جامعة عبد المالك السعدي
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Université Abdelmalek Essaadi

Pole for Doctoral Studies
Center for Doctoral Studies Sciences and Techniques and Medical Sciences

ANNOUNCEMENT OF DOCTORAL THESIS DEFENSE

Ms. ZEROUAL Imane

Will present their research work with the aim of earning a Doctorate

Doctoral program: Mathematical, Physical Sciences and New Technologies
Discipline: Computer Science
Specialty: Computer Science & Artificial Intelligence

On 20/06/2026 at 11H00 at the Mettings Hall, National School of Applied Sciences of Tetouan, UAE
Under the Theme

Design and Implementation of a Scalable Machine Learning System for Real-Time Delivery Status, Delay Forecasting, and Vehicle Assignment in Supply Chains

Front of the jury composed of :

First Name & Last Name	Establishment	Designation
Pr. CHKOURI Mohamed Yassin	ENSA of Tetouan, UAE	President
Pr. AÎT WAKRIME Abderrahim	FS of Rabat, UM5	Reviewer
Pr. EL YOUNOUSSI Yacine	ENSA of Tetouan, UAE	Reviewer
Pr. GHAILANI Mohamed	ENSA of Tangier, UAE	Reviewer
Pr. BOUDHIR Anouar Abdelhakim	FST of Tangier, UAE	Examiner
Pr. TAHIRI Abderrahim	ENSA of Tetouan, UAE	Examiner
Pr. EL BOUHDIDI Jaber	ENSA of Tetouan, UAE	Supervisor

Host Research Structure: UAE/ENSATe: Information Systems and Software Engineering (ISSE); Ensa Tetouan

Abstract

The logistics sector has experienced rapid transformation in recent years, driven by increasing economic, social, and environmental pressures. Growing global supply chains and rising urban delivery demands require providers to improve operational efficiency and meet heightened expectations for fast, reliable service. Despite these advancements, the industry continues to face significant challenges, including traffic congestion, infrastructure limitations, and unpredictable delivery disruptions with adverse weather conditions serving as a primary driver of performance variability. Traditional planning methods, which often rely on static rules or human judgment, are increasingly insufficient in such dynamic environments.

This thesis presents an integrated, machine learning–based framework designed to enhance two essential pillars of urban freight logistics: Vehicle Assignment Optimization and Proactive Delay Management. To address these challenges, the research integrates historical delivery records with high-dimensional meteorological and operational data. The proposed system employs a multi-model architecture: the Vehicle Assignment Optimization component identifies the most suitable transport based on specific delivery characteristics, while the Proactive Delay Management framework utilizes a dual-stage predictive approach; first, classifying delivery status (on-time vs delayed), and second, estimating the precise delay duration in hours.

Multiple machine learning architectures were trained and rigorously evaluated through a "model tournament" to determine the most effective solutions for these predictive tasks. By comparing model performance, the study identifies the approaches with the highest predictive accuracy and strongest practical value. Overall, the findings demonstrate that integrating this predictive framework into logistics operations significantly enhances system responsiveness, delivery reliability, and resource allocation. This work contributes to the development of intelligent, resilient, and data-driven urban logistics systems capable of adapting to complex environmental and operational uncertainties.

Keywords: Random Forest, Neural Network, Decision Tree, Weather Forecasting, Urban Logistics, Vehicle Assignment.