Mohamed Ragab

Researcher

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SUMMARY

Mohamed Ragab is a Researcher at the Technology Innovation Institute (**TII**), UAE, and an Adjunct Researcher at the Agency for Science, Technology, and Research (**A*STAR**), Singapore. His expertise focuses on developing AI-driven solutions for real-world time series applications, particularly within healthcare, manufacturing, and other scarce labeled data, distribution shifts, and sustainable, privacy-preserving AI technologies. His extensive research portfolio comprises over *20 publications*, with selected contributions in top-tier conferences, such as ICML, KDD, and IJCAI, as well as leading journals including IEEE TPAMI and IEEE TNNLS. He recently presented his work at ICML 2024. Dr. Ragab's research excellence is further demonstrated by securing a competitive **$150K** research grant aimed at advancing AI methodologies capable of learning effectively from minimal data.

EDUCATION

- **Ph.D. in Computer Science and Engineering** 2018 - 2022
  Nanyang Technological University, Singapore *GPA:4.88/5*
  - **Thesis Title:** Towards Realistic Data-driven Predictive Maintenance: A Deep Transfer Learning-based Approach
  - **Relevant Courses:** Deep Learning for Data Science, Data Mining, and Digital Image Processing.

- **M.Sc. in Electrical Engineering** 2015 - 2017
  Aswan University, Egypt *GPA: 3.62/4*
  - **Thesis Title:** High-resolution Magnetic Image Reconstruction Based on Compressive Sensing
  - **Relevant Courses:** Image and Video Processing, Medical Imaging, Electronic Circuits, Digital Communication Theory, and Wireless Communication Systems.

- **B.Sc. in Electrical Engineering** 2009 - 2014
  Aswan University, Egypt *GPA: 3.88/4*
  - **First Class Honours**
  - **Relevant Courses:** Digital Image Processing, Digital Signal Processing, C++, and Java.

EXPERIENCE

- **Propulsion and Space Research Center, Technology Innovation Institute** United Arab Emirates
  Researcher *Jun 2024 - Present*
  - **Advanced AI for Predictive Maintenance:** Develop advanced AI solutions for the predictive maintenance of jet engines, including anomaly detection, fault diagnostics, and Remaining Useful Life (RUL) estimation, ensuring scalability and robustness across various models and conditions.
  - **Multimodal Integration with Large Language Models:** Leverage Large Language Models (LLMs) to integrate and analyze multimodal data—images, signals, and text—for comprehensive engine health monitoring.

- **Center for Frontier AI Research - A*STAR** Singapore
  Research Scientist *Dec 2022 - Jun-2024*
  - **Privacy-preserving AI:** Led initiatives on source-free domain adaptation for time series data, enhancing AI's adaptability and security.
  - **Sustainable AI:** Pioneered research in continual domain adaptation for time series applications, focusing on long-term robustness and adaptability.
  - **Trustworthy AI:** Developed methodologies for robustness and uncertainty quantification in time series data, improving AI reliability.

- **Institute for Infocomm Research - A*STAR** Singapore
  Research Scholar *Aug 2018 - Dec 2022*
  - **Predictive Maintenance:** Implemented end-to-end data science pipelines for machine learning model deployment in anomaly detection, fault diagnosis, and prognosis.
  - **Transfer Learning:** Created innovative transfer learning and domain adaptation techniques for real-world predictive maintenance challenges.

- **ST Engineering Aerospace** Singapore
  AI/ML Intern *Sep 2020 - Dec 2020*
  - **Anomaly Detection** Applied LSTM, CNN, and autoencoder techniques for predictive maintenance, enhancing anomaly detection capabilities.
  - **Feature Extraction** Developed deep learning systems with automatic feature extraction for early detection of aircraft engine failures.

- **Aswan University** Egypt
  Assistant Lecturer *Dec 2017 - Jul 2018*
  - **Teaching and Mentoring** Assisted with instructional materials and exams, mentored students on final year projects.

- **Aswan University** Egypt
  Teaching Assistant *Feb 2015 - Nov 2017*
  - **Academic Support** Supported lab sessions, discussions, grading, and provided mentorship in e-learning courses.

