

HESSA K. AL-THANI

Operations Research PhD Student

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PERSONAL PROFILE

I am a doctoral candidate at the University of Michigan Department of Industrial and Operations Engineering. My research focus is combinatorial optimization. Through my graduate studies and professional experience, I have built a strong theoretical base and worked with many diverse teams.

ACADEMIC BACKGROUND

University of Michigan, Ann Arbor
PhD in Industrial & Operations Engineering
August 2020 - present

- GPA: 3.8
- Focus: Combinatorial Optimization
- Relevant Coursework: Machine Learning, Numerical Linear Algebra, Sensor Systems, Approximation Algorithms.

MSc in Industrial & Operations Engineering
January 2018 - December 2019

- GPA: 3.5
- Relevant Coursework: Integer Programming, Scheduling, Non-Linear Optimization, How Cities Work.

Carnegie Mellon University

BSc in Business Administration
August 2012 - May 2016

- GPA: 3.4, Total Credits: 230.5
- Minor in Ethics and Mathematical Science
- Mathematics Minor GPA: 3.5

AWARDS

- Qatar National Research Fund: Graduate Research Sponsorship Award 2020
- Qatar National Research Fund: Graduate Research Sponsorship Award 2017

ASSOCIATIONS

- INFORMS, Pro bono chair. Lead 3 projects that resulted in deliverables for NPO's in our community

PROGRAMMING SKILLS

R | Python | Matlab | VBA | Gurobi | Java

RESEARCH EXPERIENCE

Current research

Dec 2020 - present

Department of Industrial & Operations Engineering at the University of Michigan

- Designing approximation algorithms for stochastic combinatorial optimization problems
- Explore approximation guarantees of local search algorithms for NP-hard classes of a combinatorial optimization problem
- Develop techniques to solve polynomially-solvable classes of a combinatorial optimization problem
- Extend our R package by finding a transformation that will create valid large instances for the Maximum Entropy Sampling Problem (MESP) a combinatorial optimization problem applied to a sensor network

Research Assistant

Jan 2019 - Dec 2020

Department of Industrial & Operations Engineering at the University of Michigan

- Created an R package that transforms raw environmental data into valid input for testing algorithms that solve the MESP.
- Provided analytics in the R package that allows users to test the validity of input covariance matrices for the MESP.

Research Intern

May 2016 - July 2016

TNO (Netherlands Organisation for Applied Scientific Research)

- Created a literature survey on the impact of culture on innovation.
- Replicated a quantitative Harvard study on innovative behavior using the researchers at TNO to verify the results of the study.
- Developed and submitted a report on the impact of culture on innovation in the GCC and presented the findings to a team of researchers that will follow up with the research questions created by the study.

RECENT PUBLICATIONS

- "Tridiagonal maximum-entropy sampling and tridiagonal masks" (Discrete Applied Mathematics) Under revision.
- "Tridiagonal maximum-entropy sampling and tridiagonal masks" (Procedia Computer Science) 2021.
- "An R Package for Generating Covariance Matrices for Maximum-Entropy Sampling from Precipitation Chemistry Data" (SN Operations Research Forum) 2020.
- Released the R Package for Generating Covariance Matrices for MESP on GitHub: <https://github.com/hessakh/MESgenCov>

CONFERENCE PRESENTATIONS

- "Minimum cost adaptive submodular cover" (IOS) 2024
- "Tridiagonal maximum-entropy sampling and tridiagonal masks" (IOS) 2022
- "Tridiagonal maximum-entropy sampling and tridiagonal masks" (LAGOS) 2021

FELLOWSHIPS

Michigan Institute for Computational Discovery and Engineering Graduate Fellow.