

# NAHEED ANJUM ARAFAT

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## RESEARCH INTERESTS

I have prior experience and sufficient interest in the following domains. However I am flexible enough to work on a different domain of relevance.

- **Topological data analysis:** Exact and approximate computation of topological features of data, as well as their application in different domains.
- **Graphs and Hypergraphs:** Algorithmic aspects of graphs and hypergraphs and application of such structures on different domains.
- **Optimization problems:** Multi- and many-objective optimization problems.

## EDUCATION

### National University of Singapore (NUS)

PhD in Computer Science

Singapore

Aug 2015 - Present (Thesis defended)

- **Thesis:** Analysis and generation of data with topology from combinatorial representations

### Bangladesh University of Engineering and Technology (BUET)

Bachelors in Computer Science & Engineering; GPA: 3.79/4

Dhaka, Bangladesh

May 2014

- **Thesis:** A Fuzzy Dominance Based Evolutionary Algorithm for solving many-objective optimization problems.

## EMPLOYMENT HISTORY

### National University of Singapore

Research Fellow, Department of Information Systems & Analytics

Singapore

July 2020 - Present

- Graph-theoretic modelling and analysis of co-evolving software ecosystems.

### National University of Singapore

Research Assistant, Department of Computer Science

Singapore

Nov 2019 - June 2020

- Random generation of hypergraphs with prescribed constraints.

### United International University

Lecturer, Department of Computer Science

Dhaka, Bangladesh

Jun 2014 - Jul 2015

- Prepared lecture notes and assignments. Conducted lectures and lab-sessions. Evaluated assignment submissions and exam-scripts. Devised and evaluated lab projects. Performed miscellaneous administrative duties.

### Software Global Consultancy

Part-time Developer

Dhaka, Bangladesh

Jan 2014 - Mar 2014

- Developed cross-platform, educational mobile apps to teach kids handwriting.

## RESEARCH EXPERIENCE

### Research Fellow

Assistant Professor UM Sungyong

Department of Information Systems & Analytics, NUS

July 2020 - Present

### Research Assistant

Professor Tan Kian Lee

Department of Computer Science, NUS

Nov 2019 - June 2020

### PhD Student

Supervisor: Associate Professor Stéphane Bressan

Department of Computer Science, NUS

Jan 2016 - Present

### Undergraduate research

Supervisor: Professor Md Monirul Islam

Department of CSE, BUET

Jan 2013 - May 2014

## TEACHING/MENTORING EXPERIENCE

### Graduate Assistant

NUS

Jan 2016 - Present

## • Tutored Courses-

- **Big Data Techniques and Technologies (BT4221)**: Dept. Of Information Systems and Analytics - Aug 2019 sem.
- **Data Management and Warehousing (BT5110)**: Master Of Science Business Analytics Programme - Aug 2019 sem.
- **Data Management and Warehousing (BT5110)**: Master Of Science Business Analytics Programme - Aug 2018 sem.
- **Information Visualisation (CS5346)**: Dept. of Computer Science, School of Computing - Jan 2018 sem.
- **Data Management and Warehousing (BT5110)**: Master Of Science Business Analytics Programme - Aug 2017 sem.
- **Programming Methodology (CS1010E)**: Dept. of Computer Science, School of Computing - Jan 2017 sem.
- **Discrete Structures (CS1231)**: Dept. of Computer Science, School of Computing - Aug 2016 sem.
- **Programming Methodology (CS1010E)**: Dept. of Computer Science, School of Computing - Jan 2016 sem.

## Lecturer

United International University

Jun 2014 - Jul 2015

## • Instructed Courses-

- **Advanced Programming Languages**: Dept. of Computer Science - Summer'14, Fall'14, Spring'15, Summer'15 trimesters.
- **Data Structures**: Dept. of Computer Science - Fall'14, Summer'15 trimesters.
- **Discrete Mathematics**: Dept. of Computer Science - Summer'14 trimester.
- **Structured Programming Language**: Dept. of Computer Science - Spring'15 trimester.
- **Electric Circuits**: Dept. of Computer Science - Fall'14, Spring'15, Summer'15 trimesters.

## Mentor

PhD student

Jan 2019 - Mar 2019

- **Debabrata Mahapatra**: Held consultation and discussion sessions about the theories and applications of Topological Data Analysis.

