Hossameldin Mohammed

Data Scientist/Machine Learning Engineer

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Summary

Current Research Data Scientist and Data Science Instructor at UBC. Over 6 years experience in data science and machine learning. Recently won the first place in the Statistical Society of Canada Case Studies in Data Analysis Competition. Experience covering a wide area of data science and machine learning tools and models on a variety of problems, such as transportation emissions, traffic modeling, traffic safety, time series, deep learning, and experimental design. Published multiple high impact machine learning and statistics publications in Q1 journals. Passionate about dealing with big sets of data and designing data science workflows. Ability to build complete data science and machine learning pipelines from model development to deployment and production. Enjoys blogging about data science, transportation engineering and various other topics. Please check my blog [here].

Experience

BITSAFS and REACT labs, The University of British Columbia
Vancouver, BC, Canada

RESEARCH DATA SCIENTIST
Jan. 2017 - Present

- Compile and analyze big datasets of structured and unstructured data
- Develop computer vision algorithms for video data extraction
- Build Machine learning and econometric models and run simulations
- Create effective data visualizations
- Design and implement control experiments
- Collaborate producing research publications and conference presentations

Department of Computer Science, The University of British Columbia
Vancouver, BC, Canada

DATA ENGINEER
May 2019 - Sep 2020

- collaborate on the development of 'rudaux' software package that provides automation for managing statistics department courses that use JupyterHub and nbgrader along with a learning management system (canvas)

Master of Data Science Program, University of British Columbia
Vancouver, BC, Canada

TEACHING ASSISTANT
Jan. 2017 - Present

- Preparing tutorials, marking assignments, holding office hours and manage labs
- TA'ed courses: Descriptive Statistics and Probability for Data Science, Data Visualization I, Data Visualization II, Statistical Inference and Computation I, Data Science Workflows, Feature and Model Selection, Collaborative Software Development, Experimentation and Causal Inference, Privacy, Ethics, and Security, Spatial and Temporal Models, Web and Cloud Computing, Regression II, Business Applications of Machine Learning, Exploratory Data Analysis

SETS Intl.
Cairo, Egypt

DATA SCIENTIST
Nov. 2015 - Dec. 2016

- Identify project data requirement and design data collection methodologies
- Build statistical analysis pipelines
- Create effective data visualizations
- Design and implement control experiments
- Produce reports and presentations for project different stakeholders

Engineering Consultants Group
Cairo, Egypt

TRANSPORTATION ENGINEER
Jan. 2014 - Nov. 2015

- Collaborating with a team of engineers and draftsmen to provide projects with civil engineering related tasks and control the quality of the deliverables
- Participation in preparing proposals required documents and presentations

Cairo University
Cairo, Egypt

RESEARCH AND TEACHING ASSISTANT
Sep. 2012 - Dec. 2016

- working on research and industry projects, co-author research articles and technical reports, and working on a MSc thesis
- Preparing tutorials, marking assignments, holding office hours and manage labs

Education

University of British Columbia
Vancouver, BC, Canada

PHD IN TRANSPORTATION ENGINEERING
Jan. 2017 - Present

- Thesis: "Imitation learning agent-based microscopic simulation of bicycle traffic"
- Advisors: Dr. Tarek Sayed, and Dr. Alexander Bigazzi

Cairo University
Cairo, Egypt

MSc in Transportation Engineering
Sep. 2012 - Dec. 2016

- Thesis: "A bi-level approach for calibrating a traffic simulation model of Greater Cairo Region
- Advisors: Dr. Magdy Noureldin, and Dr. Hoda Talaat

Cairo University
Cairo, Egypt

BSc in Civil Engineering
Sep. 2007 - May 2012

- Overall Grade: Distinction with Honors

Skills

Programming	Python, JAVA, R, JavaScript, Julia, C++, LaTeX
Data Engineering	SQL, NoSQL, Hadoop, Flask, Spark, Postgres RDMS, REST API, ETL processes
DevOps	AWS, Docker, Kubernetes, Terraform
Traffic Modeling	TransCAD, VISSIM, VISUM, Paramics, Synchro, DynusT, EMME, SimTraffic, Sidra
Languages	English, Arabic, Spanish

