جامعة عبد المالك السعدي
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Université Abdelmalek Essaadi

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

ANNOUNCEMENT OF DOCTORAL THESIS DEFENSE

Ms. ABROUN Soundouss

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

Doctoral program: Engineering Sciences and Technologies
Discipline: Computer Science
Specialty: Computer Science and Artificial Intelligence

On 15/11/2025 at 10H30 at the Conference Hall, F Building, Faculty of Sciences and Techniques of Tangier, UAE
Under the Theme

Implementation of a Competency-Based Multi-Agent Adaptive CBR E-learning System

Front of the jury composed of :

First Name & Last Name	Establishment	Designation
Pr. EL HADDAD Mohamed	ENSA of Tangier, UAE	President
Pr. EL YADARI Mourad	ENSAM of Rabat, UM5	Reviewer
Pr. EL BOUHDIDI Jaber	ENSA of Tetouan, UAE	Reviewer
Pr. CHEKOUR Mohammed	ESEF of Kenitra, UIT	Reviewer
Pr. AL ACHHAB Mohammed	ENSA of Tetouan, UAE	Examiner
Pr. EN-NAIMI El Mokhtar	FST of Tangier, UAE	Examiner
Pr. GHAILANI Mohamed	ENSA of Tangier, UAE	Co-Adviser
Pr. FENNAN Abdelhadi	FST of Tangier, UAE	Supervisor

Host Research Structure: Data and Intelligent System (DIS), Computer Science and Smart Systems (C3S) Laboratory, FST Tangier, Abdelmalek Essaâdi University, Tetouan, Morocco

Abstract

This research lies at the intersection of pedagogy, artificial intelligence, and semantic technologies, with the objective of designing an adaptive, competency-based virtual learning environment that addresses the limitations of conventional e-learning systems. In response to the need for personalized instruction that aligns with learners' individual profiles, goals, and progress, the proposed system—MAS-CBRComp—leverages the combined strengths of Case-Based Reasoning (CBR), Multi-Agent Systems (MAS), and ontology-based modeling.

The system dynamically adapts learning paths by retrieving and reusing pedagogical scenarios from previous learners based on a hybrid case retrieval mechanism that integrates rule-based filtering and K-Nearest Neighbors (KNN) matching. A meta-adaptation layer refines feature weights and similarity thresholds based on learner satisfaction and performance feedback, allowing the system to evolve over time and improve its recommendations.

To ensure pedagogical relevance and semantic consistency, the architecture is underpinned by a suite of ontologies representing competencies, learning objects, learner profiles, and pedagogical strategies. The multi-agent architecture distributes responsibilities across specialized agents, ensuring modularity, scalability, and responsiveness in adapting to learner needs.

By embedding intelligent reasoning into a pedagogically grounded framework, this research contributes a scalable and reusable model for delivering **personalized, competency-aligned learning experiences**. It also offers intelligent authoring and monitoring tools for instructors, enabling more effective design and evaluation of educational content in line with learner development and instructional goals.

Key words: Adaptive Learning, Competency-based Education, Case Based Reasoning, Multi-agent systems, Ontologies, Hybrid Retrieval, Feedback-Driven adaptation.