

FARIS HAMDI RIZK

Mansoura, Egypt

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Google Scholar Website LinkedIn GitHub

Education

Delta Higher Institute of Engineering and Technology (DHIET), Egypt

Sep. 2021 – Present

Bachelor of Engineering in Electronics and Communication

GPA: 3.2/4.0

- **Concentration:** Machine Learning and Computer Vision
- **Relevant Coursework:** Python Programming, Computer Science I & II, Signals Analysis, Statistics & Probability Theory, Linear Algebra, Calculus I & II, Discrete Mathematics, Projects management, Micro-Processors, Technical Writing
- **Independent Study:** Computer Vision, Deep Learning, Machine Learning, Data Analysis using Python, Image Processing, Data Structures & Algorithms, C/C++ Programming

Research Experience

Zewail City Computing Society, Zewail City of Science and Technology, Egypt

Sep. 2024 – Present

Research Staff Member – Applied Machine Learning Lab

- Research Focus: Computer Vision, Natural Language Processing, Human-Computer Interaction, Applied Machine Learning
- Currently onboarding and planning initial research projects in collaboration with lab members.

Delta Higher Institute of Engineering and Technology (DHIET), Egypt

Jan. 2023 – Present

Undergraduate Research Assistant

- Supervisor: Prof. El-Sayed M. El-Kenawy
- Research Focus: Machine Learning, Computer Vision, Optimization Algorithms
- Collaborated on projects involving deep learning models for object detection and image classification.

Research Interests

- **Primary Interests:** Computer Vision, Deep Learning for Visual Recognition, Image and Video Analysis, Object Detection and Segmentation
- **Secondary Interests:** Ethical AI Practices, AI in Education and AI for Social and Economic Development.

Publications

- Abdelmalak M. E. S., Khodadadi N., Zaki A. M., Eid M. M., **Rizk F. H.**, et al. (2024). **Pothole Detection in Asphalt Roads: A Comprehensive Approach for Enhanced Road Maintenance and Safety with AlexNet Model.** In *Proceedings of the 2024 International Telecommunications Conference (ITC-Egypt)*, pp. 269–274. doi:10.1109/ITC-Egypt61547.2024.10620566.
- **Rizk F. H.**, Mohamed M. E., Sameh B., Zaki A. M., Eid M. M., et al. (2024). **Enhancing Student PerformanceMachine Learning Optimization Algorithms Prediction with Greylag Goose Optimization Algorithm.** In *Proceedings of the 2024 International Telecommunications Conference (ITC-Egypt)*, pp. 32–37. doi:10.1109/ITC-Egypt61547.2024.10620568.
- **Rizk F. H.**, Arkhstan S., Zaki A. M., Kandel M. A., & Towfek S. K. (2023). **Integrated CNN and Waterwheel Plant Algorithm for Enhanced Global Traffic Detection.** *Journal of Advanced Intelligent Systems*, 6(2), 36–45. doi:10.54216/JAIM.060204.
- Kandel M. A., **Rizk F. H.**, Hongou L., Zaki A. M., Khan H., et al. (2023). **Evaluating the Efficacy of Deep Learning Architectures in Predicting Traffic Patterns for Smart City Development.** *Journal of Advanced Intelligent Systems*, 6(2), 26–35. doi:10.54216/JAIM.060203.

Skills

Programming Languages: Python, C/C++

Frameworks & Libraries: TensorFlow, Keras, PyTorch, OpenCV, NumPy, Pandas, Matplotlib

Deep Learning & Computer Vision: CNNs, Transformers, Object Detection, Image Segmentation

Tools: Jupyter Notebooks, Google Colab, Git/GitHub, Linux, L^AT_EX

Research Projects

Detecting Potholes in Asphalt Roads in Real-Time Using RC Car – [Paper Link](#)

Jan. 2024 – May. 2024

Supervisors: Dr. Nima Khodadadi (University of Miami, USA), Prof. El-Sayed M. El-Kenawy (DHIET, Egypt)

- Developed and trained a Convolutional Neural Network (CNN) based on the AlexNet architecture for real-time detection of potholes in asphalt roads, achieving 92.15% accuracy. Optimized the model using high-performance GPUs for deployment in real-time systems.
- Preprocessed a large dataset of road images by performing image augmentation, resizing, and normalization to enhance model robustness and improve generalization across various road conditions.
- Implemented an image analysis pipeline that leverages high-resolution video feeds to detect surface anomalies in asphalt roads. Advanced techniques like edge detection were applied to fine-tune the model's performance.
- Led the integration of the CNN model with a real-time processing system that enabled continuous, real-world pothole detection from high-resolution camera feeds, ensuring low-latency response times in dynamic environments.
- Collaborated with a cross-disciplinary team to deploy the model on a remote-controlled car for automated real-world validation, focusing on the system's ability to detect and classify potholes in varied lighting and weather conditions.

