

# Machine Learning Based Presaging Technique for Multi-User Utility Pattern Rooted Cloud Services Negotiation for Providing Efficient Service

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## ABSTRACT

*In recent years, Cloud computing is emerging as an indispensable technology in handling the increasing number of users and data generated by them. Despite the hype, the increasing data rate proportionally increases the workload of the cloud service providers in order to meet the consumer demands. Moreover, this situation results in developing many cloud service providers in order to deliver the required and efficient services to the users. But the way to select the appropriate service provider is still remaining as a bottleneck. To solve the increasing server negotiation challenges, a pattern-based service negotiation method has been utilized in this research work. This method has been implemented with an improved suggestion feature, which provides users with similar patterns recognized from their past entries to assist the users with their current selection. By incorporating implicit tracking approach, a sequence of the services accessed by the users have been maintained and this can be leveraged as suggestion to the users. Based on the pattern, the most important services are ranked according to the users' activity and the data has been observed using machine learning algorithm. The ranked list is given to the user to select the required service. The proposed technique increases the performance of the cloud environment and also the strain handled by the service provider in suggesting the utility pattern for the user is reduced by using the machine learning concept.*

**Keyword:** - Cloud services, cloud computing, pattern-based recognition, machine learning.

## 1. INTRODUCTION

The world before the utilization of cloud services was way different. The companies established were forced to maintain their servers. The companies which were not capable of maintaining the servers were dependent on third-party providers. The service providers had a fragile set of terms and conditions. This always made companies less dependent on these third-party service providers. Later the cloud technology has taken dominance over the market of service providing and the third-party service providers diminished slowly in the following years after the introduction of cloud. The main reason cloud dominated the world of service providing is its user-friendly set of terms which are reliable and always updated as per the customers' demands. The cloud technology is a vast concept to explore and also complex for the provider in providing service. The cloud service providers provide a large number of services and resources through the cloud environment.

Thus we try to get an upgraded cloud service system that helps the user in selecting a better choice from a set of functionalities provided by the cloud service provider. The proposed system has the potential to incorporate itself in the present-day cloud service provider's system to benefit both the user and provider in various ways. The major advantage in this system is the better choice selection for the user and also less chance of the possibility of negotiation in the future to the service provider from the user.

## 2. RELATED WORK

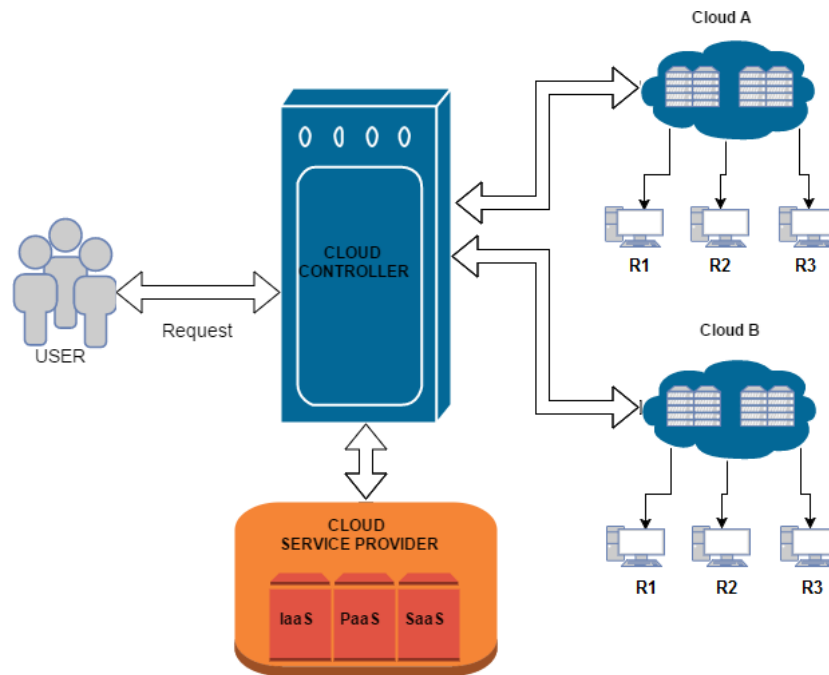
The proposed work has considered a few of the related works and made them as our base papers to state the proposed system. Such papers are mentioned below:

### Paper 1:

Source: Int. J. Intelligent Enterprise, Vol. 4, Nos. ½ [2] Published in: 2017

Title: Multi-user utility pattern-based cloud service negotiation for quality-of-service improvement: An implicit interest prediction approach.

Description: As per this paper, it states a solution for developing a better selection system for the user and reduce the negotiation problems but couldn't completely eradicate once the toil between the user and service provider starts



**Fig1 -:** General architecture of cloud computing [2]

**Paper 2:**

Source: IEEE Transactions on Industrial Informatics, Vol. 10, Number 2, IEEE. [4] Published in: May, 2014

Title: CLOUDQUAL: a quality model for cloud services

Description:

It mentions about a system called ‘CLOUDQUAL’, which is a six metrics holding service assistant. The metrics it considers are usability, availability, reliability, responsiveness, security, and elasticity. These quality dimensions define what the user precisely needs and the service provider can easily provide it to the user.

**Paper 3:**

Source: COMMUN. ACM, vol. 40, Number 4, pp. 50–58. [5]

Published in: April, 2010

Title: A view of cloud computing

Description: The paper defines the functionalities and potential the cloud technology can provide for the IT industry and as well as software development companies. The paper also explains about the capability and utility of the cloud concept in the present-day world.

