

Artificial Intelligence Techniques for Load Balancing in Cloud Computing: A Review

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Abstract-Artificial Intelligence techniques now a day's cover the market due to its numerous benefits. This is because many techniques are more explore when Artificial intelligence combines with it. Cloud computing is one of the most market capture techniques and it provides numerous benefits. The load balancing mechanism in Cloud needs to consider as the most important criteria because the user and service provider both benefits are involved if the Load balancing mechanism is proper. So in this paper, we provide detailed knowledge using various proposals on how the Artificial intelligence mechanism helps to improve the load balancing mechanism in Cloud Environment.

Keywords: Load Balancing, Artificial Intelligence, Machine Learning

I. INTRODUCTION

Cloud computing gets attraction from the industry nowadays due to any type of services like Infrastructure related, Platform Related, Software Related, Database Related, and many more. Because of these benefits, more and the number of users attracted to the usage of Cloud. As the number of the task provided by user's increases on the Cloud platform the Load balance on the Cloud server needs management. This must be done carefully otherwise the performance of the server may degrade. Sometimes it might be possible for some of the servers to get too much loaded and some of the servers is becomes an idea. The problem due to the imbalance of the Cloud resource creates issues related to the Quality of the service[2].

It also seems difficult to maintain this by using any manual method because its slow in working or it may not consider all the balancing criteria. So here the Artificial intelligence mechanism helps to solve load balancing issues to some extent. There are many techniques available like fuzzy methods, neural network-based algorithms, and other techniques that smartly solve the issue and provides better techniques[4]. The techniques of Artificial intelligence not only solve the issue but it also increases the efficiency of the existing method which may suffer from a weak Load balancing mechanism issue.

When considering the Artificial intelligence method for the Cloud Load balancing issue the process of Load balancing never suffers from the issue of Overloading or Under loading. The techniques solve the issue of low resource utilization and improve the quality of the services. There are many techniques already proposed by the various researcher which solve the issue of the load balancing by combining the AI techniques with Load balancing mechanism and proved that the efficiently of the Cloud infrastructure is increase to provide the service to the user. Here in this paper first we discuss some of the Artificial intelligence methods and also about the Load balancing mechanism of Cloud computing. Then after we discuss the Existing approaches

which solve some type of issue related to Cloud computing Load balancing using the Artificial Intelligence Technique.

Load Balancing strategy is mostly mentioned in two categories [6] one is static and the other is dynamic. In a static category, all the nodes and their properties are defined in advance and remain the same. So it becomes very easy to implement a managed node in this strategy because it didn't require the current status of the system. While in dynamic strategy the property of the nodes changes frequently as the load increases or decreases. Besides this, there are three main important techniques by which effective load balancing can be done that's Centralized, Decentralized, and Hierarchical. In all these techniques different mechanism is used and all the research mechanism discussed in the next section works on any of these techniques

II. RELATED WORKS

Many researchers work to make the Load balancing criteria effective in Cloud by providing a different mechanism. Many authors focus on the Artificial Intelligence-based mechanism and proved that the combination of AI techniques makes the Load balancing effective. In this part, we discuss some of the articles which solved the Burning issue of Load balancing using AI technique.

As mentioned by [1] work with big data management in the migration process of Cloud and makes it is more effective using a proposal Enhanced Active Monitoring Load Balancing algorithm in which they mentioned that with the use of an Intelligence system the less number of migration is required which increases the efficiency of the algorithm. The author also uses a Deep Learning mechanism which is a technique related to Artificial Intelligent for making the Load balancing mechanism very effective. The author also shows the analysis which shows that the proposed method works better than the existing Round robin process.

Author Bakul at. al [2] works on the queue operation which is an important part of the Loan balancing mechanism by using the Regression technique. The author calculates the upper and lower threshold using an intelligent technique that considers the current load and provides an effective decision in case of VM Placement. It makes the VM Queue mechanism very effective so that the Load allocation makes itself intelligent which not only increases the Quality of Services but also increases the Resource utilization for existing resources.

At [3] author Mousa et. al. mentioned that the Classification techniques help to improve the CPU and RAM utilization and make the Load balancing effective. The methodology use and user log file and bases on the grouping mechanism the VM group is formed for satisfying the needs of the user processes. The author also analyzes the proposed methodology after implementing using a different number of VM and a different number of user processes. After analyzing the author mentioned that the methodology with AI techniques improves the utilization rate as well as provide a faster response to the user resource request.

At [4] the Author provides and a novel method based on the Artificial Intelligence-based technique which Creates a cluster of VM based on the availability of CPU power and RAM for the Nodes. It also considers the overall load of the Datacenter to makes the proper decision about the Load balancing and upcoming user request. The data center controller makes an intelligent decision when a new process arrived. The DCC checks the load of existing Machines and based on current consumption and waiting to queue its takes decision where to place the new user process.

Author Dalin et. al [7] provides an algorithm called Dynamic Load balancing with Bin packing and VM configuration(DLBPR) which is work on the job scheduler in which all residing processes are deadline-based. The author proposes the Fuzzy based Intelligence algorithm by using a stochastic and hill-climbing method which helps to improve the Virtual Machine allocation more attractive. The proposed scheme also uses the Honey bee algorithm with multiple agents which makes an effective decision for Load management in the Cloud data center. The author mentioned that the swarm intelligence-based method is less effective while the method based on Hill climbing and stochastic process make more effective decision in the case of Load balancing in the Cloud.

Author Stelios et. al. [8] proposed an algorithm called SVMML which is a self-learning algorithm based on intelligence AI technique for Effective Load Balancing in Cloud. The method takes real-time information for the Datacenter Load Manager and analyzes the load on different Virtual machines. The Classification and Regression-based method get this data as an input and start processing on that. When the machines are classified based on the Load then the User process which resides in the queue is taken one by one and allocated to Virtual machines such that no VM gets overloaded. The proposed scheme also focuses on the Machine which is underloaded because ultimately it leads to poor resource utilization.

Author Amandeep et. al. at [10] make an effective survey related to the use of an AI technique to makes a Load balancing more effective. The author also provides an algorithm called FUZE which is based on the Fuzzy logic combining with the Genetic Algorithm which is a technique related to Artificial Intelligent. This technique is applied to a round-robin mechanism in which the VM Manager takes responsibility for the effective allocation of resources to the user processes. It also proposes a method based on an artificial bees colony that directly maps the processes with the best Virtual machines.

III. CONCLUSION

The load balancing in the Cloud burning issue nowadays an need to manage because if proper care is not taken then it leads to poor utilization of resources an also affects the Quality of services badly. So in this paper w provide a brief knowledge about how resource utilization makes it better for Load Balancing using Artificial Intelligence techniques. Different authors consider the different issues and provide an effective solution to make a Load Balancing mechanism effective by combining it with AI techniques like Fuzzy logic, Hill climbing, Honey bee mechanism, and more. From all the above discussion we must say when to combine

the AI technique with cloud environment then definitely its increased capacity of existing resource working which directly increases the Quality of services provided by Cloud service provider to the cloud users.

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