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# Mohamed Abid

Data Scientist



## PROFILE

Hello, I'm Mohamed Abid, a 44-year-old Tunisian currently residing in Saudi Arabia. I hold an Applied **Msc in Data Science and AI** from the esteemed "**Data ScienceTech Institute**" in France, achieving a First-Class/Summa Cum Laude distinction. Eager to contribute my expertise, I am actively seeking job opportunities in the dynamic fields of Data Science and Artificial Intelligence.

## SKILLS

- |                            |                      |                        |                     |
|----------------------------|----------------------|------------------------|---------------------|
| ■ R                        | ■ Python             | ■ SQL                  | ■ NetLogo           |
| ■ MSSQL Server             | ■ JSON               | ■ Neo4j                | ■ MatLab            |
| ■ Ensemble Model           | ■ Machine Learning   | ■ Time Series Analysis | ■ Survival Analysis |
| ■ Probability / Statistics | ■ Data Visualization | ■ Data Cleaning        | ■ Data Manipulation |

## INTERNSHIP

### 12/2022 - 05/2023 King Abdullah University of Science and Technology (KAUST) - Saudi Arabia

<https://github.com/abid-mohamed/Mapping the Spatio-Temporal Distribution of Fires in the Amazon>

Conducted a comprehensive analysis of a raster-based dataset encompassing spatio-temporal information on forest fires in the Amazon from 2001 to 2020. Utilized **R** and key packages such as **terra**, **raster**, and **h2o** for data processing, exploratory data analysis, and ensemble modeling.

#### Key Contributions:

- **Exploratory Data Analysis:** Conducted exploratory analysis on a high-resolution dataset (500m) with ten variables, capturing factors related to fires, land use, environment, and climate.
- **Class Imbalance and Missing Data:** Addressed class imbalance and missing data challenges, significantly improving model performance.
- **Data Downsampling:** Implemented a down-sampling approach, reducing the dataset to 550 million observations, and dividing it into 11 zones for improved efficiency.
- **Machine Learning Models:** Developed and evaluated machine learning models such as Distributed Random Forest (**DRF**), Generalized Linear Models (**GLM**), Gradient Boosting Machines (**GBM**), and eXtreme Gradient Boosting (**XGB**)
- **Ensemble Modeling:** Created an ensemble model by combining the strengths of individual models within each zone, enhancing predictive accuracy, leveraging **AUC** and **AUCPR** metrics.
- **Visualization:** Visualized the results through dynamic monthly maps and time trend charts, providing insights into fire probabilities in the Amazon over the 20-year period.

**Tools:** Executed the project using **R** and employed various packages, including **terra**, **raster**, **h2o**, **rsample**, **recipes**, **data.table**, **tidyverse**, **pROC**, **doParallel**, **doSNOW**, **ggplot2**, **tidyterra**.

## PROJECTS

### Project #1 Electricity Consumption Forecasting

Time Series Analysis

[https://github.com/abid-mohamed/DSTI-Time\\_Series\\_Analysis](https://github.com/abid-mohamed/DSTI-Time_Series_Analysis)

Developed predictive models for daily "electricity consumption" in a building based on 47 days of historical data. The dataset included "outdoor air temperature", influencing two distinct approaches:

- **Temperature-Agnostic Model:** Utilized **HoltWinters**, **Auto ARIMA**, **SARIMA**, and **NNET** to forecast electricity consumption, disregarding outdoor temperature. Model selection based on RMSE.
- **Temperature-Informed Model:** Incorporated the impact of "outdoor air temperature" using time series regression models (**SARIMA**, **AutoARIMA**, **NNET**, **VAR**). Selected the best-performing model through RMSE evaluation.

**Tools:** Implemented in **R** using **forecast**, **keras**, **vars**, **xts**, **ggplot2**, **openxlsx** packages.

**Outcome:** Applied selected models to forecast "electricity consumption" using the entire dataset, showcasing the impact of temperature information on predictive accuracy.



