Eslam Hussein

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Education

Virginia Tech	Ph.D. candidate - Computer Science	2018 - anticipated by May/2026	3.82 GPA
Cairo University	Master of Science in Computer Science	2016	
	Bachelor of Science in Computer Science	2007	3.68 GPA

Work Experience

Virginia Tech *(Graduate Research Assistant)* *(Aug 2018 – present)*

Joined the SocComp Lab and later the Multimedia Lab under Prof. Chris Thomas, contributing to the following projects:

- *Manipulated Video Detection*: This project uses **multimodal machine learning** and **graph neural networks (GNNs)** to detect manipulated and out-of-context videos used in disinformation campaigns. It also explains how a video was manipulated. **Tasks**:
  - **Information Extraction**: Extracting *entities*, *events*, and predicting *relationships (ERE)* from text and video.
  - **Semantic Analysis**: Leveraging **graph methods** and **large language models (LLMs)** to analyze extracted information.
  - **GNN Training**: Training **graph neural networks** to differentiate legit from manipulated videos.

  Technologies: PyTorch, PyTorch Geometric, NetworkX, HuggingFace, NLTK, Docker, spaCy
- *Narrative Analysis (**EMNLP'23**)*: Investigated the impact of narrative communication styles on engagement with *health misinformation* on Twitter. **Contributions**:
  - **Annotating and analyzing** a dataset of *health misinformation tweets* for narrative style.
  - **Developing and fine-tuning classifiers** for automatic narrative detection.
  - **Identifying general linguistic patterns** in narratives and health misinformation.
- *Platform Algorithmic Audits (Amazon and YouTube)*: Conducted separate audits of Amazon's and YouTube's search and recommendation systems to evaluate their roles in promoting misinformation. **Contributions**:
  - **Designed experimental frameworks** to analyze platform behavior.
  - **Collected and annotated large-scale data** while developing bots to simulate user interactions, such as browsing, shopping, searching, and watching videos.
  - **Trained machine learning models** to classify content based on features like descriptions, ratings, and reviews.
  - **Conducted statistical tests** to validate hypotheses about misinformation propagation.

  Technologies: Python, Selenium, Node.js, Pandas, Matplotlib, Scikit-learn, TensorFlow, and Google Cloud Platform.

Qatar Computing Research Institute, Doha (*Research Associate*) *(Apr 2016 - Jun 2018)*

I contributed to developing, maintaining, and testing the distributed graph systems Arabesque and QFrag:

- *Arabesque*: is a distributed graph mining system designed to facilitate the development of scalable graph mining algorithms by automating the exploration of subgraphs. **Contributions**:
  - **Optimized memory utilization** to enhance the system's performance and scalability.
  - **Developed applications on top of Arabesque**, leveraging its API to implement graph mining algorithms
  - **Built and configured Hadoop clusters** to support the distributed processing capabilities of Arabesque.
- *QFrag*: A distributed graph search system. Ported QFrag from Giraph/Hadoop to Apache Spark, improving performance and scalability.

Technologies: Hadoop, Apache Spark, Scala, Java, Python

Cairo University *(Assistant Lecturer)* *(Sep 2007 - Mar 2016)*

Taught various Computer Science courses, including Data Structures, Algorithms, Natural Language Processing, Artificial Intelligence, and Software Engineering (I and II).

Azhasys, Cairo (*Software Engineer*) *(Aug 2011 - May 2012)*

- Developed *PrevWage*, an employee payroll management system using VB.Net, SQL Server 2008, and jQuery.
- Built *NOSR*, an event management system leveraging ASP.NET, SQL Server 2008, and jQuery.

Infinite Software Solutions Inc (ISSI) (*Software Engineer*) *(Nov 2010 - July 2011)*

Developed a communication module to send emails, faxes, and SMSs to targeted recipient lists using ASP.NET, WCF, LINQ, SQL Server 2008, jQuery, Subsonic, and NUnit.

Data Mining & Computer Modeling Center of Excellence, Cairo (*Software Engineer*) *(Apr 2008 - Sep 2010)*

- Developed a *Revenue Management System* for Plaza Hotel to predict revenue using machine learning.
- Built a web portal for the Egyptian Ministry of Tourism to forecast tourist arrivals using historical data.

