

Ayah M. Helal

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RESEARCH
INTERESTS Computational intelligence, Artificial intelligence, Data Mining, Machine Learning, Ant Colony Optimization, Particle Swarm Optimization, Genetic Algorithms.

EDUCATION **University of Kent**, England

PhD. **Computer Science**, Nov 2020

- Research topic: *New Archive-based Ant Colony Optimization Algorithms for Learning Predictive Rules from Data*
 - My PhD. aim was to apply Ant-Miner classification algorithm to data stream mining. I introduced a new pheromone model to Ant-Miner algorithms to handle continuous attributes without discretisation procedure. This allowed the algorithm to be fast and perform on large data sets. Using the new pheromone model, I was able to successfully introduce Streaming Ant-Miner algorithm to tackle data stream mining. I compared my new approach to other stream algorithms using MOA (Massive Online Analysis) Machine Learning for Streams such as rule induction algorithm Ge-rules and very fast decision rules.
- Supervisors: Fernando Otero, Alex Freitas

American University in Cairo, Cairo, Egypt

M.Sc. **Computer Science**, Aug 2013

- GPA: 3.8 with honours
- UK Equivalent: Distinction
- Dissertation Topic: *Solving Quadratic Assignment Problem By Particle Swarm Optimization*
- Dissertation Advisor: Ashraf Abdelbar

Ain Shams University, Cairo, Egypt

B.Sc. Faculty of Computer and Information Sciences May 2008

- Grade: Good
- UK Equivalent: 2:2

WORK
EXPERIENCE

- **Lecturer in Artificial intelligence**

- University of Exeter 2021 to present
- Working on grant for stream mining for credit card transactions. This is additional to teaching Artificial Intelligence and Nature Inspired Algorithms courses for undergraduates and masters students.

- **Research Associate**

King's College London

- Principal Investigator: Luc Moreau 2019 to 2021

- Worked in a PLEAD project, which is aims to generate explanations that are provenance-driven and legally-grounded which allow the data subjects to trust the automated decisions and allow data controllers to comply with legal requirements.
- **Research Assistant**
Department of Computer Science and Engineering
American University of Cairo
 - Supervisor: Florin Balasa Ph.D 2014 to 2015
 - Memory management algorithms for Digital Signal Processing, Multimedia applications, Embedded Systems
- **Research Assistant**
Department of Computer Science and Engineering
American University of Cairo
 - Supervisor: Ashraf Abdelbar 2011 to 2014
 - Artificial intelligence, Neural Networks, Ant Colony Optimization, Particle Swarm Optimization, Genetic Algorithms
- **Software Developer**
Omnivoyance
 - Software Developer & Founder 2011 to 2013
 - Developing a virtual trading web service that provided a real time watch screen and order book for the financial sector called BorsaLink
- **Software Developer**
ESRINEA
 - Software Developer 2010 to 2011
 - Developing a customised GIS software.

JOURNAL PUBLICATIONS

1. **Ayah Helal**, and Fernando Otero “Data Stream Classification with Ant Colony Optimization”, *International Journal of Intelligent Systems*, 2022.
2. Niko Tsakalakis, Laura Carmichael, Sophie Stalla-Bourdillon, Luc Moreau, Dong Huynh, **Ayah Helal** “The dual function of explanations: why it is useful to compute explanations” *Computer Law & Security Review*, Volume 41, 2021.
3. Trung Dong Huynh , Niko Tsakalakis, **Ayah Helal**, Sophie Stalla-Bourdillon, Luc Moreau “Addressing Regulatory Requirements on Explanations for Automated Decisions with Provenance—A Case Study”, *Digital Government: Research and Practice*, 2021.
4. Khalid M Salama, Ashraf M Abdelbar, **Ayah Helal** and Alex A Freitas “Instance-based classification with ant colony optimization”, *Intelligent Data Analysis*, 2017.
5. **Ayah Helal**, and Ashraf M. Abdelbar “Incorporating Domain-Specific Heuristics in a Particle Swarm Optimization Approach to the Quadratic Assignment Problem”, *Memetic Computing*, 2014.

CONFERENCE WORKSHOP

1. Niko Tsakalakis, Laura Carmichael, Sophie Stalla-Bourdillon, Luc Moreau, Dong Huynh, **Ayah Helal** “Explanations for AI: Computable or Not?”, 2020, 12th ACM Conference on Web Science Companion.

PEER-REVIEWED
CONFERENCE
PUBLICATIONS

1. **Ayah Helal**, James Brookhouse, Fernando EB Otero “Archive-Based Pheromone Model for Discovering Regression Rules with Ant Colony Optimization”, 2018 IEEE Congress on Evolutionary Computation (CEC).
2. **Ayah Helal** and Fernando Otero “Automatic design of ant-miner mixed attributes for classification rule discovery”, Proceedings of the Genetic and Evolutionary Computation Conference, 2017.
3. **Ayah Helal**, Enas Jawdat, Islam ElNabarawy, Donald C Wunsch and Ashraf M. Abdelbar “Integrated particle swarm and evolutionary algorithm approaches to the quadratic assignment problem”, 2017 IEEE Symposium Series on Computational Intelligence (SSCI).
4. **Ayah Helal** and Fernando Otero “A Mixed-Attribute Approach in Ant-Miner Classification Rule Discovery Algorithm”, Proceedings of the Genetic and Evolutionary Computation Conference, 2016.
5. **Ayah Helal**, Enas Jawdat and Ashraf M. Abdelbar “Three Variations of a Particle Swarm Optimization/Tabu Search Approach to the Quadratic Assignment Problem”, 2015 IEEE Congress on Evolutionary Computation (CEC).
6. **Ayah Helal** and Florin Balasa “Multithreaded Signal-to-Memory Mapping Algorithm for Embedded Multidimensional Signal Processing”, 20th International Conference on Control Systems and Computer Science (CSCS) , 2015.

PROGRAMMING
LANGUAGES

- C, C++, C#, SQL, Java, Flex, Matlab, Python, Cilk plus

LANGUAGE

Fluent in English and Arabic.