Abderrazak CHAHID

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I have 2.5 years of research experience in machine learning models (ML). I worked on different projects including signal processing, image processing, computer vision, feature extraction, optimization, and statistical modeling.

Work Experience

Data Scientist | Machine Learning Engineer — *Postdoctoral fellow* since Apr 2024

Freelancer, Canada

- Implement data analysis pipeline: data preparation, cleaning, annotation, feature extraction,
- Design the ETL pipeline: data acquisition, preparation, cleaning, database management
- Implement data analysis pipeline: feature extraction, Time-series analysis, statistical modeling (PyMC)
- Design and deploy machine learning models (ML): regression, classification, object detection
- AI model deployment at the edge with NVIDIA Jetson boards and the cloud service (AWS, Azure using Terraform).

Research Scientist — *Postdoctoral fellow* Apr 2021 - Sep 2023

Ontario Tech University, Canada

- Design a **semi-automated image annotation** using Napari and VGG Image **Annotator** (VIA)
- Design an database handling data collection, data preparation, visualization, and sharing on Firebase Google Cloud.
  - *Implement smart road conditions inspection:*
    - Accelerate the road inspection process (1 mile of road can be inspected in **10 min instead of hours**)
    - Automate the inspection process by integrating robots and artificial intelligence
    - Implement road conditions screening using different sensors (3D Camera, IMU, LiDAR, GPS). [project demos]
    - Design and integrate drone-based data collection using DJI Mavic 3 / DJI Tello. [demo video]
    - Implement hybrid classification/object detection ML models for inspection of Highways in winter conditions
  - *Automated industrial inspection for nuclear power plants:*
    - Enhance the inspection process : A tool fully diagnosed in **40min with 86% accuracy**
    - Implement a hybrid deep learning-based system with user-interface UX [project demo]
    - Integrate an incremental learning feature for better data selection and training.
    - Extend the project for dental diagnosis and treatment support using semantic networks [project demo]
- 4 journal papers were published, 3 papers are under review, and 1 proposal fund award from MTO of Ontario

CTO, Design Engineer — *Startup experience* Mar 2020 - Dec 2020

Aquash Technology Startup (Stage I), KSA

- Design/manufacturing a **Jetson** Nano-based system to **collect sensor data** and control feeding for Tilapia fish aquarium.
- Manual data **cleaning, preparation and annotation** of the collected underwater camera images using LabelMe
- Design online **visualization and monitoring**, using **Grafana**, of the feeding process, fish growth, and fish health
- Design an object detection model to assess the fish health diagnosis. Implement a real-time optimal feeding strategy
- Manage the **AWS** assets used for **model deployment** and the hosting of the website
- Participate in the market assessment and potential collaborator/client discussions
- Follow up and coordinate with the external outsourcing (website and logo)

Electric Arc Fault Detection System Design — *Master's thesis internship* Apr 2014 - Aug 2014

Institut Jean Lamour (IJL), France

- Design and implement an electrical arc fault **detection algorithm** based on an active filter
- implement an FFT-based detection algorithm using spectral and statistical indicators (features)
- Develop a Matlab user interface tool to integrate the developed detection algorithm
- Validate the algorithm simulated Hardware-In-the-Loop (HIL) using Matlab and VHDL-AMS modeled power loads.
- Participate in writing my first IEEE journal paper as a co-author. [PDF]

Requirement management for automotive applications — *B. Eng's thesis internship* Feb 2013 - July 2013
Continental Automotive France

- ***Phase 1**: Requirement management for the automotive industry:*
  - Participate in creating the requirement management system for the company using emails, specs documents, meetings' notes.
  - Write the clients/stockholders' needs and translate them into concise and traceable technical specifications
  - Formulate the list of requirements and define the different tests to be conducted to satisfy the clients' needs.
- ***Phase 2**: Apply the requirement management framework to case study of crank sensor simulator:*
  - Define the technical specification and test of the target crank sensor simulator
  - Design a crank signal generator using an analog differential amplifier and fabricate the first prototype
  - Test/validate and write a final specification document of the designed system

Education

Electrical and Computer Engineering — *Ph.D* Feb 2015 - Nov 2020
King Abdullah University of Science and Technology (KAUST), Thuwal, KSA
Thesis: Pre-processing and Feature Extraction Methods for Smart Biomedical Signal Monitoring (PDF)

Embedded Systems and Micro-systems — *Master's of Science* Sep 2013 - Aug 2014
Universite de Lorraine, Nancy, France
Novel single-phase active power filter for arc fault detection

Electrical Engineering — *1 year Exchange* Sep 2012 - July 2013
INSA Toulouse - Institut National des Sciences Appliquées de Toulouse, France
I was awarded an excellence scholarship to study the last engineering year at INSA of Toulouse

Technical skills

- Data visualization and annotation: Matplotlib, Seaborn, Tableau, Napari, PyQT5, VTK, Label Studio, LabelMe.
- Training and deployment technologies: Azure, AWS, EC2, S3, Flask API, Digital Research Alliance of Canada, Google Firebase.
- **Advanced algorithm** : signal/image filtering, spectral analysis, feature extraction, parameter estimation, optimization
- **Computer vision** using **deep learning** models: CNN, GAN, RNN, Yolov4, ResNET.
- **Programming languages**: Python, C++, C, Matlab, HTML, CSS, MySQL,
- **Machine learning** frameworks: PyTorch, TensorFlow, Keras, Sklearn, PySpark,
- **MLOPs platforms**: Terraform, Jenkins, MLFlow, Tensorboard, AWS Sagemaker, Docker, Anaconda, Github.
- **Deployment/Test** embedded systems using NVIDIA Jetson Nano, RTOS, TensorRT, ONNX, GPU, IoT, SPI, etc.
- Project and **team management:** Jira, Confluence, Slack.

Awards

- *Jan 2021*: *Student Research Excellence Awards and Student Academic Accomplishment Awards*
- *Jun 2020*: **Africa-Middle East Finalist at the 2020 EMBC Student Paper Competition**

Selected Publications [Please check all my publications on my Google Scholar]

- **Chahid, Abderrazak**, et al. "Fish growth trajectory tracking using Q-learning in precision aquaculture." *Aquaculture,* 2022). [PDF]
- **Chahid, Abderrazak**, et al. "A position weight matrix feature extraction algorithm improves hand gesture recognition." *42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society*, pp. 5765-5768. IEEE, 2020. [PDF]
- **Chahid, Abderrazak**, et al. "Feature generation and dimensionality reduction using the discrete spectrum of the Schrödinger operator for epileptic spikes detection." *IEEE Engineering in medicine and biology society (EMBC)*, pp. 2373-2376. [PDF]
- **Chahid, Abderrazak**, et al. "QuPWM: Feature extraction method for epileptic spike classification." *IEEE journal of biomedical and health informatics* 24, no. 10 (2020): 2814-2824. [PDF]

Languages

English: Full professional proficiency ***French***: Full professional proficiency