الجمهورية الجزائرية الديمقراطية الشعبية
People's Democratic Republic of Algeria
وزارة التعليم العالي و البحث العلمي
Ministry of Higher Education and Scientific Research
المدرسة العليا للإعلام الآلي 8 ماي 1945 - سيدي بلعباس
Higher School of Computer Science
8 Mai 1945 - Sidi Bel Abbes

Master's Thesis

To obtain the diploma of **Master's Degree**

Field of Study: **Computer Science**

Specialization: **Artificial intelligence and Data science**

Theme

A State-of-the-Art Review of Intelligent, Dependency-Aware Autoscaling for Microservice Architectures

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Defended on: **October, 2025**
In front of the jury composed of

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Academic Year: 2024/2025

Abstract

Managing resource allocation for microservice architectures is a significant challenge, as traditional autoscaling methods often lead to costly overprovisioning or performance degradation that violates Service Level Objectives (SLOs). This thesis provides a comprehensive state-of-the-art review of smart autoscaling strategies designed to overcome these limitations. The core of this work is a systematic survey and analysis of cutting-edge research that leverages advanced Artificial Intelligence (AI), with a particular focus on Reinforcement Learning (RL) and Graph Neural Network (GNN) based approaches. By examining and comparing prominent academic and industry solutions, this review creates a structured map of the current research landscape. This comparative analysis serves as a valuable resource for researchers and practitioners aiming to understand, implement, or advance the field of intelligent resource management for modern cloud-native applications.

Keywords— Microservices, Autoscaling, Cloud Computing, Resource Management, Reinforcement Learning.