Research Projects

- **AI-Based Framework for Prognostics and Health Management (PHM) of Jet Engines (2025–2026)**
  Role: Co-Principal Investigator
  Description: Develops a comprehensive PHM solution for jet engines by combining high-fidelity data generation, adaptive AI modeling, and digital twin technology. The project involves creating a test rig for simulating engine conditions, generating diverse fault scenarios, building data-driven digital twins, and integrating an interactive dashboard to assess robustness and facilitate seamless deployment in real-world maintenance systems.

- **AI-Based Infrared Radiation Prediction for Internal Combustion Engines (2025–2026)**
  Role: Co-Principal Investigator
  Description: Aims to develop an AI model that accurately predicts infrared radiation emitted by internal combustion engines using high-resolution IR imaging and advanced learning techniques. The project enhances understanding of engine heat transfer dynamics and delivers reliable thermal predictions under varying operational scenarios.

- **Label-Efficient and Resilient Federated Learning Approach for Time Series Applications (2024-2025)**
  Role: Principle Investigator
  Description: Stands at the forefront of federated learning, offering innovative solutions to enhance data privacy and collaborative analysis in time series applications across diverse sectors such as manufacturing, healthcare, and the Internet of Things.

- **Self-aware Continuously Learning Models (2022 - 2025)**
  Role: Member
  Description: Developing models that adapt to new distributions without forgetting historical ones, impacting long-term machine learning technology advancements.

- **Learning with Less Data (2021 - 2024)**
  Role: Member
  Description: Focusing on data-efficient deep learning techniques using self-supervised learning and transfer learning methods.

- **Explainable AI for Multi-modal Predictive Maintenance of Jet Engines (2019 - 2021)**
  Role: Member
  Description: Integrating augmented reality with backend XAI modules for enhanced user-oriented maintenance and decision-making.

Honors and Awards

- **Finalist Paper Award at International Conference of Prognostics and Health Management** July 2020
- **Singapore International Graduate Award (SINGA)** August 2018
- **Best Master's Thesis Award** August 2017
- **First Class Honours Award at Bachelor's Degree** July 2014

Publications

Conference Papers

[C1] Peiliang Gong, **Mohamed Ragab**, Min Wu, Zhenghua Chen, Yongyi Su, Xiaoli Li, Daoqiang Zhang "Augmented Contrastive Clustering with Uncertainty-Aware Prototyping for Time Series Test Time Adaptation" The 31th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2025).

[C2] Emadeldeen Eldele, **Mohamed Ragab**, Zhenghua Chen, Min Wu, and Xiaoli Li "TSLANet: Rethinking Transformers for Time Series Representation Learning" International Conference on Machine Learning (ICML), 2024.

[C3] Wenyu Zhang, Qingmu Liu, Felix Ong Wei Cong, **Mohamed Ragab**, Chuan-Sheng Foo "Universal Semi-Supervised Domain Adaptation by Mitigating Common-Class Bias" Conference on Computer Vision and Pattern Recognition (CVPR), 2024.

[C4] **Mohamed Ragab**, Emadeldeen Eldele, Min Wu, Chuan-Sheng Foo, Xiaoli Li, and Zhenghua Chen, "Source-Free Domain Adaptation with Temporal Imputation for Time Series Data" The 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2023).

[C5] Emadeldeen Eldele, **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li, and Cuntai Guan "Time-Series Representation Learning via Temporal and Contextual Contrasting" International Joint Conference of Artificial Intelligence, IJCAI, 2021.

[C6] Wenyu Zhang, **Mohamed Ragab**, Ramon Sagarna "Robust Domain-free Domain Generalization with Class-aware alignment" IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2021)

[C7] Chao Jin, **Mohamed Ragab**, Khin Mi Mi Aung "Secure Transfer Learning for Machine Fault Diagnosis under Different Operating Conditions" International Conference on Provable and Practical Security (PROVSEC 2020)

[C8] **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li "Adversarial Transfer Learning for Remaining Useful Life Estimation" IEEE International Conference on Prognostics and Health Management (ICPHM 2020), (**Finalist Award**).