## RESEARCH PUBLICATIONS

### • Conference Proceedings

1. **Naheed Anjum Arafat**, Debabrota Basu, Laurent Deceusefond, and Stéphane Bressan. Construction and random generation of hypergraphs with prescribed degree and dimension sequences. In *Database and Expert Systems Applications*, pages 130–145, Cham, 2020. Springer International Publishing
2. **Naheed Anjum Arafat**, Debabrota Basu, and Stéphane Bressan.  $\epsilon$ -net induced lazy witness complexes on graphs. 2019
3. **Naheed Anjum Arafat**, Debabrota Basu, and Stéphane Bressan. Topological data analysis with  $\epsilon$ -net induced lazy witness complex. In *Database and Expert Systems Applications*, pages 376–392, Cham, 2019. Springer International Publishing
4. **Naheed Anjum Arafat** and Stéphane Bressan. Hypergraph drawing by force-directed placement. In *International Conference on Database and Expert Systems Applications*, pages 387–394, Cham, 2017. Springer International Publishing

### • Journals

1. Siddhartha Shankar Das, Md Monirul Islam, and **Naheed Anjum Arafat**. Evolutionary algorithm using adaptive fuzzy dominance and reference point for many-objective optimization. *Swarm and evolutionary computation*, 44:1092–1107, 2019

### • Preprints

1. **Naheed Anjum Arafat**, Debabrota Basu, Laurent Deceusefond, and Stéphane Bressan. Construction and random generation of hypergraphs with prescribed degree and dimension sequences (extended version). *arXiv preprint arXiv:2004.05429*, 2020

## TALKS

- **BT4221 Guest lecture (NUS)**: Conducted two guest lectures on 'Practical data analysis using Amazon EMR and Sagemaker services' in August 2020 semester.
- **BT5110 Guest lecture (NUS)**: Conducted a hands-on lecture on 'developing retail-sales data mart using Pentaho' in August 2018 semester, MSBA programme.
- **E2S2-CREATE Seminar**: Gave a talk on 'Topological Data Analysis' at E2S2-CREATE Seminar, Feb 2018 attended by 20+ researchers from E2S2 project funded by NRE
- **CS5346 Guest lecture (NUS)**: Conducted a lecture on 'Force-directed hypergraph drawing for data visualisation' in January 2018 semester at Dept. of Computer Science, School of Computing, NUS.

## SELECTED SERVICES

- **Session Chair**: Chaired two sessions at *NUS SoC-Telecom ParisTech joint workshop on Data Sciences and Artificial Intelligence*, April 2018 attended by 20+ researchers from Telecom ParisTech and NUS.

- **Session Chair:** Chaired two sessions at *NUS School of Computing Research Workshop, March 2018* attended by professors and researchers from various countries in Asia.
- **Co-organizer:** Co-organized *8th International Conference on Software, Knowledge, Information Management and Applications (SKIMA), 2014* held at United International University, Bangladesh.
- **Reviewer:** SKIMA 2014

## AWARDS & ACHIEVEMENTS

- **NUS Research Scholarship**
- **Teaching Assistant Training Certificate** issued by the Centre for Development of Teaching & Learning (CDTL), NUS for completing training on applying 'Collaborative Learning' approaches.
- **Distinguished Poster Award** at Undergraduate Research Poster Presentation Workshop, Department of Computer Science and Engineering, BUET for presenting a poster titled 'Many-Objective Evolutionary Approach using Fuzzy Dominance with Bidirectional Bias'.
- **Champion** award for showcasing the project titled 'Cell phone operated mini-car with surveillance' at Inter-University Project Show (Hardware panel), CSE Festival, BUET.
- **Talent pool Board scholarship** for excellence in Secondary and Higher Secondary exams, Jessore Board, Bangladesh.

## SKILLS

- **Languages:** Python, Java, C, C++, Matlab, R, Processing, PHP
- **Big Data Frameworks:** Hadoop, Spark
- **Data warehousing & Viz. Tools:** Pentaho Data Integration, Tableau
- **Databases:** MySQL, PostgreSQL, Oracle
- **Web Dev:** HTML/HTML5, CSS/CSS3, JavaScript, JQuery, JQuery Mobile
- Excellent presentation skill and proficiency in technical writing (Latex).
- Ability to work independently as well as in a team.
- Ability to communicate effectively and methodically to produce deliverables.