Novel Approach of Task Scheduling in Cloud by Semantic Approach of Optimization

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Abtract- To maintain and utilization of the resources on the cloud computing scheduling mechanism is needed. Many algorithms and protocols are used to manage the parallel jobs and resources which are used to enhance the performance of the CPU on the cloud environment. In the proposed work PSO (Particles swarm Optimization) and GWO (Grey Wolf Optimization) for effective scheduling. This work is based on the optimization of Total execution Time and Total Execution Cost. The results of the proposed approach are effective as it compare with existing methods.

I. INTRODUCTION

Cloud computing attracts the users by its fast computing platform, resources and services provides at anywhere. Many applications run parallel on the cloud and provide effective services. These applications maximize the communication, synchronization and decrease in utilization of CPU resources. It is very important task for the data centers to utilize the resources properly and maintains the response of the parallel jobs. To maintain and utilization of the resources on the cloud computing scheduling mechanism is needed. Many algorithms and protocols are used to manage the parallel jobs and resources which are used to enhance the performance of the CPU on the cloud environment. Algorithms like first come first serve, shortest job first and round robin are the most popular scheduling algorithm which are used to schedule the process. In cloud computing scheduling is the way toward plotting errands onto assets and the frameworks (e.g. CPU time, bandwidth and memory) effectively. In cloud computing numerous unpredictable applications require parallel preparing to execute the occupations adequately. Because of the correspondence and synchronization between relating forms there is a decline in usage of CPU assets. Thusly it is vital for a server farm to accomplish the usage of hubs while keeping up the level of responsiveness of parallel occupations [2]. Due to the availability of vast data on the internet and growing number of user's day to day, it almost impossible to assign the various tasks manually to the virtual machines[13]. Hence, to allocate the resources to each job effectively, scheduling plays an important role in cloud computing. Thus various scheduling algorithms are proposed so that they can help in achieving the order of jobs in such a way that balance between improving the performance, cost , makespan, load balancing and more over quality of service can be improved. For appropriate scheduling many undertaking parameters should be considered which a fundamental angle in successful working of cloud.

II. RELATED STUDY

Alkhanak et al. proposed a cost optimization approach for scientific workflow scheduling in cloud computing. The proposed approach employs the four meta-heuristic algorithms which are based on the population. The approach helps in reducing cost and time of the service providers. The execution cost and time are reduced as compared to baseline approaches[1] .Anubhav, et al. introduced a gravitational search algorithm for workflow scheduling in the cloud environment. The optimizations in workflow reduce the cost and makespan. In this process, two algorithms are hybridized GSA and HEFT for workflow scheduling. The performance evaluation is done on the basis of two metrics that are monetary cost ratio and schedule length ratio. The validation of result is also tested by ANOVA test and it shows that the proposed approach outperforms [2]. Sagnika et al. proposed BAT algorithm for workflow scheduling in cloud computing which helps to handle the large size of data. The scheduling process decides that which task is executed first and which is last according to their requirement of the resources. It manages the resources according to the task size and execution time. The result of the proposed algorithm is compared with particle swarm optimization algorithm and Cat swarm optimization algorithm. The convergence of the proposed algorithm is better than the existing algorithms.Vinothina et al. [4] proposed Ant Colony Optimization algorithm for workflow scheduling in cloud computing. This model is presented for heterogeneous distributed systems. The service level agreements are used to check the quality of service of the service providers. The problem of workflow scheduling is solved by using parameters cost, makespan and resource utilization. The ACO algorithms reduce the cost and makespan and enhance the resource utilization [3]. Liu, Li, et al. proposed the genetic algorithm for workflow scheduling in cloud computing with deadline-constrained. The crossover and mutation probability is adjusted by using convolution approach. This approach prevents from the prematurity and enhances the convergence. The proposed approach is compared with existing algorithms on the simulator at 4 different workflows. The results show that the total execution cost is reduced in this approach[5].Garg, et al. formulated the scheduling problem in cloud by using the Genetic Algorithm. The proposed work is done to reduce the computation time and execution cost of the task. This work is done on the cloudSim simulator and it maximizes the resource utilization. The performance evaluation is done on the different parameters and performs well [6].

