Abdelrhman Ahmed Ezzat

AI & Data Science Engineer

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Summary

Data Scientist proficient in Python and Machine Learning, with strong expertise in Data Science workflows including EDA, predictive modeling, Model Optimization, and data storytelling. Experienced in end-to-end projects with real-world applications. Strong foundation in AI techniques, with hands-on deployment experience (FastAPI, Docker) and a track record of building real-world ML prototypes.

Education

Menoufia University — B.Sc. Artificial Intelligence & Data Science. Oct 2022 – Expected Jul 2026

Experience

Digital Egypt Pioneers Initiative (DEPI) – Generative AI Trainee Jul 2025 – Present

- Contributed to a national initiative on advanced AI and Data Science technologies, focusing on Generative AI and Large Language Models (LLMs).
- Trained in Generative AI, LLMs, and prompt engineering techniques.
- Developed prototype Machine Learning applications leveraging LLMs and Generative AI models, with focus on scalability and deployment.
- Collaborated with a team of peers to design prompt engineering workflows.

Skills

Technical Skills:

- **Programming & Data Handling:** Python, SQL, PostgreSQL, NumPy, Pandas, Dask, OOP.
- **Machine Learning:** Scikit-learn, Classical ML Models, Feature Engineering, Feature Selection, Model Evaluation, Hyperparameter Tuning.
- **Deep Learning:** PyTorch, NLP (Transformers, NLTK, spaCy), Computer Vision (OpenCV), Reinforcement Learning.
- **Full stack & Deployment:** Frontend(HTML, CSS, JavaScript, React), Backend(FastAPI), Docker, Streamlit, MLOps.
- **Data Visualization & Storytelling:** Matplotlib, Seaborn, Power BI, Streamlit.
- **Time Series Modeling & Forecasting:** ARIMA, SARIMA, Prophet.
- **Big Data:** Hadoop, Spark.

Soft Skills:

- Problem-Solving, Communication Skills, Adaptability, Team Collaboration, Time Management, Critical Thinking, Leadership, Creativity.

Projects

Traffic Sign Detection and Classification (GTSRB) Nov 2025

- Collaborated in a team to build an end-to-end AI-powered traffic sign detection system using the German Traffic Sign Recognition Benchmark (GTSRB), covering 43 categories.
- Developed and optimized a custom CNN model in PyTorch, achieving over **95%** test accuracy.
- Engineered robust data pipelines with extensive augmentation for lighting, rotation, and weather variability.
- Delivered both CLI and modern web UI (FastAPI backend + HTML/CSS/JS frontend). Added GPU/CUDA acceleration for fast inference.
- Designed modular preprocessing—segmentation, feature extraction—with advanced algorithms (Otsu, Adaptive, Chow-Kaneko, Cheng-Jin-Kuo).

Tools: Python, PyTorch, FastAPI, OpenCV, HTML/CSS/JS.

DQN Agent for 2048 Game (Reinforcement Learning) May 2025

- Developed a Deep Q-Network agent to master the 2048 puzzle using custom NumPy and TensorFlow implementations of the logic and RL components.
- Engineered replay buffer, target network architecture, and epsilon-greedy strategy; agent trained for 10,000+ episodes on GPU.
- Created interactive dashboards with TensorBoard and Matplotlib to monitor score progression, Q-value trends, and exploration decay.
- Shipped a Flask web app for live play, benchmarking, and model checkpoint management, enabling both manual and AI-controlled play modes.

Tools: TensorFlow, NumPy, Flask, Matplotlib.

Vehicle Detection and Tracking Dec 2023

- Built a production-ready web app for real-time vehicle detection, tracking, and traffic analysis using YOLOv8 and custom ROI zone logic.
- Engineered the entire pipeline: video ingestion, frame-by-frame detection, counting by lanes (left/right), and output of annotated traffic videos with labeled overlays and classification (heavy/smooth traffic).
- Designed and deployed an async FastAPI backend with live progress streaming to frontend via WebSockets; support for large batch video uploads and high-res input.
- Created dynamic polygonal ROI/mask extraction for improved accuracy and flexible deployment across camera angles.
- Automated traffic status assessment, with clear statistical overlays and easy download of processed results.

Tools: Python, YOLOv8, FastAPI, OpenCV, HTML/CSS/JS.

Sports Popularity Analysis with Web Scraping May 2025

- Engineered an automated data pipeline to collect, clean, and analyze over 10,000 time-series entries from Google Trends and YouTube API, covering 5+ sports categories.
- Applied robust seasonal decomposition and ensemble forecasting (Prophet, SARIMA) to detect trend spikes and long-term popularity shifts.
- Built interactive dashboards for dynamic performance visualization, integrating event impact markers and forecast uncertainty bands.
- Processed large datasets with anomaly detection, outlier mitigation, and automated handling of missing values.

Tools: Python, Pandas, Plotly, Prophet, SARIMA, Streamlit, BeautifulSoup.

Auto-correct System using NLP & Transformers May 2025

- Developed a spelling and grammar correction system combining edit distance, custom probabilistic N-gram models, and transformer-based contextual embeddings.
- Achieved **92%** correction accuracy across benchmark datasets with a >50,000 word vocabulary and robust multi-error handling for both isolated tokens and full sentences.
- Engineered pipelines for spelling correction (PySpellChecker), grammar correction (Gramformer), and bigram-based contextual replacements, scalable to search and text input applications.
- Built an interactive Gradio GUI app and batch-processing NLP pipeline, with clear before/after comparison and vectorized outputs for potential seq2seq training.

Tools: NLTK, PySpellChecker, Gramformer, spaCy, Transformers, Gradio.