Chapter 22

Ranking of Cloud Services Using Opinion Mining and Multi-Attribute Decision Making:
Ranking of Cloud Services Using Opinion Mining and MADM

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ABSTRACT

Cloud computing has been a major focus of business organizations around the world. Many applications are getting migrated to the cloud and many new applications are being developed to run on the cloud. There are already more than 100 cloud service providers in the market offering various cloud services. As the number of cloud services and providers is increasing in the market, it is very important to select the right provider and service for deploying an application. This paper focuses on recommendation of cloud services by ranking them with the help of opinion mining of users’ reviews and multi-attribute decision making models (TOPSIS and FMADM were applied separately) in tandem on both quantitative and qualitative data. Surprisingly, both TOPSIS and FMADM yielded the same rankings for the cloud services.

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INTRODUCTION

Cloud computing is a new paradigm of computing that is often referred to computing on demand. Cloud computing is suitable for small and medium enterprises that cannot invest in huge datacenters to deliver their services/products. Cloud computing is a model for enabling usable and accessible virtualized resources that are dynamically reconfigured to adjust to a variable load, allowing for an optimum resource utilization, typically exploited by a pay-per-use model (Vaquero et al. 2009). The basic service delivery models in cloud computing are:

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

With the increasing number of cloud services, the selection of best services for a user becomes a very challenging problem. One of the reasons for the difficulty in selection are varying quality of service (QoS) attributes including performance, security and compliance, vendor lock-in, and cost. It is also observed that the above mentioned attributes are fuzzy in nature because an ideal service provider is expected to have high desirability levels of these attribute values. Even though these values are measured on a numerical scale, their treatment by users is inherently subjective, thereby making them fuzzy.

As there are several cloud services offering infrastructure as a service in today’s market, the obvious question is to select a particular cloud service in order to deploy our applications. Once the applications are deployed they have to work with robustness and help in improving the businesses using the particular cloud service(s). The selection of a cloud service becomes crucial so that the service itself should not become a hindrance. Therefore, in order to select a cloud service, generally, we analyze the quantitative metrics representing quality of service attributes of a cloud service that can be found from cloud service providers and cloud benchmarking providers. In today’s social media dominated world, there exists a vast amount of users’ reviews (as free text) that are provided by the real users of cloud service(s) in a timely and democratized way to understand the experience of the users using the particular service(s). So we developed a novel approach that employs text mining (Aggarwal & Zhai, 2012) of users’ reviews to understand the real experience of the users and applied multi-attribute decision making models (Shurjen & Ching 1992) using various quantitative QoS attributes to rank the cloud services.

The proposed ranking procedure has two stages as follows:

1. Mining the unstructured data of users’ reviews to gain insights from the real users or the current users of different cloud services.
2. Applying Multi Attribute Decision Making (MADM) models (Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) and Fuzzy MADM (FMADM)) on quantitative (QoS attributes) as well as qualitative (users’ reviews) data on different cloud services.

To the best of our knowledge, this is the first study that combines opinion mining of users’ reviews of various cloud services and their quantitative QoS attributes for ranking cloud services within the framework of multi-attribute decision making.