Rimal, et al. Cloud supports the Multi-tenancy feature and provides the scalability and other benefits to the other users. Resource management is an important task in the multi-tenant cloud computing which is done by using the scheduling process. In this work cloud based workflow scheduling policy is proposed for efficient computing in cloud. This policy reduces the overall workflow completion time, cost of execution and properly utilize the resources. The result of the proposed work is compared with existing approaches and algorithms. The simulation result of the proposed approach shows more effective results than the existing approaches [7].Casas, Israel, et al. proposed a scheduling approach called Balanced and file Reuse-Replication scheduling. This approach is used to schedule the scientific application workflows. It splits the workflows into sub-workflows which help in proper utilization via parallelization process. This approach provides the facility if data reuse and replication which helps in optimization of data and transfer it at run time. The optimization process is based on execution time and monetary cost of workflows [8].

Kaur, et al. the proposed work is done on the Infrastructure as a service platform of the computer for scheduling and resource provisioning. The scheduling process is done by using the Shuffled Frog Leaping Algorithm (ASFLA). The performance evaluation is done by comparing the result or proposed algorithm with PSO (Particle Swarm optimization). The experiment is performed on different workflows by using Java Simulator and it gives outcome at low cost and completes the task on deadline [9].Bölöni, et al. proposed the concept of computation scheduling which is used for prediction of computation cost and financial cost. It also predicts the benefit of the output and it is called as value of information. This work is based on the analysis process of real-estate investment opportunities. The scheduling algorithm used in this work is called as volume based scheduling algorithm [10].

III. PROPOSED METHODOLOGY

In this section, the proposed methodology is explained in detail and also the algorithm which is used in it in hybridized form. In this paper Particle swarm Optimization is hybrid with Grey wolf Optimization algorithm to provide the effective optimal solution. Firstly PSO is applied on the VMs and if the results are not optimized then GWO is applied. Following are the algorithms that are used in the proposed work.

PSO Particle swarm optimization (PSO) is a population-based stochastic algorithm driven by the reenactment of a social mental representation rather than the survival of the fittest person. Roused by the swarm insight and probabilities speculations, this work shows the utilization of consolidating of PSO, Gaussian probability distribution functions and additionally turbulent groupings. In the process of PSO, particles are float through the hyper-dimensional search space [8]. PSO is a population based search algorithm which is based on simulation on the social behavior of birds within a flock. Variation in the position of particle in a search space is depending upon the psychological tendency of each particle to imitate the development of other.

GWO:GWO is also an algorithm which is based on the behavior of wolves. The working of this algorithm is based on the hierarchy of wolves according to their level. The top level of wolves called alpha, beta and delta. The alpha wolves are the leaders and the beta wolves are known as subordinates. This algorithm in this work is used to get the optimal solution of the problem effectively hybrid with PSO.

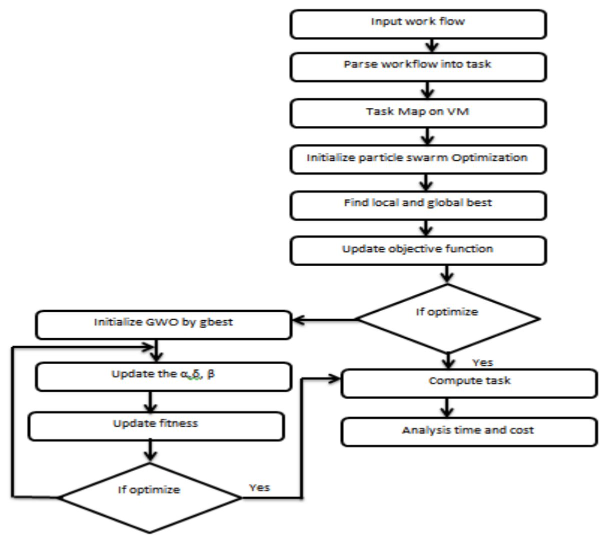

Fig.1: Flow Chart of the Proposed Algorithm

Methodology Steps

Step 1: Input the workflows.

Step 2: Parse the Workflows into tasks.

Step 3: After this Map the task on Virtual Machine (VM).

Step 4: Input the VM as Input into PSO (particle swarm optimization) Algorithm.

Step 5: PSO gives the optimized result from the VMs.

Step 6: Check the output of PSO is optimized or not. If it is optimized then compute the task otherwise Initialize the GWO.

Step 7: Analyze the time and cost of the optimal task of VM.

