measurement Conference 2022 (**IMC'22**).[***Best paper***]
- **Udit Paul**, Jiamo Liu, David Farias-Llerenas, Vivek Adarsh, Arpit Gupta and Elizabeth Belding, "Characterizing Internet Access and Quality Inequities inCalifornia M-Lab Measurements",Proceedings of the Conference on Computing and Sustainable Societies (**COMPASS'22**).
- Vivek Adarsh, Michael Nekrasov, **Udit Paul**, Alex Ermakov, Arpit Gupta,Morgan Vigil-Hayes, Ellen Zegura, Elizabeth Belding, "Too Late for Playback: Estimation of Video Stream Quality in Rural and Urban Contexts", Proceedings of the Passive and Active Measurement Conference (**PAM'21**).

Professional Experience

Graduate Research Assistant **September 2018 – Present**
University of California Santa Barbara *Santa Barbara, California*

- Developed Broadband Subscription Tier (BST) methodology which is a two-stage hierarchical unsupervised classification technique to identify broadband subscription tier information from crowdsourced active measurements. BST is able to classify subscription tiers of measurements with 99% accuracy.
- Curated a data set of 17,000 tweets obtained from the social media platform, Twitter, and developed a natural language processing framework to detect and isolate power and communication outage-related tweets to assist first responders in the event of natural disasters. Implemented 22 different machine learning algorithms and achieved close to 90% accuracy in performing the required classification task.

PhD Research Intern **June 2022 – September 2022**
IBM *Yorktown Heights, New York*

- Contributed to an Agent-Based Model (ABM) that simulates the impact of lack of good quality internet connectivity on populations of different socioeconomic statuses. Built the component of the model that estimates the effect of poor quality internet for different households. Additionally, contributed to the building of a web application that provides the whole model as a service to the public. Work under review for publication.
- Conducted a longitudinal analysis on a dataset of **30M** to understand how the internet quality has changed for different population groups. Applied statistical tests to determine the magnitude of difference in internet quality between sub-populations. Finally, deployed machine learning models to predict internet performance from demographics and infrastructure metrics. Work under review for publication.

Telecommunications Engineering Intern **June 2020 – September 2020**
CTC Technology & Energy *Kensington, Maryland*

- Implemented an active network measurement test suite as part of the company's Connect America Fund II (CAF II) compliant measurement kit.
- Implemented data monitoring dashboards using Tableau for the Alabama Broadband Connectivity for Students project.
- Conducted background research on various physical level properties of 4G and 5G small cells.
- Implemented a computer vision-enabled machine learning framework for automated classification of utility poles from static images.
- Created a data storage and processing pipeline for a large-scale Internet Service Provider data collection project for the state of Alabama.

Research Assistant **September 2016 – June 2018**
University of Cape Town *Cape Town, South Africa*

- Designed a network selection algorithm for handover for users of multiple applications.
- Designed and implemented a traffic load based infrastructure planning mechanism to support user demand in 5G networks.

Awards

- Best Paper Award winner, ACM SIGCOMM IMC'22
- Poster runner-up, ACM HotMobile'19

Selected Projects

Broadband Offering Tool

- Designing web scrapers for multiple internet service providers' web services to scalably obtain broadband service offer-related information such as download speed and cost of access at any given street address in the US.
- Employing Python's selenium and requests libraries with Docker to asynchronously make API calls and record responses in a relational database.

Emergence: A delay tolerant web application for disaster relief

- Developed a progressive web application that stores user messages locally in periods of break in internet connectivity. When connectivity is established, the locally stored messages are automatically pushed for transmission.
- Utilized Javascript ServiceWorker that allowed background processing and pre-caching of pages and data.

Steam Price Tracker

- Jointly developed a Ruby on Rails based scalable web app to track price of games found in Steam.
- Provided a social networking component in the form of comments and chat service.

Teaching

- Introduction to Computer Networks (CMPSC 176A) - Spring, 2019.
- Computer Networking (CMPSC 176B) - Winter, 2019.
- Introduction to Computer Networks (CMPSC 176A) - Fall, 2018.

Technical Skills

Languages	Python, Ruby, C/C++, JavaScript, MySQL, PostgresSQL, Bash
Developer Tools	Google Cloud Platform, Amazon Web Services, Android Studio
Technologies/Frameworks	Linux, GitHub, Hadoop, Spark, Tableau, Docker, Tensorflow, Pytorch