Sara El-Shawa

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Education

University of Guelph   **September 2020–September 2022**
Master of Applied Science in Engineering
Collaborative Specialization in Artificial Intelligence
Vector Scholarship in Artificial Intelligence Recipient 2020-21 (CAD $17 500)
Queen Elizabeth II Graduate Scholarship 2021-22 (CAD $15 000)
GPA: 4.0/4.0
Supervisor: Dr. Graham Taylor

University of Toronto   **September 2014–November 2018**
Honours Bachelor of Science
Double major in Computer Science and Biology
GPA last two years of study: 3.88/4.0, **Dean's List**
Thesis Advisor: Dr. Rob W. Ness

Work Experience

Health AI Intern   **January 2021–Present**
Vector Institute
- Using mobility data to make COVID-19 forecasts in Ontario at the Public Health Unit level.

Data Manager & Web Programmer   **May 2020–Present**
Stanford University
- Updating MetaLab's website and conducting **meta-analyses** for cognitive development research using **R**.

Software Developer   **April 2020–Present**
University of Toronto
- Designing GUI and developing a data processing pipeline for analyzing videos of social interaction networks of flies.
- Developing tests to assess **information flow** between and among social interaction networks.

Teaching Assistant   **January 2021–April 2021**
University of Guelph
- Conducted tutorials, made videos, and explained linear algebra concepts to students in ENGG1500.

AI Researcher   **November 2020–March 2021**
Public Health Agency of Canada
- Predicted the severity of COVID-19 cases by investigating associations with clinical symptoms and comorbidities.

Data Science Research Intern   **December 2018–February 2020**
Harvard University
- Identified and analyzed **social networks** among groups of interacting animals using **MATLAB** and **Python**.
- Calculated and compared network measures such as **Bonacich power centrality** between female and male groups, and groups with and without early-life stress.
- Used Python packages **NetworkX**, **Pandas**, and **DeeplabCut** for animal tracking.

Robotics Research Intern   **September 2019–February 2020**
International Research Center for Neurointelligence, University of Tokyo
- **Humanoid robot-infant** interaction to assess how a robot's contingent responsiveness contributes to infants' elicitation of gaze following.
- Designed and programmed GUI in Python for **Nao robot** to react contingently to a child through movements and vocalizations.

Genomics Research Assistant   **May 2018–August 2018**
University of Toronto
- Identified basic **graph theory** centrality measures in two biological networks using **Python** and **Bash**.
- Converted genetic network into **SQL** database for more efficient data retrieval using **python-sql** library.

Bioinformatics Research Assistant   **May 2017–August 2017**
University of Toronto
- Conducted analysis to study the effect of metabolic network topology using **Python**.
- Established and managed an analytical pipeline in **Bash** and created graphs in **R** for data analyses.

Undergraduate Research Experience

Senior Thesis Project   **September 2017–August 2018**

University of Toronto

- Analyzed the influence of genetic network properties on selection by using divergence and diversity measures.
- Conducted analysis to find how the rate of adaptive evolution varies across the genetic network.
- Found that positive selection is more prevalent in genes that are highly connected and have a high betweenness centrality measure.
- Used Python packages such as **NumPy**, **Matplotlib**, and **Pandas** and R packages such as **dplyr** and **ggplot2**.
- Poster Presentation at SMBE 2018 in Japan, **Award**: Best Undergraduate Poster (USD $500).
- **Manuscript in preparation**: **El-Shawa S.** and Ness, R. W. The effect of connectivity on the strength of selection in *Chlamydomonas reinhardtii*.

Computational Biophysics Undergraduate Researcher   **May 2018–October 2018**

University of Toronto

- Ran simulations in **C** and **Python** using fluctuation data to infer direction of molecular interactions within cells and presence of feedback in a multi-component system.
- Used stochastic processes by modifying the **Gillespie algorithm** to calculate covariance data between components to correctly identify positive and negative correlations.

Bioinformatics Undergraduate Researcher   **January 2018–August 2018**

University of Toronto

- Identified and used graph theory measures such as **clustering** and **connectivity** to analyze genetic mutations in a gene co-expression network using **Python** packages such as **NetworkX** and **Seaborn**.
- Compared network parameter distributions between salt-stress and de novo mutations in **R**.

Evolutionary Genomics Undergraduate Researcher   **May 2017–August 2017**

University of Toronto

- Conducted analysis to identify the full set of homologous genes between two model genomes.
- Worked with **Python** and **Bash**, and used Augustus, UBLAST, MUSCLE, Blast, and Standalone Blast.