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Machine Learning Aided Task Scheduling on Cloud Computing

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ABSTRACT

Cloud computing has been the trending technology in sync with the internet of things being explored to its fullest strength as the world tends to digitize each activity, be it professional or personal or academic. In the view of providing break less and in time communication among the devices connected to facilitate the user for proper management of his activities, load balancing and task scheduling are the two significant issues that obstacle the implementation. This paper tries to push the limits of the cloud computing environment by embedding the machine learning algorithm for scheduling the tasks with an indirect effect on load balancing among the resources on the cloud. The K- Means algorithm can create clusters of jobs and the resources available based on their operating characteristics and processing behavior.

Key words :. Cloud Computing, Machine Learning , K- Means

1.INTRODUCTION

Every day, there are billions of devices being connected to the cloud, making it denser. Cloud computing provides many services to the user like platform as service, software as service, etc. All these services provided on the cloud could be well utilized if the tasks provided to cloud computing are managed well. Cloud computing is being the most emerging platform which has extensive usage and requirements. As the devices are connected to increase the security, management, availability, things like these are becoming too sensitive at the implementation end. Along with these come the threats that can induce vulnerability into the cloud from the user and the various resources.

The devices connected keep posting requests to be processed at the cloud, which may vary in their characteristics. Some may be CPU intended tasks that require immense CPU utilization like floating-point operations or parallel processing tasks. Some may be memory seeking requests that need to allocate memory or access memory-related operations like read/write operations. And some may be too circumscribed with extensive data-intensive operations like significant data operations all these tasks scheduled among the resources available to process these requests. The virtual machine single on the cloud to process these requests would vary in processing behavior and computing capabilities. The incoming tasks shall be classified and shall be allotted to the excellent processing machine of that category of job. This task scheduling operation is the most critical and sensitive operation on the cloud. There are well-framed task scheduling algorithms available, but the algorithm that can process the given task and schedule it to the context-oriented machine for processing is always in demand.

Machine learning, as it has started to find its need in every field of life, is the area where the computation world is looking eagerly to shoot to its verge so that the machines start doing perception based on the training provided. This technology can train a system to learn based on its experience and make decisions even without the intervention of the human. But the days are to come where the system start guiding the human to do a task efficiently are not far from reality. The machine has many algorithms, like supervised and unsupervised algorithms. Each has its sophistication and scope of development. K-means algorithm is the unsupervised machine learning algorithm as many others. This algorithm suits well in task scheduling at the cloud platform.

2.LITERATURE SURVEY

Cloud computing-based resource provisioning using k-means clustering and GWO prioritization [1] uses the GWO algorithm with K-means to load balance and resource allocation process on the cloud and produces computation enhanced results for the mentioned tasks. K-means Algorithm Based on Cloud Computing [2] have used the k-means algorithm to assist the cloud computation with the usage of the MapReduce algorithm in text classification on big data computation using the Hadoop platform. This paper shows an increase in the processing speed and bilk data handling and better clustering results. An Improved Task Allocation Strategy in Cloud using Modified K-means Clustering Technique [3] uses a modified K-means algorithm to mitigate the issues of multiple tasks and limited resources at the cloud end. The paper shows that the make span time, time of processing, and the total cost of computation have been reduced predominantly. Multi-Objective Task Scheduling using K-mean Algorithm in Cloud Computing [4] uses a multi-objective task allocation algorhythm with k-means clustering that generates better results. The virtual and physical machines as resources are used for computation with k-means preference. The paper proves better make span time and execution improvisation [1].

3.PROPOSED METHOD

The paper presents a way to improvise the task scheduling among the machines and resource allocation for the tasks.

The following diagram in figure 1 depicts the working of the model. The cloud can get a verity of requests like big data processing, memory read or write operations, and processor-intensive operations also may be raised from the client. All these operations to be submitted to the cloud to process can be categorized by the K-Means clustering algorithm based on their characteristics. The centroid of the clustering could be initialized to any task at random. As the functions are available based on a first-come, the first-serve base is clustered based on their operating characteristics [2]. These characteristics are provided as training data for the module, and the new coming tasks will be given as test data to classify the assignment based on their operating factors. This data is saved on the cloud for future training of the system.

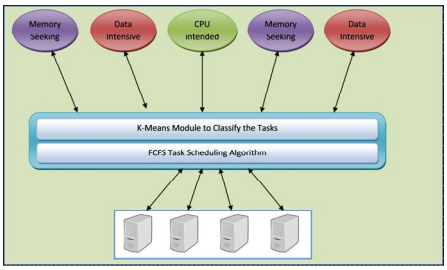

Figure 1: K-Means Aided Task Scheduling

The clustered data of the tasks is provided as input to the FCFS module, where these are prioritized based on their arrival. The next job is to get the suitable machine from the available resources that best suit the task at hand. These machines were selected again using a clustering mechanism, which groups them into separate clusters based on their processing capability and task handling abilities. Then these clustered machines will be allocated with the context-oriented tasks according to their computational and processing behavior. The K-means algorithm takes the tasks that are coming to the cloud as input and keeps the clusters of these different tasks as a reference with their operational characteristics as key for clustering. This data on jobs is correlated with The computational behavior of the machines. The best-correlated pair of task-machine will be allotted for processing the task at hand by the available devices on the cloud [3]. The process of clustering and correlating with the machine could be depicted as in the following figure.

4. CONCLUSIONS

As there are many algorithms present that enhance the working of the cloud environment, the model proposed is as implementing the machine learning algorithm with the FCFS to mitigate the problem of task scheduling and load balancing at the back end, can prominently enhance the cloud computing environment for the better results. Once the correlation between the tasks and the machine is established, the model could be verified and tested on could simulation software like CloudSim. The model has a scope of improvement over the makespan time, but the execution time is a significant enhancement that it can provide.

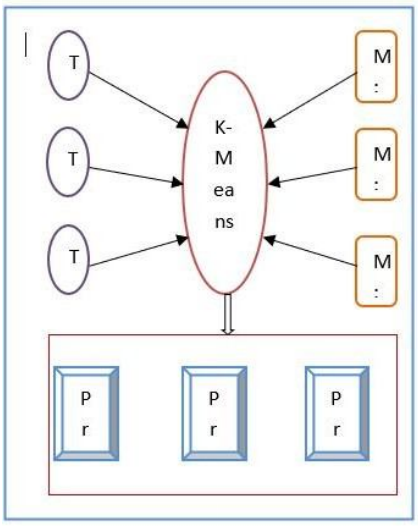

Figure 2: Overall Working of the Model

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