International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 04, 2019
ISSN: 1475-7192

Cloud Environment Workload Prediction

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***ABSTRACT**--Scalability and elasticity are very important features in Cloud environment. Analysis of workload can be done and future work load can be predicted for better resource allocation and efficacy of cloud platform there by reducing the cost. A number of regression models are taken for that.*

***Keywords**-- Prediction, Genetic Algorithm, KNN*

I. INTRODUCTION

Scaling Mechanism of Cloud Computing can be classified into Reactive auto scaling and Proactive auto scaling.

1. Reactive Auto Scaling

In this approach, current resource usage or application performance related metrics are considered to make decisions about auto scaling. The scaling decisions are taken after detection of SLA violations. Once the scaling needs are identified, the actual scaling operation takes some amount of time for adding or removing resources.

2. Proactive Auto Scaling-This works based upon predictions. It helps us to make decision regarding resource allocation well in advance. Various prediction methods include Moving Average (MA), Auto Regressive (AR), ARIMA, and Neural Networks NN

Time Series Forecasting: It is a regressive model to forecast the future resource demand values. A dataset with respect to a fixed time interval is obtained to forecast future values of a time series, a prediction model is first trained with the time series. This will help to get a pattern of the data and will help in analysing the future need.

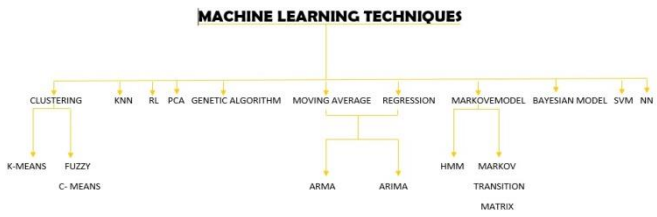

Figure 1: analysing the future need

Major Areas of predictions Carried out are

1. Energy Efficiency/Power Consumption

Better Prediction in power consumption will help in minimize cost

2. Resource Allocation

Better resource allocation will improve the performance and workload

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Received: 22 Aug 2019 | Revised: 13 Sep 2019 | Accepted: 15 Nov 2019

3. Work Load

This depends on the no on request, no of resource utilization, and no of resource demand. Prediction can help to improve the efficiency

II. LITERATURE REVIEW

In [1] the author bestowed a hybrid system, that combined the kernel fuzzy c-means clustering algorithmic rule and genetic algorithmic rule .The paper titled[2] statistic foretelling of cloud knowledge center workloads tested many statistic foretelling models on real cloud workloads which might facilitate predictions in dynamic cloud environments Autoregressive (AR(1)) model, moving average (MA(1)) model, straightforward exponential smoothing, double exponential smoothing, and ARIMA models were used for the study Workload prediction with machine learning model needed a high priced in fracture to figure an enormous assortment of labor load Jinawang [6] planned an ARIMA model and also the BP neural network model that would predict the long run server CPU utilization Genetic algorithmic rule (GA) [8] has been used as a soft computing approach, that uses the mechanism of survival strategy. FCFS and RR and a neighborhood search algorithmic rule were compared Getting correct prediction results is crucial to the economical operation of an automatic resource scaling algorithmic rule. Energy economical VM placement and migration approach [9] is planned supported genetic algorithmic rule. In future a resource programming algorithmic rule by modifying the genetic algorithmic rule fitness are often planned which can offer energy economical programming for the cloud within the real time. The findings in paper[1o] compare the algorithm's potency for the resource wastage by the 2 approaches within the terms of the request for the memory and CPU. The thesis [11]propose a genetic algorithmic rule primarily based resolution to the virtual machine placement downside, that uses a unique fitness operate and body structure and considers resource utilization, network information measure usage, and energy prices at constant time.[12]In this paper author proposed an adaptation prediction technique victimisation genetic algorithms to mix statistic foretelling models. [14]The aim of this paper is to develop a task programming algorithmic rule within the cloud computing surroundings supported genetic algorithmic rule for allocating and execution freelance tasks to boost task completion time, decrease the execution price, as well as, maximize resource utilization. [15]This GA method is perennial until either the fittest body (optimal solution) is found or the termination condition (maximum variety of iteration) is exceeded.[16]Load Levelling are often handled by numerous mechanisms and algorithmic rule. D uring this paper, we have a tendency to gift the integrated genetic and ant colony algorithmic rule for virtual machines placement [17]dynamic virtual machine allocation supported adaptation genetic algorithmic rule In this work, the virtual machine allocation downside is solved by victimisation the adaptational genetic algorithmicrule. The planned adaptation genetic algorithmic rule uses constant quantity and recursive adaptation at the same time by choosing the values for genetic operator’s parameters and by choosing the chances of applying these operators.

