Chapter 11
A Model for Trust Decision, Data Analysis, and Evaluation to Identify Quality Web Services

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ABSTRACT

Cloud computing has emerged as a powerful paradigm for delivering web services, and includes scalability, flexibility, and cost efficiency. Due to functional overlap and diversity, web services form a major challenge for selecting adequate services to develop user-provider trust. To address the issue, this study presented a machine learning based trusted model to assist users in selecting trustworthy web services. In the initial stage, using K-Means clustering method the services are selected based on three clusters such as high, medium, and low trust. Next, the trust score is generated by evaluating performance parameters to identify the best services. Experiments conducted with QWS datasets demonstrate that the proposed approach efficiently predicts adequate services with a minimum error rate and high accuracy gain. This technique achieves a 99.32%, 99.36% and 99.48% accuracy rates for the low, medium, and high trust prediction, respectively. The result shows that it is more effective than existing approaches and builds a strong trust relation between users and providers.

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1. INTRODUCTION

Cloud computing has sparked a great deal of interest from both industry and academia since it was proposed (Z. Li et al., 2017). The National Institute of Standards and Technology (NIST) (Mell & Grance, 2011) says that, this computing provides lots of services to the users, including PlatformAsAService (PaaS), InfrastructureAsAService (IaaS), and SoftwareAsAService (SaaS) (G. Kaur & Bala, 2021; Sahi, 2015). Examples include Amazon Web Services (AWS) (Hormozi et al., 2012; Shyam & Manvi, 2016), Microsoft Azure (Nawrocki et al., 2021), Google Cloud Platform (GCP) (Liu et al., 2017; Mehmood et al., 2018), and many more. These services offer on-demand access to computing resources, such as databases, storage, and virtual machines (VMs), as well as higher-level services such as analytics, machine learning, and software applications (Abdullah et al., 2020; G. Kaur & Bala, 2021; O. Sharma & Saini, 2016). There are several options for selecting a single service to complete a specific task. For example, if an individual wants to store their data and asks for a storage service, there are multiple options available. Choosing one of the best storage services among many is, however, a time-consuming and tedious task (Rahimi et al., 2021).

One of the services in cloud computing is web service (WS), which refers to a cloud-based service that can be accessed over the internet using standard web protocols such as Hypertext Transfer Protocol (HTTP) (Padhy et al., 2011). The selection of the best cloud service is an important factor in establishing trust between the user and the provider (Whaiduzzaman et al., 2014). It also has a massive impact on the success and productivity of the business. Trust in the cloud refers to the belief and confidence that a cloud user (CU) has in the ability of a cloud service provider (CSP) to securely and effectively store, process, and manages sensitive data and applications. It covers various aspects, including data privacy, security, reliability, and compliance with regulatory standards.

A high level of trust is essential for customers to adopt cloud services and for CSPs to build and maintain a loyal customer base (Gupta et al., 2013). It is a key element in the achievement of cloud computing and can affect the adoption, utilization, and overall satisfaction of customers with cloud services (W. Li et al., 2021). According to research (Hasnain et al., 2022), a trustworthy WS has low response time (RT) instance values and high throughput (TP) instance values. In contrast to this, the disparity between the promised instance values and the original values acquired by users indicates untrusted services (Hasnain et al., 2020). But the previous studies found that high TP and low RT values can be indicators of a trusted WS, but they do not guarantee trustworthiness. A service may have high TP and low RT values but still have vulnerabilities or lack adequate security measures, making it untrusted. Additionally, even if a service provides guaranteed instance values, these values

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