

# Mohamed Ayman Mohamed

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## EDUCATION

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- **University of Alberta** Edmonton, Canada  
*Pursuing a MSc student in Computer Science department; GPA: 4.0/4.0* *September 2023 - September 2025 (Expected)*  
**Coursework:** Reinforcement Learning I, Reinforcement Learning II, Modeling Strategic Behavior, Software Analytics.  
**Supervisor:** Marlos C. Machado
- **The American University in Cairo University** Cairo, Egypt  
*Pursued a BSc in Computer Engineering with a Minor in Mathematics; GPA: 3.97/4.0* *August 2018 - June 2023*  
**Achieved** in being the Top **10%** among Spring 2023 Students.  
**Coursework:** Intro to Machine Learning, Practical Machine Deep Learning, Digital Signal Processing, Multi-variable Calculus, Linear Algebra, Discrete Mathematics, Graph Theory, Probability and Statistics, Data Science in Practice, GPU Computing.  
**Thesis:** Improved ANN Search for Text Retrieval  
**Supervisors:** Hossam Sharara, Nouri Sakr

## SKILLS SUMMARY

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- **Languages:** **Excellent** at {C, C++, Python, SQL}, **Intermediate** at {Scala, JavaScript}
- **Framework, Software and Tools:** Selenium, Flask, Numpy, Pandas, Tensorflow, Pytorch, Sklearn, Git, Vue.js, React JS, Phabricator, JIRA, AWS, JWT, CUDA C.

## INDUSTRIAL EXPERIENCE

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- **Microsoft**  
*Applied Scientist Intern* *July 2022 - September 2022*
  - \* Researched and implemented novel machine learning and data mining approaches to reduce the data size to 0.1% achieving approximately 95% performance on data distillation using **PyTorch**.
  - \* Improved the performance of the reduced dataset across different model architectures.
- **Suitera L.L.C**  
*Software Engineering Intern* *September 2021 - April 2022*
  - \* Implemented and optimized algorithms for a pre-processor to efficiently process user input into standard formats using **C++**. Did rigorous testing using **Google Test**.
  - \* Used OpenGL to draw complex circuit structures and electric current visualization.
- **Envelope.network Inc.**  
*Full Stack Software Engineering Intern* *June 2021 - August 2021*
  - \* Designed and implemented a Cross-Browser(Chrome, Firefox) Extension with **Parcel.js**, **Node Js**, **HTML**, and **CSS**.
  - \* Designed and implemented backend functionalities in **Scala** and developed API endpoints using **Finatra**.
  - \* Connected the **PostgreSQL** Database with the backend using **Slick**, functional relational mapper.
  - \* Designed and implemented frontend functionalities using **Vue.js** and integrated them with the backend using **Axios**.

## RESEARCH EXPERIENCE

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- **University of Alberta**  
*Graduate Assistant* *September 2023 - Present*
  - \* **Research Assistant:** Working on implementing the first continual Reinforcement Learning environment that simultaneously mimics real-world scenarios with both smooth and sudden changes.
  - \* **Teaching Assistant:** Made weekly office hours to help the students understand some concepts regarding the materials. Prepared and explained Tutorials and labs. The courses are Fundamentals of Databases and Computer Networks.
- **KAUST — King Abdullah University of Science and Technology**  
*Research intern — Vision CAIR Lab* *February 2023 - September 2023*
  - \* Implemented innovative ideas on SAT architecture, leveraging data science approaches to create Ground Truth for logical anchors. [Accepted in the ICLR 2024 conference]

- \* Developed an advanced Anchors Parser framework, combining rule-based heuristics and scene graph parsing to automatically extract textual information from utterances, resulting in improved object localization and disambiguation.
- \* Conducted rigorous evaluation of the 3DCoMPat dataset using diverse 3D segmentation models and metrics, gaining valuable insights into its properties. Made significant contributions to the Compositional 3D Vision Challenge, leading to notable improvements in informed and agnostic Intersection over Union (IOU) metrics.

## ○ The American University in Cairo

*Undergraduate Assistant*

*September 2020 - December 2022*

- \* **Research Assistant:** Mined and scraped independent public data of COVID propagation from 2018 to 2021 using **Selenium** and **SQL**. Used different models to improve the accuracy of adding regulation choices to limit COVID propagation.
- \* **Teaching Assistant:** Made weekly office hours to help the students understand some concepts regarding the materials. Prepared and explained Tutorials. The courses are Fundamentals of Computing II, Fundamentals of Computing II LAB, Introduction to Algorithms and Analysis, and Introduction to Machine Learning.