Projects

- Exploring the impact of British Columbia's November interventions on the spread of COVID-19 [code] (UBC)

- Detection of glare in autonmous vehicle sensors [code] (UBC)

- Generative modeling of cyclists in off-street paths using LSTIM-based Variational Autoencoders (UBC)

- Clustering of cyclist following and overtaking stages using mixed mixture modeling (UBC)

- Understanding cyclist hidden behavioural patterns using Generative Adversarial Imitation Learning (UBC)

- Collaboration in the development of 'rudaux' software package [code] (UBC)

- Collaboration in the development of BITSAFS Traffic Intelligence (TI) software for computer vision-based traffic analysis [code] (UBC)

- Development of an agent-based bicycle traffic microsimulation [code] (UBC)

- Extraction of cyclist and pedestrian behavioural patterns in shared space environments [code] (UBC)

- Autonomous vehicle motion prediction using Lyft data [code] (Kaggle Competition)

- Detection and classification of pedestrians and cyclists on Brooklyn bridge using Convolutional Neural Networks, New York City, NY, USA (UBC)

- Prediction of Pedestrian-vehicle conflicts at multiple intersections in Edmonton, AB, Canada using computer vision and machine learning techniques (UBC)

- Prediction of Vehicle-bicycle yielding behaviour analysis at the intersection of Burrard bridge and Pacific street, Vancouver, BC, Canada using seamingly unrelated regression (UBC)

- Prediction of Pedestrian-vehicle-bicycle conflict at Burrard bridge and Pacific street intersection, Vancouver, BC, Canada using computer vision and machine learning techniques (UBC)

- Towards wise cities: A data-driven approach for sustainable mobility (SETS Intl.)

- Traffic management program for the city of Arriyadh, KSA (SETS Intl.)

- Buidling a database management system for data warehousing and retreival for the Ministry of Transportation in Cairo, Egypt (SETS Intl.)

- Truck Sampling and portable emission measurement for modeling Cairo transportation emissions phase II (SETS Intl.)

- Building a longitudinal cohort study for transportation demand time series data collected at the city of Arriyadh, KSA (SETS Intl.)

- Detailed design and tender documents preparation for Thumamah smart road corridor western section (SETS Intl.)

- Traffic impact study for major mixed landuse development in New Cairo (5.6 million m2 Land Area) (SETS Intl.)

- Trip Generation Manual for Qatar (SETS Intl.)

- Master Planning and Infrastructure Design of The Grand Egyptian Museum (GEM) - Phase III (ECG)

- Master Planning and Infrastructure Design of King Abdullah Economic City, Saudi Arabia (ECG)

- Mall of Arabia, 6th of October, Egypt (ECG)

- Master Planning and Infrastructure Design of Tathleeth Road, Tathleeth, Saudi Arabia (ECG)

- Master Planning and Infrastructure Design of Haqil, Haqil City, Saudi Arabia (ECG)

- Master Planning and Infrastructure Design ofOman Public Prosecution Head Office, Muscat, Oman (ECG)

- Master Planning and Infrastructure Design of Bisha 4, Bisha, Saudi Arabia (ECG)

- Master Planning and Infrastructure Design of Shah new Accommodation Complex, Abu Dhabi, United Arab Emirates (ECG)

Publications

- **Mohammed, H.**, Sayed, T., Bigazzi, A. Y. (2021) Pattern-Based Validation of Agent-Based Bicycle Microsimulation models. (forthcoming)

- **Mohammed, H.**, Sayed, T., Bigazzi, A. Y. (2021). Comparing Continuous and Discrete State-Action Spaces in Agent-Based Bicycle Microsimulation. (forthcoming)

- **Mohammed, H.**, Bigazzi, A. Y., Sayed, T. (2021). Long Short-Term Memory-Based Generative Variational Inference Approach for Unconstrained Bicycle Trajectories. (Accepted)

- **Mohammed, H.**, Sayed, T., Bigazzi, A. Y. (2020) Microscopic modeling of cyclists on off-street paths: A stochastic imitation learning approach, Transportmetrica A: Transport Science, DOI: 10.1080/23249935.2020.1870178s.

