Abdur Rahman M. A. Basher

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Research Interests

My research focuses on designing machine learning algorithms to predicting various biological functions (e.g. metabolic pathways) from genomic sequence information. At the same time, I investigate various challenges associated with multi-label learning and its applications.

Education

The University of British Columbia **Vancouver, BC, Canada**
PhD in Bioinformatics *2013–2020*
Thesis title: Machine Learning Methods for Metabolic Pathway Inference from Genomic Sequence Information.

Concordia University **Montreal, QC, Canada**
MASc in Information Systems Security *2009–2011*
Thesis title: Mining Chat Logs to Extract Information about Authors and Topics for Crime Investigation.

King AbdulAziz University (KAU) **Jeddah, Saudi Arabia**
BSc in Computer Science *2004–2008*
Thesis title: University Courses Timetabling System using Genetic Algorithm.

Research Experience

PhD Student **The University of British Columbia**
Bioinformatics (Hallam) Lab, Vancouver, BC, Canada *2016–Present*
Research: Proposed multiple solutions to predicting metabolic pathways from genomic sequence information at different levels of complexity and completion using supervised and semi-supervised machine learning algorithms.
Advisors: Dr. Steven J. Hallam (primary advisor), Dr. Aria S. Hahn, and Dr. Kishori M. Konwar.

Research intern **Genome Sciences Centre**
Bioinformatics Technology (Birol) Lab, Vancouver, BC, Canada *2013–2016*
Research: Conducted large-scale data analysis from PubMed articles using cutting-edge developments in the domain of biomedical natural language processing (BioNLP). These include discourse analysis using convolutional neural networks to summarize and retrieve articles related to patient genomic and mutation profiles.
Advisors: Dr. Inanç Birol (primary advisor), Dr. Victoria A. Stuart, and Dr. Djallel Bouneffouf.

MASc Student **Concordia University, Montreal, QC, Canada**
Data Mining and Security (DMaS) Lab *2009–2011*
Research: Proposed algorithms based on topic models to characterize topics, compute the contribution of authors in these topics, and study the transitions of these topics over time.
Advisors: Dr. Benjamin C. M. Fung (primary advisor).

Publications

Journal Articles (Accepted/Under Review)

4: Abdur Rahman M. A. Basher, Ryan J. McLaughlin, and Steven Hallam. "Metabolic Pathway Inference using Non-negative Matrix Factorization with Community Detection." *Bioinformatics,*

2020 [under review].

3: Abdur Rahman M. A. Basher and Steven Hallam. "Leveraging Heterogeneous Network Embedding for Metabolic Pathway Prediction." *Bioinformatics, 2020* [to appear].

2: Abdur Rahman M. A. Basher, Ryan J. McLaughlin, and Steven Hallam. "Metabolic Pathway Inference using Multi-Label Classification with Rich Pathway Features." *PLOS Computational Biology, 2020* [to appear].

1: Abdur Rahman M. A. Basher and Benjamin CM Fung. "Analyzing Topics and Authors in Chat Logs for Crime Investigation." *Knowledge and information systems, 2014*.

In Preparation

5: Abdur Rahman M. A. Basher and Steven Hallam. "mltS+ [TO BE ADDED]." *2020*.

4: Abdur Rahman M. A. Basher and Steven Hallam. "mltS [TO BE ADDED]." *2020*.

3: Abdur Rahman M. A. Basher and Steven Hallam. "reMap: Relabeling Metabolic Pathway Dataset with Bags to Enhance Predictive Performance." *2020*.

2: Abdur Rahman M. A. Basher and Steven Hallam. "Modeling Metabolic Pathways as Bags (with Augmentation)." *2020*.

1: Abdur Rahman M. A. Basher and Steven Hallam. "Multi-label Pathway Prediction based on Active Dataset Subsampling." *2020*.

Non-peer Reviewed Articles

1: Abdur Rahman M. A. Basher, Alex Purdy, and Inanç Birol. (2015). "Event Extraction from Biomedical Literature." *biorxiv*. 1-13.

Presentations

2: Abdur Rahman M. A. Basher and Steven Hallam. "Leveraging Heterogeneous Network Embedding for Metabolic Pathway Prediction.", BIOF, IOP and GSAT programs (B.I.G.) retreat, Vancouver, BC, *2019*.

2: Abdur Rahman M. A. Basher and Steven Hallam. "Metabolic Pathway Inference using Multi-Label Classification with Rich Pathway Features.", BIOF, IOP and GSAT programs (B.I.G.) retreat, Vancouver, BC, *2018*.

1: Abdur Rahman M. A. Basher, Connor Morgan-Lang, and Steven Hallam. "Machine Learning Approach to Recovering Metabolic Pathways from Metagenomics Sequences", Centre for Microbial Diversity and Evolution (CMDE) retreat, Victoria, BC, *2016*.

Fellowships and Awards

7: Four Year Fellowships (4YF) ($18,200 per year + tuition fee), The University of British Columbia (UBC), Canada. *2013-2017*.

6: Faculty of Science - Graduate Support Initiative (GSI) Fund ($8,500 per year), The University of British Columbia (UBC), Canada. *2013-2017*.

5: Power Corporation of Canada Graduate Fellowships ($5,000), Concordia University, Canada. *2009-2010*.

4: Concordia Graduate Student Support Program (GSSP) ($15,000 per year), Concordia University, Canada. *2009-2011*.

3: First Honor Graduate for graduating with high GPA from King AbdulAziz University, Saudi

Arabia. *2008*.

2: Faculty of Computing and Information Technology (FCIT) distinguished award, King AbdulAziz University (KAU), Saudi Arabia. *2008*.

1: King AbdulAziz University merit award ($2,000), Saudi Arabia. *2004-2008*.

Teaching Experience

Teaching Assistant

The University of British Columbia **Vancouver, BC, Canada**
2016–2017

I was a TA for the following Master of Data Science (MDS) courses:
- DSCI 571 Supervised Learning I
- DSCI 573 Feature and Model Selection
- DSCI 575 Advanced Machine Learning

Professional Service

Data Scientist

BigOui Marketing Inc. **Montreal, QC, Canada**
Part-time data scientist *September 2012–September 2014*

To achieve the company's goals, my responsibilities included:
- Developing and evaluating internal ecosystem to maintain a three-phase project plan
- Collaborating with team members to suggest IT solutions
- Assisting in launching and advocating this project in Montreal

Programming

- Python, R, LaTeX, MATLAB.

References

Available upon request.