



**Pole for Doctoral Studies  
Center for Doctoral Studies  
Sciences, Technologies, and Medical Sciences**

## **ANNOUNCEMENT OF DOCTORAL THESIS DEFENSE**



**M. MNIAI Ayoub**

**Will present here research work with the aim of earning a  
Doctorate**

**Doctoral program: Engineering Sciences and Techniques  
Discipline: Engineering Sciences  
Specialty: Computer Science, Artificial Intelligence**

**On 26/07/2025 at 10H30 at the Conference Hall, F Building,  
Faculty of Sciences and Techniques of Tangier, UAE  
Under the Theme**

**Granular Computing: Credit Card Fraud Detection**

**Front of the jury composed of :**

<b>First Name &amp; Last Name</b>	<b>Establishment</b>	<b>Designation</b>
Pr. AZMANI Monir	FP of Larache, UAE	President
Pr. OUENNICHE Jamal	University of Edinburgh, Business School, UK	Reviewer
Pr. EZZIYYANI Mostafa	FST of Tangier, UAE	Reviewer
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Pr. AZMANI Abdellah	FST de Tanger, UAE	Examiner
Pr. BAIDA Ouafae	FST of Tangier, UAE	Examiner
Pr. JEBARI HASSANI Khalid	FST of Tangier, UAE	Supervisor

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## Abstract



The proliferation of credit card utilization has markedly escalated, fundamentally transforming the transactional methodologies employed by consumers and enterprises alike. However, the pervasive threat of fraudulent activities remains a pressing concern within the banking sector, resulting in annual economic detriments amounting to billions of dollars. The financial industry has adopted a preemptive strategy to address this critical issue. The severity of the circumstances calls for collaborative endeavors aimed at innovating methodologies that ensure both the sustainability and the integrity of the financial ecosystem.

This dissertation investigates data-centric methodologies for the detection of fraud, addressing its intricate challenges through the application of Granular Computing (GrC) to discern unauthorized transactions executed without the consent of the cardholder. GrC serves as an essential mechanism for the identification of credit card fraud, facilitating the examination of transaction data across varying levels of granularity. Comprehending GrC necessitates an understanding of the concept of granularity.

Granularity delineates the degree of detail or the dimensions of the components within a system. The establishment of a robust fraud detection framework is imperative for mitigating the financial repercussions associated with credit card fraud. By capitalizing on the capabilities of FCM, the system may proficiently categorize transactions into clusters based on their shared characteristics, thereby enhancing the comprehension of transaction patterns.

This clustering technology enables the identification of anomalies that may indicate fraudulent behavior. Moreover, the incorporation of FRST facilitates the examination of both macro-level data, such as overarching transaction trends, and micro-level details, encompassing the attributes of individual transactions, through the application of diverse granularities. This multifaceted approach uncovers subtle discrepancies and anomalies that may signify fraudulent activity while concurrently addressing the intrinsic uncertainty within transaction data.

**Keywords:** Granular Computing, Fuzzy C Means, Rough Set, Fuzzy Rough Set.