

Karima SELMANI BOUAYOUNE

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Profile

Professional in research and higher education, specialized in mathematics, statistics, AI and data analysis, with a solid background in industrial development, risk analysis, prediction, forecasting and making decision.

University Experiences

Postdoctoral Research

03 March 2026-19
august 2026

- Automatic cost estimation system for carpentry from plans and specification:
 - Contributed to the development of an automated solution for estimating construction quantities and carpentry costs from architectural plans.
 - Prepared and organized datasets for training artificial intelligence models.
 - Performed manual annotation of architectural floor plan images to build training datasets.
 - Developed scripts to convert annotations into the YOLO format.
 - Trained and evaluated YOLO and RT-DETR models for the automatic detection of construction elements.
 - Integrated an artificial intelligence backend into Label Studio to enable automatic pre-annotation.
 - Tested SAHI with RT-DETR to evaluate small-object detection in architectural floor plans and compare results with predictions generated without SAHI.
 - Validated automated predictions and improved annotation quality and consistency.

Lecturer

2024-Currently

-Lecturer at the CLI (Institutional Liaison Committee)

-Department of Applied Sciences- Université du Québec à Chicoutimi (UQAC)

RESEARCH AND CREATION INTEGRATION PROJECT:

- Automatic cost estimation system for carpentry from plans and specification:
 - Analyzed company requirements for automating cost estimation from construction plans.
 - Evaluated and compared several floor plan analysis frameworks and libraries, including Floorplan Transformation, CubiCasa5K, and FloorNet.
 - Developed scripts for the conversion and preprocessing of PDF construction plans and images.
 - Developed and optimized OCR methods for the automatic extraction of text from construction plans.
 - Conducted a comparative evaluation of OCR tools, including Tesseract and EasyOCR, and analyzed their performance.
 - Installed, configured, and maintained the Label Studio annotation environment.

-Department of Computer Science and Mathematics - Université du Québec à Chicoutimi (UQAC)

-Teaching of Mathematics Courses:

- Advanced Calculus
- Real analysis
- Vector and matrix algebra
- Mathematic basis

Postdoctoral Research

2023-2024

Technology Park - Department of Applied Sciences: Université de Québec à Chicoutimi (UQAC)

Project in partnership with Rio **Tinto**:

Monitoring of greenhouse emissions in aluminium production

- Data analysis using statistical calculations on software such as Excel, Python, JMP and Minitab
- Results on signal segmentation with descriptive statistics

Doctoral internship

11/2012 -02/2013

RISK & PERFORMANCE CENTRE: ECOLE POLYTECHNIQUE DE MONTRÉAL, Canada

- Identify the interplay between maintaining a system in operational conditions and resilience
- Test the continuity plan to ensure the return to normal under safe operating conditions

Internship
Laboratory LISTIC, Annecy, France

04/2008 - 07/2008

- Realization of studies on industrial performance, the Balanced Scorecard and risk management
- Study application on Alcatel Adixen's quality, logistics and production services

Non-Academic Experience

Trainer
SKILLART Consulting, Rabat, Maroc

06/2016-12/2022

- Design and delivery of advanced training courses in data analysis
- Artificial Intelligence Training
- DBMS and SQL training
- Training in statistics and its tools such as Excel, R, Python, SPSS
- Training in geographic information systems (GIS) and software: QGIS and ArcGIS.
- Data visualization training with Tableau and Power BI

Project Manager
Benarko Company, Fez, Morocco

January 2022

- IT Project Management in Fez

Academic Training

Master en Leadership

2023

Institute of Applied Sciences

SWISS UMEF-Geneva – Switzerland

Doctorate in Engineering Science and Technology

2019

Mohammadia School of Engineering- Rabat- Morocco

Industrial Risk Management Team

Theme: "Maintenance in Operational Conditions (MCO) and its interactions with operational safety and Resilience: Application to a railway system and an Urban system"

Master's Degree (equivalent to Master's Degree) in Information Systems and Industrial Management

2010

Sidi Mohamed Ben Abdellah University - Fez, "Faculty of Sciences"

Bachelor's degree (equivalent to Baccalaureate) in Applied Mathematics (Statistics)

2006

Mohamed V University- Rabat, Faculty of Sciences

Key Competencies

Mathematics: Algebra, matrices, vector, calculus, Number theory, Analysis, topology, integration, differential calculus, mathematical programming, numerical analysis, Newton methods derivation, advanced calculus, Arithmetic, Algorithmics, Optimization, Operations research, Cryptography, Geometry

Mathematics Statistics: probability laws, sampling, random variables, stochastic processes, Markov chain, martingale, spatial statistics, prediction and decision-making.

Data Analysis and Modeling : Descriptive Statistics, Regression, Probability, ACP, AFC, AFD, Time Series, Simulation, Estimation, Analysis of Variance (ANOVA), Hypothesis Testing (T, F), Segmentation, Clustering, Decision Trees, cleaning data, treatment data, EDA, Validation, prediction, visualization, making decision.

Artificial intelligence techniques: LLM, machine learning, NLP, Pytorch, OpenCV, GitHub, Pandas, Numpy. Neural networks, K-Means, decision tree

Development Methodologies : UML, optimization, design and model-oriented, GIS

Programming Languages : Python, SQL, SAS, SPSS, JAVA, C, R, HTML.

Project management : Dashboard, PDCA, SWOT, PESTEL matrix, strategic planning.

Risk Management and Reliability : FMEA, ISO 9001/14001/18001, Six Sigma, Ishikawa analysis, ERP, feedback, continuous improvement.

Visualization Tools : JMP, Minitab, Tableau, Power BI, QGIS, MapInfo, Excel.

Publications

Newspaper Articles (Indexed Scopus):

- [1] Karima SELMANI BOUAYOUNE & al; Maintaining the water consumption, in an urban system: A probabilistic approach is applied; Journal of Water And Land Development , 2017, No. 33 (IV–VI): 157–164 , PL ISSN 1429–7426; DOI: <https://doi.org/10.1515/jwld-2017-0031>
- [2] Karima SELMANI BOUAYOUNE & al; A Stochastic method based on the Markov Model of Unit Jump for Analyzing Cack Jump in a Material ; International Journal of Technology (2017) Vol. 8, No. 4 , pp: 622-633, ISSN 2086-9614; DOI: <https://ijtech.eng.ui.ac.id/article/view/582>

Conference Papers:

[3] Karima SELMANI BOUAYOUNE ; A Forecasting Methodology based on growth models, for assessing performance: Application on the Moroccan Railway; International Conference of Times Series and Forecasting (2018), Vol.3, pp :1443-1449, Granada, Spain; https://itise.ugr.es/ITISE2018_Papers_Vol_3.pdf

[4] Karima SELMANI BOUAYOUNE & al; A new methodology, based on errors analysis, for preventing railway system reliability; International Workshop on Transportation and Supply Chain Engineering (2016), International University of Rabat. Morocco.

[5] Karima SELMANI BOUAYOUNE & al; A Strategy of Maintain in Operational Conditions (MCO), to improve the Resilience; 1st International conference on Mechanics of Materials and Structures (2014), Marrakech, Morocco.

Improvement

- **Certificate in the Quebec Scientific Entrepreneurship Program - QcSE** 2024
- **Insurance training for financial advice** 2024
Premerica Company, Quebec
- **Advanced English course (120 hours)** 2024
Nevy's Language School , Toronto, Canada
- **Summer School, Aluminium Training,** 2023
Laval University, Quebec

Languages

- French: Advanced Level
- English: Intermediate Level
- Arabic: Mother tongue

Hobbies and Interests

- Sport (training and gymnastics), cinema, literature.