# BASSANT ELSOMKHRATY

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## 👤 BACKGROUND

Recent Computer Science and Engineering graduate with a solid foundation in Artificial Intelligence, optimization, and computer vision. Skilled in designing, deploying, and optimizing scalable systems, with experience transitioning models from development to production. Focused on solving complex problems and improving system performance through practical, real-world solutions. Prepared to apply my technical skills and contribute to projects that drive efficiency and progress in AI and optimization.

## 🎓 EDUCATION

**Egypt-Japan of Science and Technology**      **September 2020 – February 2025**
*B Sc. in Computer Science and Engineering*      ***GPA**: 3.3/4*

## 📖 PUBLICATIONS

- **"Arabic Handwritten Document OCR Solution with Binarization and Adaptive Scale Fusion Detection,"**      21 October 2024
  6th Novel Intelligent and Leading Emerging Sciences (NILES) Conference      [Paper Link]
  - Addressed the unique challenges of Arabic Handwritten Text Recognition (AHTR) by designing a robust line detection algorithm utilizing Differentiable Binarization and Adaptive Scale Fusion techniques to enhance accuracy in segmenting Arabic text lines.
  - Designed and implemented an OCR system with CNN-BiLSTM-CTC architecture, achieving a Character Recognition Rate (CRR) of 99.20% and a Word Recognition Rate (WRR) of 93.75%.
  - **Technologies:** TensorFlow/Keras, DBNet++, Python, OpenCV, Data preprocessing.

## 💼 EXPERIENCE

**NTI Machine Learning for Data Analysis**      **September 2024 – November 2024**
*Machine Learning Intern (On-Site)*
- Applied supervised and unsupervised learning techniques to build and evaluate models, ensuring optimal performance through hyperparameter tuning and model selection.
- Conducted exploratory data analysis (EDA) to understand dataset characteristics, identifying trends, and key features using statistical analysis and data visualization techniques.
- Developed an Arabic Sentiment Analysis model on a Twitter dataset as my final project, leveraging advanced preprocessing techniques with NLTK (tokenization, stemming, stop word removal), leading to a 12% accuracy improvement using LSTM.

**Digital Egypt Pioneers Initiative (DEPI)**      **April 2024 – October 2024**
*Generative AI Professional Intern (Hybrid)*
- Ranked among the top 3 out of 600 participants for contributions and overall achievements in the track.
- Integrated transformer-based models and GANs for various AI-driven applications, significantly improving outcomes in NLP and content generation.
- Optimized AI models using quantization and pruning, improving model efficiency and reducing inference time.
- Developed and deployed scalable AI applications with FastAPI, ensuring high performance and seamless integration in production environments.
- Contributed to the development of a Retrieval-Augmented Generation (RAG) system for Egypt's Constitution as my final project, improving query accuracy by 18% through the integration of LLMs.

**Huawei ICT Academy**      **August 2024 – September 2024**
*AI Trainee (Remote)*
- Gained hands-on experience in developing deep learning models using MindSpore, focusing on efficient training, optimization, and fine-tuning for AI tasks.
- Learned to deploy AI models on Huawei Cloud, optimizing for scalability, reliability, and efficient execution in production environments.

**Qorrect Company**      **July 2024 – September 2024**
*Full Stack Intern (Hybrid)*
- Improved front-end functionality using AngularJS, enhancing user interaction and experience.
- Optimized back-end performance with ASP.NET Core and C#, focusing on system scalability and reliability.
- Integrated Hangfire for efficient background task management.
- Optimized SQL Server queries, improving data retrieval and system performance.
- Redesigned the progress-tracking feature, boosting user engagement.

# ⵟ PROJECTS

**Arabic Handwritten Document OCR Solution** | *Python, ResNet, CNN-BiLSTM CTC, OCR*          **Graduation Project 1**
- Addressed the **complexity** of Arabic handwriting by integrating **binarization** and **adaptive scale fusion** to detect lines in noisy, variable-scale documents.
- Combined **ResNet** for line segmentation with a **CNN-BiLSTM CTC** engine, achieving **3% CER** and **6% WER** a boost for **real-world Arabic OCR** tasks.

**Toxic Comments Detection** | *Python, TensorFlow, BiLSTM, GRU*                                  **November 2023**
- Developed a high-impact **NLP** system to automatically flag online harassment, achieving **97% accuracy** with a **GRU** model.
- Implemented a two-stage classification (toxic vs. non-toxic + five subtypes) to handle diverse linguistic challenges, using live data from the Twitter API.

**Attendance System** | *Ionic Angular, OpenCV, Firebase*                                          **May 2023**
- Built a **real-time face recognition** solution with **OpenCV**, achieving **98% accuracy** for fast, reliable classroom attendance.
- Used **Ionic Angular** for a user-friendly interface and **Firebase** for secure image/data storage, minimizing instructor workload.

**Grocery App** | *Ionic Angular, PHP, AWS*                                                        **March 2023**
- Architected a scalable backend on **AWS** with robust **authentication** and encrypted key management to protect user data.
- Developed **data scraping** for Carrefour product catalogs, enhancing the app's usability and product coverage.

**3D Construction Optimization** | *Python, Colmap, Pix2Vox, VGG16, ResNet, ESRGAN*                **February 2023**
- Improved **3D reconstruction** quality from low-resolution mobile images using **ESRGAN** for super-resolution.
- Leveraged **Pix2Vox** with **VGG16/ResNet** to create more detailed models, demonstrating an innovative pipeline for **Colmap**-based 3D projects.

# ⚒ SKILLS

**Programming Languages:** Python, C++, C# , Javascript
**Frameworks:** TensorFlow, PyTorch, MindSpore
**Libraries:** scikit-learn, Pandas, NumPy, Matplotlib, Seaborn
**Artificial Intelligence (AI):** CNN, RNN, NLP , Transformers, Generative AI (Hugging Face, RAG)
**Image Processing:** OpenCV, Image Segmentation, Object Detection, Feature Extraction
**Cloud Computing & Deployment:** Microsoft Azure , Docker, RESTful APIs
**Software Development:** ASP.NET Core, AngularJs, Git, GitHub, Agile Development, Unit Testing
**Databases:** MySQL, MongoDB, PostgreSQL
**Data Visualization:** Tableau, Power BI
**Operating Systems:** Windows, Linux
**Soft Skills:** Communication, Analytical Thinking, Leadership, Teamwork, Collaboration, Adaptability, Time Management

# ⚲ CERTIFICATES

**Deep Learning Specialization**                                                                  **Feb 2024 – Apr 2024**
- Neural Networks and Deep Learning (Feb 2024, Coursera)
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization (Mar 2024, Coursera)
- Structuring Machine Learning Projects (Mar 2024, Coursera)
- Convolutional Neural Networks (Jan 2024, Coursera)
- Sequence Models (Apr 2024, Coursera)

**Machine Learning Specialization**                                                               **Nov 2023 – Dec 2023**
- Supervised Machine Learning: Regression and Classification (Nov 2023, Coursera)
- Advanced Learning Algorithms (Dec 2023, Coursera)
- Unsupervised Learning, Recommenders, Reinforcement Learning (Dec 2023, Coursera)

**Other Courses and Certifications**
- AWS Foundation in Machine Learning, Udacity Online (2021)
- Data Analysis Professional, FWD (2021)

# 🌐 LANGUAGES

**Arabic**                                                                                        **Native Speaker**

**English**                                                                                       **Excellent, Professional**

**Japanese**                                                                                      **Good Knowledge**