Faris H. Rizk

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Note: My full name is Faris Hamdi Rizk Elsayed Ibrahim.

Education

Delta Higher Institute for Engineering and Technology (DHIET) **Talkha, Dakahlia, Egypt**
Bachelor of Engineering in Communications and Electronics *Sep. 2021 – Jun. 2026 (Expected)*

- **Concentration**: Machine Learning, Computer Vision.
- **Relevant Coursework**: Computer Programming, Computer Skills, Signals Analysis, Analysis & Research Skills, Microprocessors & Applications, Statistics & Probability Theory, Mathematics: (1) Calculus I, (2) Calculus II, (3) Linear Algebra, (4) Discrete Mathematics, (5) Mechanics: Statics and Dynamics, Project Management, Technical Writing, Communication & Presentation Skills.
- **Independent Study**: Deep Learning for Computer Vision, Machine Learning, Metaheuristics Optimization Algorithms, Data Analysis, Image Processing, Data Structures & Algorithms, Object Oriented Programming, C/C++ Programming, Writing in the Sciences.

Research Experience

State University of New York at Buffalo **Remote — Buffalo, NY, USA**
Undergraduate Researcher *– Supervisor: Prof. Junsong Yuan* *Oct. 2024 – Present*

- At the State University of New York at Buffalo, I contributed to research on human-object interaction (HOI) detection, a computer vision task that involves localizing humans and objects in an image and identifying their interactions, typically represented as (human bounding box, object bounding box, object class, action class). My work focused on proposing novel models, implementing architectures, and conducting experiments using benchmark datasets such as V-COCO and HICO-DET.
- Wrote an article explaining the QPIC model, a cornerstone for state-of-the-art HOI detection models. The article, titled **Understanding QPIC: Query-Based Pairwise Human-Object Interaction Detection with Transformers**, aims to simplify and clarify the model's mechanics. The article was published on Medium [5].

Zewail City for Science, Technology, and Innovation **6th of October City, Giza, Egypt**
Research Lead *– Applied Machine Learning Lab, Zewail City Computing Society (ZCCS)* *Sep. 2024 – Present*

- Heading a multidisciplinary team focused on developing applied machine learning solutions, such as a computer vision detection system for dermoscopic image analysis to improve early skin cancer detection, particularly in underserved regions. Our research addresses critical challenges, including class imbalance, to enhance the reliability and robustness of diagnostic tools..

Delta Higher Institute for Engineering and Technology (DHIET) **Talkha, Dakahlia, Egypt**
Undergraduate Researcher *– Supervisors: Prof. El-Sayed M. El-Kenawy, Prof. Marwa M. Eid* *Jan. 2023 – Aug. 2024*

- Developed and integrated a real-time, computer vision-based pothole detection system on a remote-controlled vehicle. The system utilizes high-definition cameras, an Inertial Measurement Unit (IMU), GPS modules, and an STM32F401RCT6 microcontroller to enable real-time road inspection and precise pothole detection, achieving **92.15% accuracy** [1].
- Contributed to design, conduct experiments, and analyze results for the **Ocotillo Optimization Algorithm (OcOA)**, a desert-inspired metaheuristic for complex optimization problems. OcOA dynamically adjusts its search strategy based on iterative feedback, balancing exploration and exploitation. Evaluated against benchmark functions from the CEC 2005 suite, it outperforms existing algorithms in accuracy, convergence speed, and efficiency. Its adaptability in feature selection highlights its robustness for continuous and discrete optimization [2].
- Led a project optimizing student performance prediction models using the **Greylag Goose Optimization Algorithm**, reducing mean squared error from 0.0103 to 0.0060 [3].
- Contributed to the design and implementation of the **Ninja Optimization Algorithm (NiOA)**, a novel metaheuristic inspired by ninja traits such as stealth, precision, and adaptability. NiOA balances exploration and exploitation to navigate complex search spaces while avoiding local optima. It features a scanning phase for broad search and a refinement phase for precision. Evaluated against benchmark optimization functions and CEC 2005 benchmarks, NiOA demonstrates superior solution quality, convergence rate, and time complexity. Results underscore its robustness in high-dimensional optimization [4].