## HONORS AND AWARDS

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- **Egyptian Collegiate Programming Contest “ECPC”, Bronze-medalist:** participated with my team in ECPC and ranked **1st** place in AUCCPC out of 40 teams and top **20s** in Egypt. *Aug. 2022*
- **GITEX High Flyer, Final participant:** Participated with my team in the GITEX competition for detecting and regulating emotions using Deep learning. *Oct. 2022*
- **Dell Technologies C(4F)<sub>2</sub> Hackathon ”Final Participant”:** Led the team to rank as the 8th team among +100 teams in the first AI Hackathon in Egypt. *Mar. 2021*
- **Hash-code Competition; ”Participant”:** Led the team to rank as the Top **ten** in Egypt and the 700th among 10900+ teams in Google Hashcode 2021. *Feb. 2021*

## SELECTED PROJECTS

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- **Critic Based Empathetic Actor Updates in Sequential Social Dilemmas** | *Pytorch, Python* Grad. Project  
*Multi-Agent RL, Social Dilemma* *Winter 24*
  - \* Promoted agent cooperation based on intrinsic motivation without access to rewards.
  - \* demonstrated that agents can develop cooperative behaviors through Simple Inequity Aversion (SIA) in social dilemmas.
- **A Comparative Study between TensorFlow and Pytorch** | *Python, TensorFlow, Pytorch* Grad. Project  
*Machine Learning, Data Science, Software Analytics* *Fall 24*
  - \* Conducted an in-depth analysis comparing PyTorch and TensorFlow, revealing that PyTorch offers greater ease of use for deep learning model implementation, more detailed documentation, and faster issue resolution due to a rapidly growing research community.
- **Improved ANN Search for Text Retrieval** | *C++, CUDA C, Python, PyTorch* Undergraduate Thesis  
*Optimization, Document Retrieval, NLP* *Sep 22 - April 23*
  - \* Implemented an inverted index algorithm on the state-of-the-art SPTAG Search and achieved a significant **10x** speed improvement in search performance.
  - \* Utilized autoencoders to extract meaningful queries from the dataset through data mining techniques.
  - \* Designed and incorporated a Filter Search approach into the SPTAG codebase, and developed a dedicated dataset to facilitate testing and evaluation of the filter search functionality.
- **Premier League** | *My SQL, React Js, Flask, Selenium* Course Project  
*Database Systems* *Spring 21*
  - \* Scraped useful information about the players, teams, and football league matches from Premier League Website.
  - \* Implemented a database system backend and an application that provides league analytics.
- **Fake News Detection** | *Python, Numpy, Pandas, Sklearn, Django* Course Project  
*Machine Learning, Data Mining, NLP* *Fall 21*
  - \* Pre-processed the uncleaned tweets and converted them to a numerical representation using **Word2vec Embedding**.

- \* Trained the pre-processed data in a **neural network implemented from scratch** to get 73% accuracy.
- \* Implemented a simple web application using **Django** to test the user input on the learned weights.

- **Multimodal Emotion Detection** | *Python, TensorFlow Poster* Course Project  
*Deep Learning, Computer Vision, NLP, DSP* *Spring 21*
  - \* Pre-processed the limited videos into image frames, audio, and sentences using **Digital Signal Processing** and **NLP**
  - \* Trained the model using **CNN**, and **RNN**, and fused it using **attention models**.
- **BootLoader** | *x86-64 assembly, linux* Course Project  
*Computer Organization* *Fall 20*
  - \* Implemented an Assembly Program using 86/64x from BIOS to Scanning PCI devices in Long Mode.
- **Visiting Scheduling Problem** | *C++* Course Project  
*Optimization, Approximate Algorithms, Problem Solving* *Fall 20*
  - \* Used Approximation algorithms to maximize an NP Problem and proved it by implementing different Scenarios (Brute Force) to compare with the program algorithm performance.
- **Search Engine** | *C++* Course Project  
*Optimization, Web Search algorithms* *Fall 20*
  - \* Used different algorithms, like Page Rank, to implement a Search Engine.

## LEADERSHIP / EXTRACURRICULAR

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- **Participant at Deep Learning and Reinforcement Learning Summer school** *July 24*
- **Vice President GitHub Campus expert, AUC** *February 21 - March 23*  
*Managing Courses and contests in different fields*
- **Machine Learning instructor, GDSC AUC** *September 21 - February 22*  
*Tutorials and managing contests*