

Yessine Khanfir

Machine Learning Engineer

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Introduction

A dedicated **Machine Learning Engineer** with a proven track record of designing and implementing advanced AI models to solve challenging problems. My work includes developing state-of-the-art solutions, such as a splice-site prediction model utilizing DNA transformers and an innovative LLM-based approach for cancer immunogenicity prediction. With a strong foundation in **deep learning, NLP, and computer vision**, my contributions have been recognized through impactful research, including a publication in IEEE/CVF WACV 2024. I am passionate about pushing the boundaries of AI and delivering impactful solutions that address real-world needs.

Experience

AI Research Engineer, InstaDeep – Tunis, Tunisia Sept 2022 – Current

- Designed a **splice-site prediction model** utilizing the Nucleotide Transformer, InstaDeep's in-house DNA foundational model; achieved significant improvements in model performance on internal test data, enhancing suitability for our specific use cases, eliminating reliance on external models and associated costs.
- Developed a **novel LLM-based approach for cancer immunogenicity prediction**, consisting of a two-stage architecture that combines a fine-tuned LLM (DNA, RNA, or Protein) with XGBoost; initially fine-tuned the LLM for the immunogenicity task, followed by training XGBoost on the concatenated embeddings and lab-generated tabular features to accurately predict the likelihood of antigens triggering an immune response.
- Conducted research on automatic handwritten text extraction and named entity detection, focusing on the integration of **CNNs, Transformers, and Graph Neural Networks** to achieve a state-of-the-art method for joint optical character recognition and word tagging; **implemented, trained, and benchmarked** model combinations, culminating in publication at the IEEE/CVF WACV 2024 (Rank A conference).
- Mentored interns throughout their projects to help them acquire essential theoretical and technical skills, ensuring successful outcomes; supported new team members in their integration by helping them develop the necessary technical expertise to contribute effectively to projects and deliver value.

Machine Learning Engineer, Edit on the Spot – Freelance, remote Aug 2022 – Jan 2023

- Established the initial baseline codebase and architecture for a **modeling and data processing framework** from the ground up, creating a robust foundation for future developments.
- Designed and trained a **multi-modal model for automatic content cropping** that leverages natural language input along with Mel-frequency cepstral coefficients (MFCC) features to efficiently remove introductory and concluding segments from recorded shows, podcasts, and meetings, preserving only the relevant content.

AI Research Intern, InstaDeep – Tunis, Tunisia Feb 2022 – Aug 2022

- Completed a graduation internship where I implemented a **hybrid model combining Transformer Neural Networks and Graph Neural Networks** to enhance representation learning for information extraction from historic handwritten documents, resulting in a successful project that contributed to my graduation with excellent appreciation.

Publications

Graph Neural Networks for End-to-End Information Extraction from Handwritten Documents Jan 2024

Y Khanfir, M Dhiaf, E Ghodhbani, A Cheikhrouhou, Y Kassentini

10.1109/WACV57701.2024.00056

Tools and Technologies

- **Languages, Frameworks and Libraries:** Python, PyTorch, Jax, HuggingFace, Biopython, Scikit-learn, Pandas, Matplotlib, Numpy, MLflow, FastAPI, Flask, LLMs, Generative AI, Conversational AI.
- **Version Control:** Git, DVC.
- **Containerization and isolation:** Docker, Conda.
- **Other Tools:** Linux, CUDA, Google Cloud Platform (GCP), Neptune, Weights & Biases.

Licenses and Certificates

Machine Learning DevOps Engineer, Udacity nanodegree Nov 2024

- Skills: MLOps, Automated Machine Learning, Git Workflows, Data Version Control (DVC), CI/CD.

Fundamentals of Deep Learning, Nvidia Deep Learning Institute Nov 2021

- Skills: Pytorch, Convolutional Neural Networks (CNN), Natural Language Processing (NLP), Data Augmentation, Transfer Learning

Education

ESPRIT University, Tunisia, Master's degree in **Computer Science** Sept 2017 – June 2022

- **Coursework:** Software programming, Mathematics, Artificial Intelligence, Statistics, Machine Learning, Databases, Operational Research

Other Activities

IndabaX Tunisia 2024 Workshop Speaker, Tunis, Tunisia May 2024

- Delivered an introductory presentation to Biomedical AI, showcasing how machine learning can effectively tackle complex biological challenges, including splice site and gene expression prediction.
- Led a practical session where participants implemented and trained their own deep learning models using PyTorch and pretrained open-source models from Hugging Face to perform promoter strength prediction.

Participated in IEEE/CVF WACV 2024, Hawaii, USA Jan 2024

- Represented our paper "Graph Neural Networks for end-to-end Information Extraction from Handwritten Documents", in a poster session where I had the chance to deeply explain our approach and collect constructive feedback.

Attended Deep Learning Indaba 2023, Accra - Ghana Sept 2023

- Represented InstaDeep in a week-long event dedicated to advancing machine learning and artificial intelligence in Africa.
- Attended workshops and practical sessions focused on cutting-edge advancements and the latest developments in AI, engaging with leading researchers and innovators in the field.

Lions Clubs International, Tunis - Tunisia Sept 2019 – Sept 2020

- **Activist:** Engaged in youth activism focused on social change by providing vital aid and support to elderly individuals in shelters and distributing essential supplies, such as food and clothing, to underserved rural communities.

Languages

English: Proficient.

French: Proficient.