[C9] **Mohamed Ragab**, Osama A. Omer, Hany S. Hussien"Compressive Sensing MRI Using Dual Tree Complex Wavelet Transform with Wavelet Tree Sparsity" *34rd National Radio Science Conference (NRSC), 2017*

Journal Papers

[J1] Edward*, **Mohamed Ragab***, Min Wu, Yuecong Xu, Zhenghua Chen, Abdulla Alseiari, Xiaoli Li, "EverAdapt: Continuous Adaptation for Dynamic Machine Fault Diagnosis Environments" *Mechanical Systems and Signal Processing, 2025*

[J2] Tilman Krokotsch, **Mohamed Ragab**, Min Wu, Xiaoli Li, Zhenghua Chen, Clemens Gühman,"From Inconsistency to Unity: Benchmarking Deep Learning-Based Unsupervised Domain Adaptation for RUL" *IEEE Transactions on Automation Science and Engineering, 2025*

[J3] Emadeldeen Eldele, **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li, "Label-efficient time series representation learning: A review" *IEEE Transactions on Artificial Intelligence (TAI), 2024*

[J4] **Mohamed Ragab**, Emadeldeen Eldele, Wee Ling Tan, Chuan-Sheng Foo, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li, "ADATIME: A Benchmarking Suite for Domain Adaptation on Time Series Data" *ACM Transactions on Knowledge Discovery from Data (TKDD), 2023*

[J5] Emadeldeen Eldele, **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li, Cuntai Guan Self-supervised Contrastive Representation Learning for Semi-supervised Time-Series Classification." *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2023.*

[J6] Emadeldeen Eldele,**Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li Contrastive Domain Adaptation for Time-Series via Temporal Mixup" *IEEE Transactions on Artificial Intelligence (TAI), 2023.*

[J7] Nguyen, Cuong, Arun Raja, Le Zhang, Xun Xu, Balagopal Unnikrishnan, **Mohamed Ragab**, Kangkang Lu, and Chuan-Sheng Foo Diverse and consistent multi-view networks for semi-supervised regression" *Machine Learning, 2023.*

[J8] Emadeldeen Eldele, **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li "Self-supervised Learning for Label-Efficient Sleep Stage Classification: A Comprehensive Evaluation" *IEEE Transactions on Neural Systems and Rehabilitation Engineering (TNSRE), 2023.*

[J9] **Mohamed Ragab**, Emadeldeen Eldele, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li "Self-supervised Autoregressive Domain Adaptation for Time Series Data" *IEEE Transactions on Neural Networks and Learning Systems (TNNLS), 2022.*

[J10] Emadeldeen Eldele , **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li and Cuntai Guan "ADAST: Attentive Cross-domain EEG-based Sleep Staging Framework with Iterative Self-Training." *IEEE Transactions on Emerging Topics in Computational Intelligence, 2022.*

[J11] **Mohamed Ragab**, Zhenghua Chen, Wenyu Zhang, Emadeldeen Eldele, Min Wu, Chee-Keong, Kwoh, Xiaoli Li "Conditional Contrastive Domain Generalization Towards Real-world Fault Diagnosis" *IEEE Transactions on Instrumentation and Measurement, 2022.*

[J12] Tiihonen, Armi, Sarah J. Cox-Vazquez, Qiaohao Liang, **Mohamed Ragab**, et al "**Predicting antimicrobial activity of conjugated oligoelectrolyte molecules via machine learning**" *Journal of the American Chemical Society (JACS), 2021.*

[J13] **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chee-Keong Kwoh, Xiaoli Li "Attention Based Sequence to Sequence Model for Remaining Useful Life Prediction" *Neurocomputing, Elsevier, 2021.*

[J14] **Mohamed Ragab**, Zhenghua Chen, Min Wu, Chuan-Sheng Foo, Chee-Keong, Kwoh, Ruqiang Yan, Xiaoli Li "Contrastive Adversarial Domain Adaptation for Machine Remaining Useful Life Prediction" *IEEE Transactions on Industrial Informatics, 2021.*

[J15] **Mohamed Ragab**, Zhenghua Chen, Haoliang Li, Min Wu, Chee-Keong Kwoh, Xiaoli Li "Adversarial Multiple-Target Domain Adaptation for Fault Diagnosis" *IEEE Transactions on Instrumentation and Measurement, 2021.*

[J16] Qing Xu, Zhenghua Chen, **Mohamed Ragab**, Chao Wang, Min Wu, Xiaoli Li "Contrastive Adversarial Knowledge Distillation for Deep Model Compression in Time-Series Regression Tasks", Neurocomputing, 2021.