Technologies: C#, ASP.NET, SQL Server 2005, Crystal Reports, and OLAP.

Publications

1. Achyut Ganti*, **Eslam Hussein***, Steve Wilson, Eva Zhao, Zexin Ma. *Narrative Style and the Spread of Health Misinformation on Twitter*. (* ***equal contribution as first author***) accepted at ***EMNLP'23 Findings*** [paper]
2. **Eslam Hussein**, Hoda Eldardiry. *Investigating Misinformation in Online Marketplaces: An Audit Study on Amazon.* (arXiv)
3. **Eslam Hussein***, Prerna Juneja*, Tanushree Mitra. *Measuring Misinformation in Video Search Platforms: An Audit Study on YouTube*. ***CSCW***, 2020. (* ***equal contribution as first author***) [paper]
4. **Eslam Hussein**, Ahmed Ibrahem Hafez, Aboul Ella Hassanien, Aly A Fahmy. *Nature-inspired algorithms for solving the community detection problem*. **Logic Journal of the IGPL: Oxford Journals**, 2017 [paper]
5. **Eslam Hussein**, Abdurrahman Ghanem, Vinicius Vitor dos Santos Dias, Carlos HC Teixeira, Ghadeer AbuOda, Marco Serafini, Georgos Siganos, Gianmarco De Francisci Morales, Ashraf Aboulnaga and Mohammed Zaki**.** *Graph Data Mining with Arabesque*. ***SIGMOD 2017. (Best Honorable Mention***) [Demo paper]
6. Fatma H. Ismail, **Eslam Hussein**, Aboul Ella Hassanien, Tai-Hoon Kim. *Blog Clustering with Committee Approach*. Fourth International Conference on Information Science and Industrial Applications (**ISI**) 2015
7. **Eslam Hussein**, Ahmed Ibrahem Hafez, Aboul Ella Hassanien, Aly A Fahmy. *A Discrete Bat Algorithm for the Community Detection* Problem. **International Conference on Hybrid Artificial Intelligence Systems** (**HAIS**) **2015**. [paper]
8. **Eslam Hussein**, Ahmed Ibrahem Hafez, Aboul Ella Hassanien, Aly A Fahmy. *Community Detection Algorithm Based on Artificial Fish Swarm Optimization*. **IEEE Conference on Intelligent Systems**, 2014 [paper]

Skills

- **Core Competencies**: **Graph Neural Networks (GNNs)**, **Transformer Architectures**, **Self-Supervised Learning**, **Information Extraction**, **Attention Mechanisms**, **Multimodal Fusion**, **Contrastive Learning**
- **Technical Skills:**
  - **Languages: Scala**, **Java**, **Python**, C/C++, C#, VB.Net, Prolog, **SQL/TSQL**, **Bash**
  - **Machine Learning/Deep Learning**: **Scikit-Learn**, **NLTK, PyTorch**, **PyTorch Geometric**, **TensorFlow**
  - **Big Data and Databases**: **Spark**, **Hadoop**, Microsoft SQL Server, MySQL
  - **Web and General Programming**: ASP.NET, XML, JavaScript, JQuery, **Node.js**, **Git**
  - **Tools and Platforms**: **Docker**, Singularity, **Google Cloud Platform**, Selenium
- **Relevant Coursework**: Data Analytics, **Advanced Machine Learning**, **Graph Machine Learning**, Social Computing, Statistics in Research, **Information Retrieval**, **Multimodal Machine Learning**, **Statistics**
- **Languages**: English (Fluent), Arabic (Mothertongue)

Students Mentorship

- **Josh Mathew**: B.Sc. Computer Science, Virginia Tech 2018-2022
- **Tran Chau:** B.Sc. Computer Science, Virginia Tech 2019 - 2023
- **Andrew Zhang**: M.Sc. Computer Science, Virginia Tech 2024

Service

- **Reviewer:** ICWSM [2021, 2022], CSCW [2021, 2022, 2023], SNAM 2021, CHI 2022
- **Program Committee**: ICWSM (2021, 2022)