Greylag Goose Optimization for Student Performance Prediction – [Paper Link](#)

Sep. 2023 – Dec. 2023

Supervisors: Prof. Marwa M. Eid, Prof. El-Sayed M. El-Kenawy (DHIET, Egypt)

- Led a team in implementing the Greylag Goose Optimization (GGO) algorithm to enhance the performance of a Multilayer Perceptron (MLP) Regressor for predicting student performance, achieving a significant reduction in Mean Squared Error (MSE) from 0.0103 to 0.0060. Based on a comprehensive dataset from Portuguese secondary schools.
- Utilized GGO for hyperparameter tuning, optimizing the MLP model's learning rate, regularization parameters, and network architecture, leading to more accurate predictions.
- Conducted a comparative analysis with other metaheuristic algorithms, demonstrating that GGO+MLP outperformed other configurations regarding predictive accuracy and computational efficiency.
- Explored various statistical techniques such as ANOVA and Wilcoxon Signed Rank Tests to validate the improvements in model performance post-optimization, ensuring statistical significance in the results. Helped educational institutions identify at-risk students early, allowing for more targeted interventions to improve overall academic outcomes.

Enhancing Traffic Detection Using Deep Learning and Optimization – [Paper Link](#)

Mar. 2023 – Jun. 2023

Supervisors: Prof. El-Sayed M. El-Kenawy (DHIET, Egypt)

- Led a team in the design and implementation of a hybrid Convolutional Neural Network (CNN) and Waterwheel Plant Algorithm (WWPA) to detect and track vehicles in global traffic data, improving real-time traffic monitoring systems.
- Achieved a model accuracy of 97.28% with the WWPA-CNN, surpassing the performance of traditional CNN models such as VGG19Net, ResNet-50, and AlexNet.
- Collaborated in developing a globally diverse traffic dataset, which included multiple environmental conditions and traffic patterns across various cities, enhancing the model's generalization ability in different regions and weather scenarios.
- The fusion of CNN and WWPA established a new benchmark for object detection systems in smart cities, offering scalable solutions for urban planners aiming to optimize traffic flow and ensure road safety.

Predicting Traffic Patterns in Smart Cities Using Deep Learning – [Paper Link](#)

Jan. 2023 – May. 2023

Supervisors: Prof. El-Sayed M. El-Kenawy (DHIET, Egypt)

- Applied various deep learning architectures, including AlexNet, ResNet-50, GoogLeNet, VGG16Net, and VGG19Net, to predict and analyze traffic patterns in urban environments.
- Performed a comparative analysis of model performance, with AlexNet emerging as the best-performing model with an accuracy of 93.18%, making it highly effective for real-time traffic pattern prediction.
- Utilized a comprehensive traffic dataset from major city intersections, capturing traffic flow dynamics across different times of the day, including peak and non-peak hours, to train and test the models.
- Implemented statistical methods, including ANOVA and Wilcoxon Signed Rank tests, to validate the performance of the models and ensure statistical significance, thereby enhancing the reliability of the model.

Extracurricular Activities

Graphic Design Head <i>Google Developer Student Club (GDSC)</i> <ul style="list-style-type: none">Leading design team for event materials, club branding, and promotional content.	Oct. 2023 – Present <i>DHIET, Egypt</i>
Graphic Designer <i>Google Developer Student Club (GDSC)</i> <ul style="list-style-type: none">Designed graphics for events; collaborated on creative solutions.	Jan. 2023 – Oct. 2023 <i>DHIET, Egypt</i>
Human Resources Member <i>IHOW Organization</i> <ul style="list-style-type: none">Managed recruitment, onboarding, team-building; facilitated communication.	Oct. 2022 – Jan. 2023 <i>DHIET, Egypt</i>

Competitions

2nd Place (out of 25 teams) <i>GDG DevFest Mansoura Hackathon</i> <ul style="list-style-type: none">Placed 2nd in GDG DevFest Mansoura Hackathon among 25 teams; developed a web platform for freelance opportunities in Egypt.	Oct. 2023 <i>Mansoura University, Egypt</i>
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Languages

English: C1 Level (Advanced)

Arabic: Native Speaker