Ayoub Ajarra

- ayoub-ajarra.github.io

"Thinking outside the box."

SUMMARY

My research area is in the interdisciplinary filed of Learning Theory, Representation Learning, Graph Networks, Reinforcement Learning. I'm specifically interested in the intersection between Deep Learning and physics. I have a natural attraction to mathematics, physics and I enjoy coding, I learn everyday from experts and explore new methods and revolutionary approaches by staying update and being active on AI communities. I'm also passionate about innovation, using the next technology before everyone else has even heard of it, and making crazy ideas turn into the best machine learning models, based on rigorous approaches for impactful solutions in scientific communities such as climate science.

EDUCATION

ECOLE CENTRALE CASABLANCA Casablanca
Master degree in Artificial Intelligence Research Sep. 17 - expected graduation on Mai. 22
Relevant Coursework: Learning Theory, Advanced statistical learning, Machine Learning, Computer Vision, Generative models, Reinforcement Learning, Meta Learning .

CLASSES PRÉPARATOIRES IBN TAYMIYA Marrakech
Advanced mathematics and physics (MPSI-MP)* Sep. 15 - Aug. 17
Intensive undergraduate program in Mathematics, Physics and Computer Science, leading to nationwide examinations to enter the French Grandes Ecoles.

HSE UNIVERSITY Moscow
Summer School on Machine Learning in Bioinformatics Aug. 20
Theoretical foundations of AI and protein prediction.

EXPERIENCE

MILA Montreal
Visiting research student - Supervised by Yoshua Bengio, Loubna Benabbou and Dianbo Liu Apr. 1st - Oct. 30
• Literature review of machine learning-based approaches to capture the missing fine-scale physics of clouds in climate models.
• Literature review of different physical inductive biases to learn physical consistent fluid evolution with simple experimental data generated from high-fidelity simulators.
• Implementation of 3D-Unet with squeeze-excitation blocs to learn space-time evolution of non stable physical system (e.g fluid instabilities).
• Generated data describing Rayleigh-Bénard instability that occur in the atmosphere between two layers of different temperatures from Dedalus.
• Proposed a new approach based on Helmholtz theorem to reduce the representation -describing Rayleigh-Bénard instability, into a discrete one and study the interaction of the vortices represented by keypoints, then implemented a graph encoder-decoder to learn the space-time evolution of the discrete representation based on causal graphs.
• Proposed an improved approach of the previous one by considering the "merge/split" behaviors of multiple vortices and by using dynamic graph networks that supports the natural variability of the keypoints.

VALWIN Nantes
Data Scientist Aug. 19 - Feb. 20
• Contributed in database construction and consolidation: Scrapping new data of large dimension (20k products: their description, images,etc..) and integrated them in the catalogue of product's API: Algolia.
• Worked with an agile team to develop machine learning analytics across domains
• Implemented and designed three algorithms for products categorization ; a combination both of **NLP** (products descriptions) and CNN architectures (VGG,Resnet,MobileNet).
• Discover, evaluated and applied the latest research in natural language processing (NLP) and machine learning to extract most relevant information from French texts.
• Analyzed customer's distribution both temporally and spatially, designed a innovative model to identify target regions in France with high potential, presented analytic results and uncertainty to decision makers
• Implemented a product recommendation system based on the customer's purchase history.

SNCF Paris
Research project Nov. 20 - Feb. 21
• Implemented an algorithm to classify images of pantograph, face, rail and roof of the train using EfficientNet and Attention models, as well as detecting defaults on pantographs and rails.
• Won the award of the best research project in my school.

ECOLE CENTRALE CASABLANCA'S LAB Casablanca
Research Intern - Complex Systems Team Feb. 20 - Aug. 20
• Implemented an algorithm to prediction the number of reported cases of COVID-19 dynamics for the next seven days in France and Morocco.
• Won the competition for the best **research article** in my school.
• Technologies used include: **ARIMA**, **Adaboost, Xgboost, Catboost**, **Keras**, **Pytorch**

TECHTREND SOLUTIONS Casablanca
Data scientist Apr. 19 - Aug. 19
• Performed statistical analysis, temporal and pattern analysis of the traffic, correlation of events that occur in an intersection.
• Created a simulation of traffic from intersections of Casablanca map using Anylogic software.
• Implemented a model to predict future traffic flow with high-resolution forecasts.
• Discovered rules by analyzing patterns and created new perspectives and a better understanding.
• Technologies used include: **Anylogic**, **Opencv , Keras, Tensorflow**,

RAADEMA Marrakech
Data scientist Intern Jun. 18 - Sep. 18
• Searched and collected meter datasets.
• Implemented a model for detection and recognition of the dial of a meter by using various CNN architectures, based on three models: **YOLOv3**, **Fast-YOLOv3**, **ResNet-50**, **ResNet-101**, with performing a comparative study.
• Implemented a simple algorithm to decode errors that were sent by meters to reveal hidden informations.

ADDITIONAL EDUCATION

• Stanford CS224w: Machine Learning with Graphs
• Stanford CS231n: Convolutional Neural Networks for Visual Recognition
• Stanford: Tensorlfow for deep learning research
• Deep learning : dlcourse.ai by ods.ai
• Modern web scraping with python using scrappy by Udacity
• Stanford CS330: Deep Multi-Task and Meta Learning

PROJECTS

• Analyzing global terrorism Network using **Graph theory**
• Crime prediction and analysis **inspired by Predpol**
• The NYC taxi problem: On finding the optimal parking lots locations
• Using News to Predict Stock Movements: Kaggle competition by Two Sigma
• Airbus Ship Detection Challenge: Kaggle competition by Airbus
• Lyft Motion Prediction for Autonomous Vehicles: Kaggle competition by Lyft
• Speech representation and understanding simple speech commands inspired by TensorFlow Speech Recognition Challenge
• COVID-19 mRNA Vaccine Degradation Prediction
• Predict demand for an online classified ad by Avito
• Forest Fire Classification: algorithms based on satellite temperature anomaly data.

SKILLS

• **Languages:** English (full proficiency), French (native), Arabic (native).
• **Programming Languages:** Python, R, SQL
• **Algorithms:** Machine learning, Deep learning, Reinforcement learning . Meta Learning
• **Pattern recognition:** Computer vision, Natural language processing
• **Technologies:** Pytorch, Tensorflow, Keras, Theano, Caffe
• **Big data:** Hive, Spark, Hadoop . Mapreduce

HONORS AND AWARDS

• **Finalist** ranked among 150 best Data Scientists for Y-Data program 2020 2020
• **Won** college Mathematical Olympiad, ranked 1st. 2014
• **Won** college Mathematical Olympiad, ranked 1st. 2013

VOLUNTEERING IN AI

I work on different projects with Wildlife.ai on object detection and species identification

• Predicting the conservation status of plant species worldwide
• Monitoring whales with satellite imagery
• Detecting plastic litter in natural environments