Muhammad **Osama** Sakhi

U.S. Citizen | msakhi3@gatech.edu | www.sakhi.es | mosdragon | mosakhi

Education

Georgia Institute of Technology *Atlanta, Georgia*

Master of Science in Computational Science & Engineering *Aug 2017 - Dec 2019*

- **GPA:** 3.85
- **Coursework:** Computer Vision, Learning with Limited Supervision, Computational Data Analysis, Numerical Linear Algebra, Machine Learning for Trading, Modeling & Simulation, Algorithms, Computational Chemistry, Quantum Mechanics

Georgia Institute of Technology *Atlanta, Georgia*

Bachelor of Science in Computer Science *Aug 2013 - May 2017*

- **GPA:** 3.86
- **Concentrations:** Devices & Intelligence
- **Coursework:** Machine Learning, Natural Language Processing, Artificial Intelligence, Design and Analysis of Algorithms, Robotics & Perception, Systems & Networks, Digital Design Lab, Prototyping Intelligent Appliances

Skills

Artificial Intelligence	Graph Search Algorithms, Probabilistic Inference, Particle Filtering, Markov Decision Processes
Machine Learning	Deep Learning, Q-Learning, Self-supervised Learning, Object Detection, Image Classification
Programming	Python, C, C++, SQL, Java, Golang, JavaScript, HTML, MATLab
Frameworks	PyTorch, Scikit-Learn, Pandas, OpenCV, SimPy, Spark
Other	AWS, GCP, Docker, Kubernetes, REST APIs, LaTex

Research

The REDUCE Project *Dr. Munmun De Choudhury*

GT Social Dynamics & Wellbeing Lab *Jul 2019 - Present*

- Created language model embeddings for social media data to feed into time-series model to forecast weekly suicide attempts
- Trained regression model using language features from millions of Tweets to serve as one learner in final ensemble approach
- Collaborating with teammates to determine additional time-series streams that may aid in the forecasting problem

Cross Domain Context Prediction for Sketch-Based Image Retrieval *Research Project*

Group Lead *Sep 2019 - Present*

- Extending Carl Doersch's self-supervised context prediction approach to visual representation learning by predicting relative direction of patches from aligned images in two different domains
- Researching related works, defining problem statement, and designing evaluation metrics to compare performance of our models against benchmark results for sketch-based image retrieval
- Implementing Doersch's AlexNet inspired network architecture and performing ablation studies to compare how using varying levels of ImageNet pre-training affects overall model performance on sketch-based image retrieval
- Presenting findings and methodology to other graduate students with backgrounds in Deep Learning and Computer Vision

Facebook SUMO Challenge *Dr. Zhile Ren*

Research Assistant *Sep 2018 - Mar 2019*

- Trained a Faster-R-CNN network on 360 Degree RGB-D images to localize bounding boxes in 2D
- Recovered 3D bounding box predictions from 2D object detections using a variety of heursitics for 100+ categories to place 2nd in SUMO Challenge
- Began extension of deformable convolutions for 3D voxel inputs
- Contributed to baseline methods for SUMO dataset paper with collaborators from Stanford and Princeton. Paper is on-hold pending resolution of legal disputes on the curation of the dataset by Facebook

Computing Betweenness Centrality *Dr. Oded Green*

High Performance Computing Lab *Aug 2016 - May 2017*

- Ported algorithm for computation of betweenness centrality on dynamic graphs onto NVIDIA GPUs using cuStinger framework

Experience

Georgia Institute of Technology *Atlanta, Georgia*

Head Teaching Assistant for Intro. to Artificial Intelligence *Aug 2019 - Present*

- Managed a team of 17 Teaching Assistants responsible for all grading and projects for 450 undergraduate students
- Developed entirely new mass auto-grader system with built-in plagiarism detector to reduce grading time for each TA by 85%
- Created extensive new review guides for all core course concepts: Graph Search Algorithms, Reinforcement Learning, Probabilistic Inference, Neural Networks, and Decision Trees
- Served as guest lecturer on Particle Filtering for a class section with 300 students
- Organized and lead review sessions with co-TAs to better prepare students for exams and projects

The Home Depot *Smyrna, Georgia*

Computer Vision Intern *May 2019 - Aug 2019*

- Fine-tuned 20+ models to extract fine-grained features from furniture images to enable training of a generative model that could produce aesthetically compatible furniture collections
- Developed a reusable framework for quickly aggregating images from the various data sources, performing data cleanup and augmentations, fine-tuning ResNet/VGG models, and evaluating using F1 scores and confusion matrices

DukeTIP *Houston & Atlanta*

Instructor *Jun 2018 - Jul 2018*

- Taught a total of 40 students for four weeks across two courses: Modern Programming and Artificial Intelligence
- Designed syllabi, conducted parent-teacher conferences and crafted assignments spanning five core topics: Fundamentals of Python Programming, Web Development, Graph Search Algorithms, Machine Learning, and Natural Language Processing

