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Rahul Kumar Dass

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Education

University of Miami — Coral Gables, FL
Doctor of Philosophy in Computer Science; GPA: 3.85/4.00 — **May 2022 (Expected)**

Indiana State University — Terre Haute, IN
Master of Science in Computer Science, GPA: 3.89/4.00 — May 2017
Thesis: Decision Tree Learning – implementation and improvement of ID3 algorithm
Advisor: Dr. Lászzló Egri.

Lancaster University — Lancaster, United Kingdom
Master of Physics in Theoretical Physics, GPA: 3.0/4.0 (Second Class Honours) — 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.]*

Research Projects

- ***Predictive Policing*** (Aug 2019 – present): achieved greater fairness across 7 deep learning architectures **(Python and fastai/PyTorch)** by proposing a multidimensional approach to annotate faces based on race-ethnicity combinations. Outperformed current text-based approaches used in social sciences for 4 demographic groups by 12.51% to 22.15% using just 2% of images from a mugshot dataset (MDC, Florida). Led to a peer-reviewed conference article.

- ***RoboCup@Home Virtual 2021*** (Jan 2020 – present): leading the UM Robotics vision team and improving 67 YCB objects' perception and localization for a Toyota HSR in simulation **(Docker, ROS and Gazebo)** by applying extensive robot tailored data augmentations and high-level object categorizations for general robotic tasks such as "clean-up", "bring me" and "avoid obstacles" **(Python, darknet, YOLO).**

- ***FATE@DR*** (Dec 2020 – present): investigating the extent of racial-ethnic bias and the relation of medical image quality assurance when predicting the severity of diabetic retinopathy as a multi-label classification problem using retinal fundus images (**Python and fastai/PyTorch**). Funded by a Miami CTSI Pilot Award ($40,000) and working in collaboration with University of Miami Bascom Palmer Eye Researchers.

Experience

University of Miami — Coral Gables, FL
Graduate Research Assistant - *Department of Computer Science* — January 2018 – May 2019

- Installed and configured a cluster (1-head node and 32-compute nodes) from scratch to create an **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 submitted 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

- Held lab/office hours to assist undergraduate students with Computer Science course concepts including Intro. to Artificial Intelligence, Java Programming and Networking and Security. Used **bash scripts**, **Makefiles** to help automate grading.
- Conducted practical lab sessions for programming languages including **C, Java** and **Javascript/HTML** for > 50 students.

Summer Research Assistant - *Department of Sociology* — May 2018 – July 2018

- Improved manual data preprocessing by linking 194,393 mugshots' jail number IDs with their court records using **Python scripts** and **Linux tools**. Created a randomized dataset of 14,000 mugshots based on demographic metadata to be annotated by student raters for an interdisciplinary research proposal that was successfully awarded a $40,000 grant.

Fellowships and Awards

- **U-LINK Predoctoral Fellowship, University of Miami** (Aug 2019 – Present): selected from 41 graduate student applicants across 3 UM campuses to support interdisciplinary Ph.D. research focusing on the development of trustworthy computer vision systems and understanding how racialization occurs within AI and society.

- **U-LINK Phase 1 Grant ($10,000), University of Miami** (Jan – Aug 2019): responsible for detailing a deep learning pipeline to link arrestees' physical characteristics with their criminal sentencing outcomes to show racial disparities within Miami-Dade County, mentioned as an equal contributor despite being a Ph.D. student as part of a 4-faculty member team.

Programming Languages and Technologies

Python; fastai/PyTorch; Linux tools; Vim; Bash; LaTeX; SQL; Git/Github – proficient.
Keras/TensorFlow; ROS; C/C++; Java – prior experience.
OpenCV, dLib NumPy, Pandas, Matplotlib, scikit-learn – Data Science tools used

Talks and Workshops

"Beyond Black and White: Assessing Deep Learning Facial Classifications by Considering Race and Ethnicity as a Multidimensional Physical Characteristic" PhD. Student Talk Series, Department of Computer Science. University of Miami. April 6, 2020.

"Facial Recognition, Ethical Considerations and Social Responsibility" invited panel discussion with Miami-based community stakeholders including Microsoft Philanthropies, Miami Police Department, and Kairos; followed by case study workshop on "Facial Recognition Adoption" with 100 honors students. Miami Dade College. November 14, 2019.

"Gigabytes for Good" invited co-presentation with Dr. Nick Petersen (advisor). Center for Computational Sciences Social Systems Informatics Lecture series. University of Miami. November 1, 2019.

"Agent Skill Learning and Keepaway using Parameterized Policy Search" Ph.D. Student Talk Series, Department of Computer Science. University of Miami. March 26, 2018.

Peer-reviewed Conference and Workshop Publications

Rahul K. Dass, Odelia Schwartz, and Ubbo Visser. "From ImageNet to Facial Analysis Classification: Rethinking CNN Initialization Paradigms for Out of Domain Adaptation using Self-Auditing," 2021 – *working paper*.

Rahul K. Dass, Nick Petersen, Marisa Omori, Tamara R. Lave, and Ubbo Visser. "Detecting Racial Inequalities in Criminal Justice: An Ethical Deep Learning Approach for Generating and Interpreting Racial Identification using Mugshots." – *under review*.

Rahul K. Dass, Nick Petersen, Ubbo Visser, and Marisa Omori. "It's Not Just Black and White: Classifying Defendant Mugshots Based on the Multidimensionality of Race and Ethnicity." *Proceedings of the 17th Conference on Computer and Robot Vision*, 2020. DOI 10.1109/CRV50864.2020.00039, IEEE Xplore, pp. 238-245.

Reviewer

- RoboCup
- International Conference on Learning Representations (ICLR)
- Scientific Reports - Nature Research Journal