Kazi Shahrukh Omar

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EDUCATION

University of Illinois at Chicago   *August 2021 - May 2026 (Expected)*
Doctor of Philosophy*,* Computer Science, GPA(Current): 4.00/4.00
Advised by Dr. Fabio Miranda

Military Institute of Science and Technology   *February 2015 - August 2019*
Bachelor of Science, Computer Science and Engineering (CSE), GPA: 3.71/4.00

RESEARCH EXPERIENCE

University of Illinois at Chicago, Department of Computer Science
Research Assistant (Supervisor: Dr. Fabio Miranda)   *August 2021 - Present*

- Investigated coverage of OpenStreetMap (OSM) sidewalk data and computed the trustworthiness index as an alternative measure to assess the quality of the data. There is a massive scarcity of information on the location, condition, and accessibility of sidewalks across the world, which limits interactive mapping and urban analytics. Our study takes a step toward understanding OSM sidewalk data quality by evaluating its coverage and reliability.
- Developed a novel computational framework based on a conditional generative adversarial neural network that enables the quantification of sunlight access and shadows at a global scale. Our proposed method was 12x faster compared to the state-of-the-art shadow-accrual maps that use ray tracing and 120x faster than a standard ray tracing algorithm using NVIDIA's Optix.
- Developed an in-memory model to approximate spatiotemporal mobility-flow queries based on NeuralCubes - a neural network model for learning query-result approximation. Our model yielded less than 2% absolute error in query approximation while keeping a low memory footprint (114 KB)

Military Institute of Science and Technology, Department of CSE
Final Year Thesis (Supervisor: Dr. Muhammad Nazrul Islam)   *February 2018 – December 2018*

- Developed a prediction model to detect autism spectrum disorder (ASD) for different age groups using a merged random forest (CART and ID3) classifier. The model could effectively predict autistic traits for all three age groups and was later deployed in a mobile application.
- Developed a system for tracking Alzheimer patients' health and location through IOT hardware modules and a mobile application.

TEACHING EXPERIENCE

University of Illinois at Chicago, Department of Computer Science – Chicago, IL

Teaching Assistant (CS 424: Visualization and Visual Analytics)   *August 2022 - Present*
Course Instructor: Dr. Fabio Miranda

Teaching Assistant (CS 425: Computer Graphics)   *January 2022 - May 2022*
Course Instructor: Dr. Fabio Miranda

Uttara University - Dhaka, Bangladesh

Lecturer   *July 2019 – June 2021*
Courses Taught:
Discrete Mathematics - Computer Peripheral, Interfacing and Maintenance - Digital Logic Design - Computer Graphics - Object Oriented Programming - Design and Analysis of Algorithms - Data Structures

PUBLICATIONS

K.S. Omar, G. Moreira, D. Hodczak, M. Hosseini, M. Lage and F. Miranda, "Deep Umbra: A Global-Scale Conditional Generative Adversarial Approach for Sunlight Access and Shadow Accumulation in Urban Spaces", *IEEE Transactions on Big Data*. **(Under Review)**

K.S. Omar, G Moreira, D Hodczak, M Hosseini and F Miranda, "Crowdsourcing and Sidewalk Data: A Preliminary Study on the Trustworthiness of OpenStreetMap Data in the US", *ASSETS'22 UrbanAccess Workshop*. **(Accepted)**

K.S. Omar, M.N. Islam, and N.S. Khan, "Exploring Tree-Based Machine Learning Methods to Predict Autism Spectrum Disorder", *Neural Engineering Techniques for Autism Spectrum Disorder, vol (1), pp 165–183. Academic Press*, 2021.

K.S. Omar, A. Anjum, T. Oannahary, R.K. Rizvi, D. Shahrin, T.T. Anannya, S.N. Tumpa, M.M. Karim, M.N. Islam and F. Rabbi, "An Intelligent Assistive Tool for Alzheimer's Patient", *The 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT)*, 2019.

K.S. Omar, P. Mondal, N.S. Khan, M.R.K. Rizvi, M.N. Islam, "A machine learning approach to predict autism spectrum disorder", *International Conference on Electrical, Computer and Communication Engineering (ECCE)*, 2019.

TECHNICAL SKILLS

- **Programming Languages:** Proficient: Python, C/C++; Familiar: JavaScript, Java, R, MATLAB, Shell Scripting
- **Web:** HTML, CSS, Bootstrap, Angular, Flask
- **Libraries/Frameworks:** NumPy, Pandas, Dask, Matplotlib, Seaborn, Plotly, scikit-learn, TensorFlow, d3.js, Shiny
- **Other Skills:** Version control - Git, Latex/Overleaf

SELECT HONORS AND AWARDS

- Merit Scholarship for academic performance, Military Institute of Science and Technology, 2018
- Dean's List (two consecutive years), Military Institute of Science and Technology, 2016-2017

SELECT PROJECTS

US Gun Death Statistics of 2013
University of Illinois Chicago, Fall 2022
- A visualization system to investigate US gun death statistics on city and state scales for the year 2013.
- Built using Pandas, JavaScript, HTML, CSS, SVG, and d3.js.

Big Yellow Taxi
University of Illinois Chicago, Spring 2021
- A visualization tool to identify the trends and interesting patterns in Taxi ridership data (2019) in Chicago.
- The visualizations were created for a screen with a resolution of 5760x1620.
- Built using Pandas, R, and Shiny.

Modeling the Pandemic
University of Illinois Chicago, Spring 2021
- This project was created to model and visualize the impact of COVID-19 in Chicago neighborhoods using sociodemographic data and COVID-19 statistics.
- The sociodemographic and COVID-19 data used were at ZIP code level granularity.
- Built using Numpy, Pandas, Matplotlib, Seaborn, Geopandas, and scikit-learn.

Shadow Map
University of Illinois Chicago, Fall 2021
- Web application to visualize the distribution of accumulated shadows for each season of the year.
- The accumulated shadows were computed for three days of the year: June 21 (summer solstice), September 22 (autumnal equinox), and December 21 (winter solstice).
- Built using HTML, CSS, JavaScript, d3.js, Angular, and Flask.