Pindrop *Atlanta, Georgia*

Software Engineer *Jun 2017 - Jun 2018*

- Automated a data collection task that consumes 90 days' worth of data for researchers to create adaptive fraud detection models
- Optimized memory consumption for a new service to use 75% less memory than previous implementations
- Created new framework for continuous deployment of fraud detection models to production systems
- Migrated database records from Postgres to Redis and used custom key-value encoding to optimize lookup times

Georgia Institute of Technology *Atlanta, Georgia*

TA for Intro. to Artificial Intelligence *Fall 2016, Spring 2019*

- Lead review sessions to help students better understand course concepts in preparation for projects and exams
- Graded coursework, proctored exams, held weekly office hours to ensure students understood course material and projects

Pindrop *Atlanta, Georgia*

Software Engineering Intern *May 2016 - Aug 2016*

- Designed database performance experiment to help determine which relational database scaled appropriately for the expected load of 1 million requests/day
- Helped re-architect existing monolithic back-end API server with smaller, independent micro-services

The Home Depot *Atlanta, Georgia*

Research & Development Intern *Mar 2015 - Aug 2015*

- Designed path planning algorithm for semi-autonomous floor cleaning bot to traverse store aisles
- Utilized Computer Vision and Optical Character Recognition libraries to scrape Driver's License information from images
- Created handwriting recognition Android app to allow for quicker product searches and checkout
- Developed a walkie-talkie Android application that communicates using WebSockets to relay audio messages in real time

BitPay *Atlanta, Georgia*

Software Engineering Intern *May 2014 - Aug 2014*

- Integrated analytics system throughout BitPay application to monitor site responsiveness and activity for 35,000 merchants
- Designed database schemas and executable utilities to enable automated daily financial settlements of $1M to merchants

Standard Code *Atlanta, Georgia*

Web Developer Intern *Oct 2013 - May 2014*

- Developed internal project milestone management platform using MySQL and Ruby on Rails

Projects

The Humor Genome Project *Dr. Lew Lefton*

Database Team Lead *Aug 2015 - Dec 2015*

- Developed web application that crawls Reddit pages for jokes and recommends jokes for users to view and rate
- Create database schemas for jokes and reviews to enable future linguistic exploration of jokes

Presentations

Generative Adversarial Network Paper Discussion *Atlanta, Georgia*

Discussion Lead *Sep 2019*

- Reflected on the strengths of the GAN paper by Ian Goodfellow to contrast a colleague who presented on the weaknesses of the paper
- Presented the concept of GANs and the intuitions that went into its development to an audience of 50 graduate students

TEDxGeorgiaTech Spring Conference *Atlanta, Georgia*

Finalist Student Speaker *Apr 2019*

- Chosen as the sole GT student to return as a speaker for April 2019 Conference in front of an audience of 400

TEDxGeorgiaTech Fall Speaker's Salon *Atlanta, Georgia*

Student Speaker *Nov 2018*

- Selected among 70 applicants to deliver a TED talk in front of a crowd of 200 students
- Presented on the importance of mentorship and on inspiring students to find their passions

Extracurriculars

TEDxGeorgiaTech *Atlanta, Georgia*

Student Speaker, Panel Moderator *Sep 2018 - Nov 2019*

- Selected among a crowded field of candidates to delivered TEDx talks twice in front of crowds of over 250 TEDxGeorgiaTech conference attendees
- Served as moderator for a panel of board members representing TEDxAtlanta, TEDxUGA and TEDxEmory discussing the challenges of hosting TEDx events

Georgia Tech RoboJackets *Atlanta, Georgia*

Software Team *Sep 2015 - Feb 2016*

- Utilized Arduino with Lego Bricktronics components to build simple robots that navigate without colliding into obstructions
- Developed firmware to interact with updated hardware for autonomous soccer-playing robots for International RoboCup competition

Georgia Tech IEEE *Atlanta, Georgia*

Webmaster *Aug 2014 - Apr 2015*

- Developed completely new public site that allowed all officers to post updates using just Markdown

Georgia Tech Student Government Association *Atlanta, Georgia*

Sustainability Committee Member *Sep 2013 - May 2014*

- Established sustainability reward system for club events across campus to promote green habits

Startup Exchange *Atlanta, Georgia*

Member *Sep 2013 - May 2014*

- Attended weekly meetings and learned about the challenges of running a startup, from ideation to funding to intellectual property to maintaining a user base

Honors & Awards

2019 **2nd Place**, Facebook SUMO Challenge 3D Object Detection Track

2017 **Highest Honors**, Georgia Institute of Technology Spring 2017 Graduation

2016 **Recipient**, Faculty Honors

2015 **Recipient**, Faculty Honors

2014 **Scholarship Recipient**, Asian & Pacific Islander American Scholarship Fund & Wells Fargo Scholarship