- **Mohammed, H.**, Bigazzi, A. Y., Sayed, T. (2019). Unconstrained Cyclist Trajectory Simulation for Agent-Based Models. 54th Annual Conference of the Canadian Transportation Research Forum, Vancouver, BC, Canada.

- **Mohammed, H.**, Sayed, T., Bigazzi, A. Y. (2019). Toward Agent-based Microsimulation of Cyclist Following Behavior: Estimation of Reward Function Parameters Using Inverse Reinforcement Learning (No. 19-03431).

- **Mohammed, H.**, Bigazzi, A. Y., Sayed, T. (2019). Characterization of bicycle following and overtaking maneuvers on cycling paths. Transportation research part C: emerging technologies, 98, 139-151.

- Abdelgawad, H., **Mohammed, H.** (2016). Towards Wise Cities: A Data-Driven Approach for Sustainable Mobility. Smart Cities (A White Paper). SETS Intl.

- **Mohammed, H.** and H. Talaat. (2016). Calibration of Mesoscopic Traffic Simulation of Large Networks, Case Study: Greater Cairo Metropolitan Area, Cairo University.

- Abdelgawad, H., **Mohammed, H.**, Talaat, H. (2016). Truck Sampling and Measurement Techniques for Cairo Emission Model, SETS Intl.

Talks

Exploring the impact of British Columbia's November interventions on the spread of COVID-19

Online

STATISTICAL SOCIETY OF CANADA (SSC) 2021 ANNUAL MEETING

June, 2021

Artificial Intelligence-Based Generative Modeling

Cairo, Egypt

WORKSHOP - ARAB SOCIETY FOR COMPUTER AIDED ARCHITECTURAL DESIGN (ASCAAD) 2021

March, 2021

Traffic Modeling and Simulation

Vancouver, Canada

GUEST LECTURE - UNIVERSITY OF BRITISH COLUMBIA

January, 2021

Agent-Based Modeling   *Vancouver, Canada*
Guest Lecture - University of British Columbia   *January, 2020*

Data Science Workflow in R   *Vancouver, Canada*
Guest Lecture - University of British Columbia   *September 2019*

Extracurricular Activity

Co-operative Mobility Project   *Redondela, Galicia, Spain*
                                                                           March 2014

- Finding new alternatives for sustainable transportation in the city of Redondela with the participation of 4 countries Spain, Macedonia, Belgium and Egypt
- Featured in Spanish media in 3 newspapers and an interview with Redondela city local Radio

Faculty Leadership and Development Center at Cairo University   *Cairo, Egypt*
                                                                          Jan. 2013 - Dec. 2016

- Courses Attended: Conferences Organization, Effective Presentation Skills, Quality Assurance in Education, and Using Technology in Education

Honors & Awards

2021	**Statistical Society of Canada**, 1st place winner of the 2021 Case Studies in data analysis competition - Modeling COVID-19 disease dynamics in Canada	*Vancouver, Canada*
2020	**University of British Columbia**, President's Academic Excellence Initiative PhD Award	*Vancouver, Canada*
2017-2020	**University of British Columbia**, International Tuition Award	*Vancouver, Canada*
2012-2016	**Cairo University**, Master Degree Fellowship	*Cairo, Egypt*
2012	**Cairo University**, Graduation Prize for Distinguished Students	*Cairo, Egypt*
2007-2012	**Cairo University**, Fellowship for distinguished undergraduate students	*Cairo, Egypt*