# PROJECTS

## Project #2 Covariate Impact Analysis and Variable Selection

Machine Learning

<https://github.com/abid-mohamed/DSTI-ASML>

The objective of this project was to assess the influence of covariate variables on a continuous response variable within two distinct datasets.

### Datasets:

- Data1:
  - ◆ Comprises 12 observations of the response variable and 2 categorical covariates.
  - ◆ Variable Selection Methods: **ANOVA, Step-wise Forward, Step-wise Backward, Lasso**.
  - ◆ Applied **lm** function to determine weights for selected variables.
- Data2:
  - ◆ Consists of 16 observations of the response variable and 4 continuous covariates.
  - ◆ Mitigated small dataset issues using **Bagging** to reduce variance error.
  - ◆ Variable Selection Methods: **Adjusted R-squared, Step-wise Forward, Step-wise Backward, Lasso**, Variable Selection Using Random Forests (**VSURF**).
  - ◆ Calculated associated errors for each selection method.
  - ◆ Identified the **best model by averaging coefficients** from the lowest error procedures.

**Tools:** Executed the project using **R** and employed various packages, including **glmnet, MASS, leaps, VSURF, ggplot2, ggpubr, and dplyr**.

**Outcome:** The project resulted in a comprehensive understanding of covariate impacts through rigorous variable selection methods. The utilization of diverse techniques showcased my proficiency in statistical modeling and data analysis using the **R** programming language.

## Project #3 Database Synchronization using Python and pyodbc

Data Wrangling with SQL

[https://github.com/abid-mohamed/DSTI-Software\\_Engineering\\_and\\_Data\\_Wrangling\\_with\\_SQL](https://github.com/abid-mohamed/DSTI-Software_Engineering_and_Data_Wrangling_with_SQL)

This project involves creating a **Python** script to interact with a database server and retrieve the latest version of a specified table.

The script uses the **pyodbc** package for secure connections to an **MSSQL Server** and communicates with the database by executing queries.

### Key Steps:

- **pyodbc Connection:** Establishes a secure connection to the database server using the **pyodbc** package.
- **Query Execution:** Communicates with the database by sending and executing queries to extract the necessary data.
- **Local Comparison:** Compares the database table with the last saved version on the hard drive to detect any changes.
- **Dynamic View Update:** Generates an updated table view only if modifications are identified during the comparison.

This project streamlines the process of keeping a local copy of a specific database table current, enhancing efficiency in data retrieval and utilization.

## Project #4 Data Retrieval from MSSQL Server

Data Wrangling with SQL

[https://github.com/abid-mohamed/DSTI-Data\\_Wrangling\\_With\\_SQL](https://github.com/abid-mohamed/DSTI-Data_Wrangling_With_SQL)

This project focuses on extracting five types of information from a large **MSSQL Server** database through well-designed SQL queries.

### Key Features:

- **Data Extraction Goals:** The project aims to obtain five distinct types of information from the extensive MSSQL Server database.
- **Query Techniques:** Standard **SQL** Queries, **Division SQL** Queries, and **Dynamic SQL** Queries with **T-SQL stored procedure**.

## Project #5 Photon Propagation Simulation

Agent Base Modeling

[https://github.com/abid-mohamed/DSTI-Agent\\_Base\\_Modelling](https://github.com/abid-mohamed/DSTI-Agent_Base_Modelling)

<https://www.comses.net/codebases/23ce38af-ae87-47bf-b9e3-2523a54fe1a1/releases/1.0.0>

Developed a simulation model to study **photon behavior in a water tank** and assess the influence of water characteristics on energy propagation.

- **Simulation Features:**
  - ◆ Implemented a light source **emitting photons** with random directions, simulating **barrier hits, surface reflections, and particle collisions**.
  - ◆ Explored **four water types** ("Pure-Sea", "Clear-Ocean", "Coastal", and "Turbid-Harbor") with distinct absorption and scattering coefficients.
- **User Interface:**
  - ◆ Designed an intuitive interface for water type selection, photon count adjustment, and photo-detector positioning.
  - ◆ Real-time visualization provided immediate insights into photon behavior and **total received energy**.
- **Parameter Exploration:** Enabled experimentation through sliders for adjusting parameters like beamwidth and photo-detector position.
- **Tools:** Implemented using **NetLogo** programming language for an interactive and accessible user experience.