**Paper 4:**

Source: IEEE Transactions on Cloud Computing, Vol. 3, pp.66–79, IEEE. [9]

Published in: January–March, 2015

Title: ‘SelCSP: a framework to facilitate selection of cloud service providers’

Description: The paper proposes an efficient system to help the user to choose a better service provider but does not mention any sort of precise algorithm or method to eliminate the toils faced by the user to select the cloud service provider with better options of services.

**3. PROPOSED WORK**

The proposed work states about a finer system which performs tasks that benefits the user in choosing the cloud service provider as per his requirements and also reduce future negotiations between user and service provider regarding the services supplied to the user and other terms established in the initial stage of agreement of service providing. The system uses a machine-learning algorithm that must furnish the classification of the cloud service provider according to the multi-user utility pattern. The multi-user utility pattern holds a logbook which in this case needs not to be acquired by the user as the algorithm takes care of it and provides a final suggestion after analysis of all these log inputs. The service ranking is also allocated through the functionality of the algorithm to the user. The user according to the ranking can prefer his choice. The selection process is much more refined once we go on to implement the proposed system. The algorithm we use in this proposed method can be a machine learning algorithm that can solve classification and regression problems. Thus we use the k nearest neighbor algorithm which comes under supervised machine learning algorithm. The algorithm is easy to implement and perceive.

## 4. METHODOLOGY

The concepts we propose utilizing an already existing system technology and in addition to it a few methods of machine learning. The major theories we adopt from machine learning are the algorithms that aid in solving classification and regression problems. The algorithm we use here is the k nearest algorithm as it is easy to understand and as well as easy to implement. Along with the algorithms we also utilized a small part of an existing system. The reason we require the past system is that the stated system is never a novel methodology but it's an updated proposal for the existing system. Thus the existing system available and also suitable for us is a multi-user utility pattern. The utility pattern is analyzed by the aid of the algorithm to benefit client from choosing a good and as well as a suitable cloud service provider

### 4.1 Equations and Processes

**Supervised machine learning:** The basic standard of supervised machine learning is that the learning algorithm is provided with some sample data or a training set from which the algorithm should learn from. In supervised learning, there are two types of problems defined. The first one is regression and another one is classification. Before understanding these concepts we shall design basic steps of a supervised learning process which is as follows.

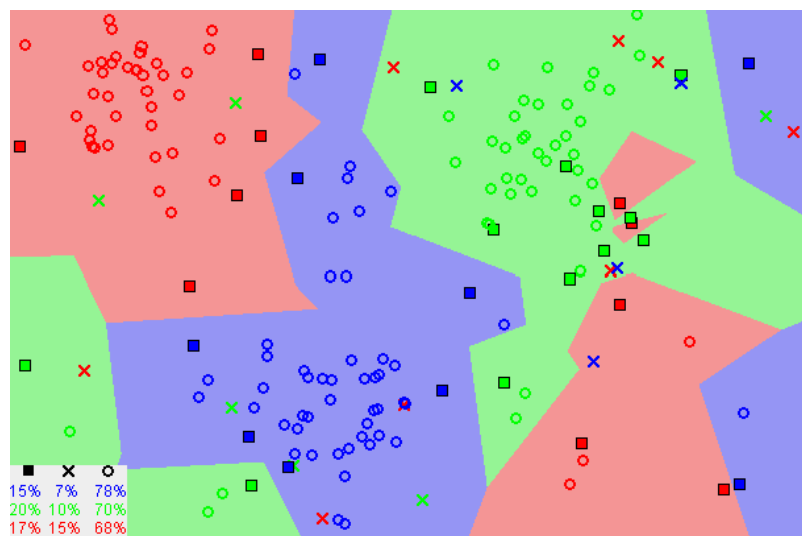


Fig 2: Image displaying similar data points typically existing close

#### 4.1.1 Basic Steps:

- Provide training set data into the learning algorithm
- The learning algorithm understands the data and learns the hypothesis 'k'
- Feed a new input data to k 4. This time the algorithm provides output which we can avail from k

(i)The best example we can say for supervised learning is a machine making predictions. The prediction requires pre-labelled data through which it learns and starts to predict from the next instance when the new data is given as input and the prediction done by the system is given as output to the given input.

**4.1.2. Regression and classification:** In regression type of problems, we try to predict some continuous-valued output and whereas in classification we predict some discrete values.

**4.1.3. KNN algorithm:** This algorithm comes under supervised learning which involves both regression and classification-based solutions. The ideology of KNN is that similar data points are close to each other. KNN believes in such an ideology for the algorithm to be useful.

#### 4.2 Fundamental KNN Algorithm Steps:

1. Initialize with loading data.
2. Declare k with chosen number of neighbors.
3. For every sample of data, calculate the distance between the query example and the current example from the data.
4. Add the distance and index of the example to avail an ordered collection.
5. Sort the ordered collections of distances and indices in ascending order with respect to distances.
6. Select the first K entries from sorted set.
7. Avail the labels of the selected K entries.
8. If regression, return the mean of the K labels.
9. If classification, return the mode of the K labels.

## 6. CONCLUSIONS

After the text edit has been completed, the paper is ready for the template. The stated system is a proposal to initiate a novel concept in the existing system to make it provide better results. The proposed system is constantly being worked upon and various other methods and designs are constantly being improvised in terms of machine learning concept and also the updates in the existing system used. Apart from this the concept stated has great usage and cloud service users can be benefitted from it. These pros can be eventually increased by undergoing constant research. Henceforth, the concept of designing a machine for assessing the cloud service providers ranking through machine learning is observed as a novel approach and has a great future scope in developing this system to the next level.

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