[J17] **Mohamed Ragab**, Osama A. Omer, Mohamed Abdel-Nasser "Compressive sensing MRI reconstruction using empirical wavelet transform and grey wolf optimizer" *Neural Computing and Applications, 2018.*

Teaching Experience

- **ECE 422 Computer Networks** Covered topics like Network Protocols, Layering, Physical and Link layers, Retransmissions, and Routing.
- **ECE 424 Digital Signal Processing** Undergraduate course focusing on continuous-time and discrete-time signal analysis, Fourier transform techniques.
- **CSE 302 Signals and Systems** Focused on signal and system analysis, including discrete-time and continuous-time signals, Fourier representations, Laplace and Z-transforms.

Supervised Students

- **Edward (NTU Master's student)** Continual Domain Adaptation for Machine Fault Diagnosis. March 2023 - Sep 2023.
- **Yang Sizhe (NUS Master's student)** Robust Uncertainty Quantification for Time Series Data. January 2023 - June 2023.

Training and Workshops

- **Cambridge Center for AI in Medicine Summer School** Focused on Time-Series in Healthcare, Causal Deep Learning, and Synthetic Data. September 2023.
- **Project Management Fundamentals** Emphasized practical application through exercises and case studies. March 2023.
- **Trustable, Verifiable and Auditable Artificial Intelligence** Explored techniques for privacy-preserving federated learning. December 2022.
- **Introduction to Grant Writing** Focused on developing compelling proposals for funding opportunities. September 2022.

Invited Talks

- **Tutorial on Domain Adaptation at Amadeus IT Group** Discussed constraints of supervised learning and transfer learning techniques. March 2023.
- **Self-supervised Autoregressive Domain Adaptation at Institute for Infocomm Research** Presented a new framework for UDA for time-series data. June 2022.
- **Towards Real-world Predictive Maintenance at Nanyang Technological University** Discussed data-driven fault classification methods and AMDA method. March 2022.
- **Introduction to Transfer Learning at Universitat Rovira i Virgili** Overview of transfer learning and domain adaptation in various scenarios. February 2022.

Services and Professional Activities

- **STAR Ambassador for A*STAR Graduate Academy** Providing academic and career guidance, participating in science education and mentorship programs.
- **Journal Invited Reviewer** Peer reviewer for several IEEE Transactions and other academic journals:
  - IEEE Transactions on Industrial Informatics (TII)
  - IEEE Transactions on Instrumentation and Measurement (TIM)
  - IEEE Sensors Journal (SENSORS)
  - Neural Networks (NN)
  - IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
  - Mechanical Systems and Signal Processing (MSSP)
  - IEEE Transactions on Artificial Intelligence (TAI)
- **Program Committee Member** Serving as a program chair member at top AI conferences:
  - International Joint Conference on Artificial Intelligence (IJCAI)
  - Association for the Advancement of Artificial Intelligence (AAAI)
  - International Conference on Learning Representations (ICLR)
  - Knowledge Discovery and Data Mining (KDD)
  - Conference on Neural Information Processing Systems (NeurIPS)
  - International Conference on Machine Learning (ICML)

Skills Summary

- **Programming Languages** Proficient in Python, C++, MATLAB, and Java. Extensive experience in developing complex algorithms and machine learning models.
- **Frameworks and Libraries** Advanced skills in Scikit-Learn, Pandas, NumPy, PyTorch, and Keras for data processing, statistical analysis, and deep learning.
- **Tools and Technologies** Competent in using Docker for containerization, GIT for version control, Wandb for experiment tracking.
- **Platforms** Experienced in working with Linux, Windows, and web-based platforms. Proficient in using cloud services like GCP and Alibaba Cloud for scalable machine learning solutions.
- **Soft Skills** Strong leadership qualities, effective communication, and presentation skills. Proficient in academic writing and critical thinking.

References

Adj. Prof. Xiaoli Li
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