

Quality-Based Web Service Classification with Explainable AI and Recommendation System: A Semi-Supervised Learning Approach

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Abstract: This project in machine learning concentrates on the development of web service selection accuracy and efficiency with two key parts being the classification model and the recommendation model. Classification model classifies web services with respect to four qualities: response time, availability, reliability, and throughput concerning Quality of Service. This categorization is done utilizing multiple machine learning algorithms, among which are included Decision Trees, Support Vector Machines (SVM), Logistic Regression, K-Nearest Neighbors (KNN), Naive Bayes, Random Forest, Multi-Layer Perceptron (MLP), and XGBoost. To continue improving transparency with the classification results and to improve trust in a classification process, we use explainable AI approaches such as LIME, among others, with the ability to provide interpretability and insights to how classification is made. The Recommendation Model uses the K-Nearest Neighbors algorithm to determine the top 10 matching web services to be presented based on the preference of the user. It computes similarity scores between the user's input and the available services such that the system can guarantee relevance and precision in the recommendation. In fact, the interface is so intuitive that anyone can upload his data, inspect the classification results, and get recommendations personalized to his needs. This will further improve the decision to select a service because the solution is adaptive and user-friendly for the framework. The intelligent classification and recommendation process improves the experience of the users and optimizes business operations with the selection of most business able web services.

Keywords: Web Service Classification, Service Recommendation System, Quality of Service (QoS), Response Time, Availability, Reliability, Throughput, XGBoost, Semi-Supervised Learning, Explainable AI (XAI), Local Interpretable Model-Agnostic Explanations (LIME), Model Interpretability, Bronze-Silver-Gold-Platinum Grading, Performance Metrics, Service Quality Tiering