## PROJECTS

### Project #6 Multivariate unimodular polynomial matrix completion

Applied Mathematics

[https://github.com/abid-mohamed/Multivariate\\_Unimodular\\_Polynomial\\_Matrix\\_Completion](https://github.com/abid-mohamed/Multivariate_Unimodular_Polynomial_Matrix_Completion)

The project focuses on solving a set of multinomial equations utilizing the multivariate unimodular polynomial matrix completion, specifically employing the **Lombardi-Yengui algorithm**. The applications extend to addressing signal processing problems.

- **Algorithmic Approach:** Central to the algorithm is the identification of a “**Gröbner basis**”, a crucial step in simplifying the problem and transforming it into a one-variable polynomial solution.
- **Tools:** Implemented the project using **Maple**.



## EXPERIENCE

### 09/2009 - 09/2018 Company “Mhiri Confection” - Tunisia

ACCOUNTANT

As an accountant for a workwear clothes manufacturer, I played a pivotal role in optimizing and automating critical processes to enhance efficiency and meet stringent deadlines.

My focus extended beyond traditional accounting responsibilities, as I leveraged programming skills to introduce automation using **MatLab**.

#### Key Contributions:

- **Invoicing and Payment Management:** Managed invoicing and tracked foreign customer payments efficiently.
- **Automated Document Preparation:**
  - ◆ Developed and implemented **MatLab** programs to automate the generation of administrative documents on a weekly basis.
  - ◆ Transformed customer information into a structured **MatLab** dataset for seamless data processing.
- **Data Wrangling and Reporting:**
  - ◆ Utilized **MatLab** for data wrangling, seamlessly integrating datasets into **Excel** files.
  - ◆ Created and updated production planning, providing valuable insights to the management team.
  - ◆ Automated the generation of detailed reports for each production order, enhancing communication with the production unit.
- **Export Documentation:** Automated the preparation of invoices and essential financial and customs documents for weekly export operations.



## PUBLICATION

### Environmetrics Journal

- **Mohamed Abid**, Jonatan A. González, Óscar Rodríguez de Rivera, and Paula Moraga “Mapping the Spatio-Temporal Distribution of Fires in the Amazon from 2001 to 2020: An Ensemble Modeling Approach”, (submission) Aug, 2023.

### CoMSES Computational Model Library

- **Mohamed ABID** (2022, May 29). “ABM for Underwater optical wireless communication in a water tank” (Version 1.0.0). CoMSES Computational Model Library. Retrieved from: <https://www.comses.net/codebases/23ce38af-ae87-47bf-b9e3-2523a54fe1a1/releases/1.0.0/>



## EDUCATION

### 03/2020 - 10/2023 Data ScienceTech Institute - France

Applied Msc in  
Data Science and AI

Mention : First Class / Summa Cum Laude (Grade 95 | A+)

### 26/12/2021 Neo4j Certified Professional

Certificate: <https://graphacademy.neo4j.com/certificates/db64f7427c53c75dd4513e6ccfbc9df2d6a1216f9e71e1110b3e501959a34cf4.pdf>

Certificate number: 17336311

### 03/2019 - 09/2019 Wall Street English of Jeddah - Saudi Arabia

English courses - level 11.

### 2010 - 2013 Faculty of Business and Economics of Sfax - Tunisia

Bsc in Computer Science  
Applied to Management

Evening class

Thesis: “Analysis and Design of a Data Warehouse”.

### 1999 - 2006 Faculty of Sciences of Sfax - Tunisia

Bsc in Applied Mathematics

Thesis: “Implementation of multivariate unimodular polynomial matrix completion”.



## LANGUAGES

Arabic (native), English, French