Publications

[1] M. E. S. Abdelmalak, N. Khodadadi, A. M. Zaki, M. M. Eid, **F. H. Rizk**, A. Ibrahim, A. A. Abdelhamid, L. Abualigah, E.-S. M. El-Kenawy, "Pothole Detection in Asphalt Roads: A Comprehensive Approach for Enhanced Road Maintenance and Safety with AlexNet Model," in *Proc. 2024 Int. Telecommun. Conf. (ITC-Egypt)*, 2024, pp. 269–274. doi:10.1109/ITC-Egypt61547.2024.10620566.

[2] E.-S. M. El-Kenawy, **F. H. Rizk**, A. M. Zaki, M. E. Mohamed, A. Ibrahim, A. A. Abdelhamid, N. Khodadadi, E. M. Almetwally, M. M. Eid, et al., "Ocotillo Optimization Algorithm (OcOA): A Desert-Inspired Metaheuristic for Adaptive Optimization," in *Journal of Artificial Intelligence and Metaheuristics*, vol. 1, pp. 39–9, 2024. doi:10.1234/JAIM.2024.01039.

[3] **F. H. Rizk**, M. E. Mohamed, B. Sameh, A. M. Zaki, M. M. Eid, E.-S. M. El-Kenawy, "Enhancing Student Performance Prediction with Greylag Goose Optimization Algorithm," in *Proc. 2024 Int. Telecommun. Conf. (ITC-Egypt)*, 2024, pp. 32–37. doi:10.1109/ITC-Egypt61547.2024.10620568.

[4] E.-S. M. El-Kenawy, **F. H. Rizk**, A. M. Zaki, M. Elshabrawy, A. Ibrahim, A. A. Abdelhamid, N. Khodadadi, E. M. Almetwally, M. M. Eid, "NiOA: A Novel Metaheuristic Algorithm Modeled on the Stealth and Precision of Japanese Ninjas," in *Journal of Artificial Intelligence in Engineering Practice*, vol. 1, no. 2, pp. 17–35, 2024. doi:10.5678/JAIEP.2024.010217.

Technical Articles

[5] **F. H. Rizk**, "Understanding QPIC: Query-Based Pairwise Human-Object Interaction Detection with Transformers," *Medium*, 2024. Available at: Article Link.

Skills

Programming Languages: Python (proficient), C/C++ (familiar), MATLAB (familiar).

Frameworks & Libraries: PyTorch, TensorFlow/Keras, Scikit-learn, OpenCV, NumPy, Pandas, Matplotlib.

Tools: Jupyter Notebooks, Google Colab, Git/GitHub, Linux/Unix, LaTeX.

Soft Skills: Problem-Solving, Project Management, Critical Thinking, Leadership, Teamwork, Communication, Adaptability.

Languages: Arabic (Native), English (Fluent).

Leadership and Extracurricular Activities

Google Developer Student Club (GDSC) at DHIET — **Talkha, Dakahlia, Egypt**
Graphic Design Head, ***Certificate*** — *Oct. 2023 – Jun. 2024*

- Led a team of 5 designers, increasing "DevFest" attendance by 30% through impactful promotional campaigns.
- Managed the club's visual identity across digital and print platforms, growing followers by 25%.
- Enhanced leadership and project management skills by coordinating team efforts and meeting deadlines.

Google Developer Student Club (GDSC) at DHIET — **Talkha, Dakahlia, Egypt**
Graphic Designer, ***Certificate*** — *Jan. 2023 – Oct. 2023*

- Designed promotional materials for events, contributing to a 20% increase in social media engagement.
- Collaborated with cross-functional teams to ensure cohesive branding and messaging.

IHOW Organization — **Talkha, Dakahlia, Egypt**
Human Resources Member — *Oct. 2022 – Jan. 2023*

- Led recruitment and onboarding for 10+ new members, improving team diversity.
- Facilitated team-building activities to enhance communication and productivity.

Competitions and Awards

DevFest Mansoura Hackathon — **Mansoura University, Egypt**
2nd Place *(Out of 25 teams)* — *Dec. 2023*

- Developed a data-driven platform to connect skilled laborers with clients, reducing unemployment and poverty in Egyptian society.
- Built predictive models using machine learning to match laborers and clients efficiently.
- Collaborated with design and development teams, contributing to the project's technical and user experience elements.