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III. Load balancing Algorithms

There are two categories of algorithms

Static Algorithm-which includes all the CPU scheduling algorithms like FCFS,RR etc .It is used where the state of machine do not change

Dynamic Algorithm-Includes algorithms that can do optimization like Genetic Algorithm ,ACO.Can work based upon the current status of the machine

Genetic algorithm

This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.

There are five phases in a genetic algorithm.

- Initial population
- Fitness function
- Selection
- Crossover
- Mutation

Example of Genetic Algorithm

Timetable for a particular batch.

Creating Chromosome

- Represent a class as **<subject, class, Day, Lecture Time>**

Represent it as a binary pattern to form a **chromosome**. **<Data Mining, Msc2, Monday, 10.00AM>**Data Mining – 1111,Msc2 -1110,Monday- 1101,10.00-1011

Combine you get 1111111011011011.18 gene(Each bit is called a gene)

Different class combinations becomes the **initial population.** Max size is no of classes

Fitness value-Find the value where there is less conflict

Now you can perform **selection, crossover and mutation** operations to maximize the fitness value for each class.

Stop when the classes have minimum number of conflicts.

KNN Algorithm

- KNN can be used for both classification and regression predictive problems.Grouping is done based on some criteria.The K nearest neighbours will be found matching to it.So The new data that has come can easily be matched to some group

Proposed Work

1. Load dataset

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2. Apply genetic algorithm to create population

3. Group the population using KNN

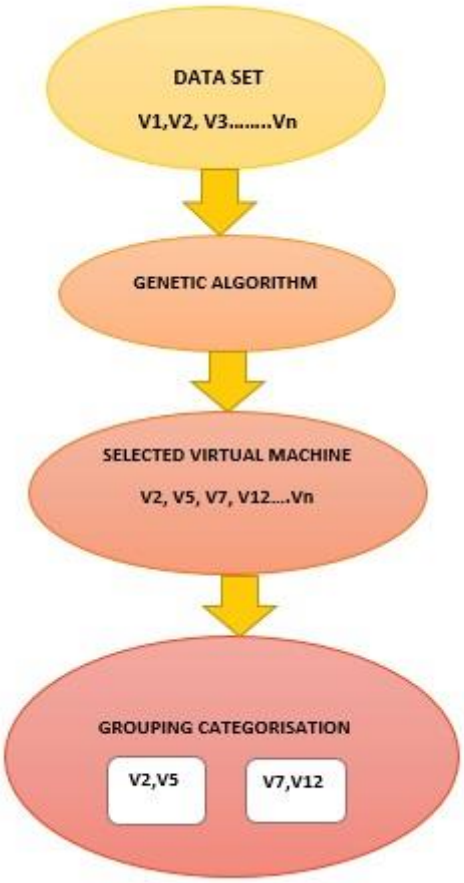

Figure 2: The proposed work combines both the feature of selection as well as grouping

IV. CONCLUSION

The future work includes the implementation of this work on real cloud or some simulation model which will be capable to do prediction of work load well in advance so as to increase the efficiency and minimize cost.It can also be implemented in Python or R.The dataset can be obtained from Google trace or yahoo cloud service benchmark

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