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Rahul Kumar Dass

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Education

University of Miami

Doctor of Philosophy in Computer Science; GPA: 3.85/4.00

Coral Gables, FL

May 2022 (Expected)

Thesis: Predictive Policing: Matching Defendant Mugshots to Criminal Court Sentencing Based on Racial and Ethnic Physical Characteristics Using Machine Learning

Advisors: Dr. Ubbo Visser and Dr. Nick Petersen

Indiana State University

Master of Science in Computer Science, GPA: 3.89/4.00

Terre Haute, IN

May 2017

Thesis: Decision Tree Learning – implementation and improvement of ID3 algorithm

Advisor: Dr. László Egri.

Lancaster University

Master of Physics in Theoretical Physics, GPA: 3.0/4.0 (Second Class Honours)

Lancaster, United Kingdom

July 2013

Thesis: Quantum Field Theory II

Advisor: Dr. Anupam Mazumdar.

*Bachelor Degree equivalency**

**[Completed three-years of full-time undergraduate coursework and proceeded straight to a Master's degree.]*

Programming Languages and Technologies

Python; C/C++; Linux tools; Vim; Bash; LaTeX; SQL; Git/Github; Java – proficient.

TensorFlow; JavaScript; MongoDB; Redis; PostgreSQL – prior experience.

OpenCV, NumPy, Pandas, Matplotlib, scikit-learn – Data Science tools used

Experience

University of Miami

Coral Gables, FL

Graduate Research Assistant - Department of Computer Science

January 2018 – August 2019

- Installing and configuring a cluster (1-head node and 32-compute nodes) from scratch to create an NSF-funded open source, distributed HPC infrastructure for experimental evaluation of an automated theorem proving system called StarExec-Miami, fork of StarExec which uses enterprise level architecture. (NSF Award Number 1730419)
- Improved codebase for jobs to fully utilize hardware resources by using native StarExec, SGE and Linux log files to debug, troubleshoot and resolve software compatibility issues. Code edits were proposed as git pull requests and were merged with the original StarExec repository.

Graduate Teaching Assistant - Department of Computer Science

August 2017 – May 2019

- CSC 424 – Network communication and security (Grader** and held 4-hr/week C lab sessions > 20 undergrad CS seniors)
- CSC 220 – Computer Science Programming II (4-hr weekly Java lab sessions > 30 undergrad CS majors)
- CSC 401 – Computer Science Practicum 1 (Grader** and held weekly JS/HTML office hours for 8 undergrad CS seniors)
- CSC 545 – Intro. to Artificial Intelligence (Grader** and 7-hr/week lab sessions to help CS seniors)

***[created bash scripts and/or Makefiles to help automate student grading]*

Summer Research Assistant - Department of Sociology

May 2018 – July 2018

- Improved manual data preprocessing by automation; linking 200,000 unlabeled mugshots' jail number IDs with their court records and created a training dataset of 14,000 mugshots for 3 student raters resulting to 42,000 individual labels as part of a machine learning pipeline that could not have been distributed without using Python scripts and Linux tools.

Research Projects

- Predictive Policing** (Aug 2019 – present): testing if current deep learning models reinforce racial inequalities based on transfer learning approaches using Python, Keras/TensorFlow and TorchVision/PyTorch. Also, exploring if adding facial landmark measures and image preprocessing (face segmentation, cropping, pose correction etc.) using OpenCV/Dlib improves arrestee's race/ethnicity classification to help prevent bias within the criminal justice system.
- Facial profiling using deep learning** (Dec 2018 – July 2019): assessed mugshots' classification accuracies based on 1) two race groups (Black and White), and 2) four race/ethnicity subgroups (Black Hispanic, Black non-Hispanic, White Hispanic, White non-Hispanic) by fine-tuning VGG-16 and VGG-Face models using two Nvidia Tesla P100s, obtaining 85% and 93.7% for task 1, and 43.6% and 50.2% for task 2.

Leadership and Awards

- **U-LINK Predoctoral Fellowship (\$40,000 per year, 3-years), University of Miami** (Aug 2019 – Present): selected as one of two recipients from a pool of 41 graduate student applicants across three UM campuses based on the merits of a proposed interdisciplinary project, team of mentors from Computer Science and Sociology and potential societal impact.
- **U-LINK Phase 1 Grant (\$40,000), University of Miami** (Jan – Aug 2019): selected as the only graduate student team member listed on a U-LINK interdisciplinary Phase 1 grant out of 7 awarded faculty team projects for proposing to link criminal sentencing disparities with arrestees' physical characteristics in Miami-Dade County using machine learning. (\$10,000 to Dass)

Technical Documents***

***[For a complete list, please visit: <https://miami.academia.edu/RahulDass> Note: this is not a list of publications but a list of technical documentations written when conducting independent research/projects.]

- [1] Dass R., *Q-Learning: Tabular to Neural Networks*. ECE 753 – Final Report, University of Miami, 2018.
- [2] Dass R., Ma L., and Manolovitz B., *Reinforcement Learning: Navigating mazes using SARSA*. ECE 648 – Project 3, University of Miami, 2018.
- [3] Ma L., Manolovitz B., and Dass R., *Radial Basis-function Network*. ECE 648 – Project 2, University of Miami, 2018.
- [4] Ma L., Manolovitz B., and Dass R., *Linear Classification: Perceptron vs WINNOW*. ECE 648 – Project 1, University of Miami, 2018.
- [5] Dass R., *Decision Tree Learning – An implementation and improvement of the ID3 algorithm*. CS 695 – Final Report, Indiana State University, 2017.
- [6] Dass R., Mukherjee A. and Banerjee S. *Student Java Online Documentation*. PGDSE – Advanced Java Project, Jadavpur University, 2013.
- [7] Dass R., *Library Automated System*. PGDSE – Visual Basic.Net Project, Jadavpur University, 2013.
- [8] Dass R., *Quantum Field Theory II*. PHYS 451 – Master of Physics Thesis, Lancaster University, 2013.
- [9] Dass R., *The quantum theory of many interacting particles with an investigation into the jelly model of a degenerate electron gas*. PHYS 373 – Mini-project III, Lancaster University, 2012.
- [10] Dass R., *Symmetry in quantum mechanics through group theory and its representations*. PHYS 372 – Mini-project II, Lancaster University, 2012.
- [11] Dass R., *The variational method and applying the perturbation theory to derive the Fermi-Dirac Distribution*. PHYS 371 – Mini-project I, Lancaster University, 2011.