ALGORITHM USED PSO_GWO

Step 1: Input the mammographic images.
Step 2: Apply Gray Scale on the images.
Step 3: Edge detection by using the Prewitt Filter.
Step 4: For optimization input in the PSO model.
Step 5: Apply the loop in PSO model. for each particle n in S do
Step6 : for each dimension d in D do
Step7: //initialize each particle's position and velocity
Step8: $y_{p,q}=Rnd(y_{max}, y_{min})$
Step9: $z_{p,q}=Rnd(-z_{max}/3, z_{max}/3)$
Step10: end for
Step11: //initialize particle's best position and velocity
$z_p(l+1) = z_p(l) + \gamma 1_n(p_n - y_n(l)) + \gamma_{2n}(G - y_n(l))$
New velocity
$y_n(l+1) = y_n(l) + y_n(l+1)$
Where
p denotes the particle index
l denotes discrete time index
z_p denotes velocity of n^{th} particle
y_p denotes position of n^{th} particle
p_n denotes best position found by n^{th} particle(personal best)
J denotes best position found by swarm(global best, best of personal bests)
$J_{(1,2)i}$- random number on the interval[0,1]applied to the n^{th} particle
Step12: $pb_n=y_p$
// update global best position
Step13: if $f(pb_n) < f(gb)$
Step 14: $gb = pb_n$
Step15: end if
end for
Input the optimized output into GWO.
Step16:Initialize GWO A_i(i=1, 2, …n)
Initialize x, X, and Y
Step 1 :Calculate fitness function for every search agent
$A_\alpha \leftarrow$ best search agent
$A_\beta \leftarrow$ second beat search agent
$A_\delta \leftarrow$ Third best search agent
While (T<Max iterations)
For (X_i in every pack)
Update current position of wolf by eq. (1)
Update x, X and Y
Calculate the fitness function for all search agents
Update A_α, A_β, and A_ω
End for
For best pack insert migration (m_i)
Evaluate fitness function for new individuals selection of best pack
New random individuals for migration
End if
End while

IV. RESULTS

In this section result of the proposed section is explained on the different work flows of the cloud that are SIPHT, MONTAGE.

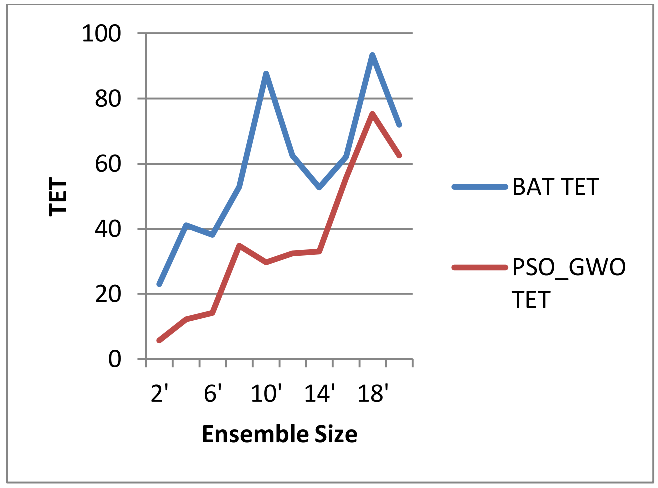

Fig.2: Comparison graph of TET of BAT and PSO_GWO using SIPHT workflow

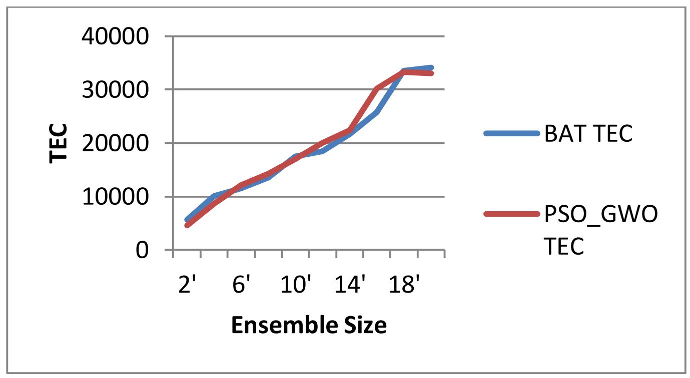

Fig.3: Comparison graph of TEC of BAT and PSO_GWO using SIPHT workflow

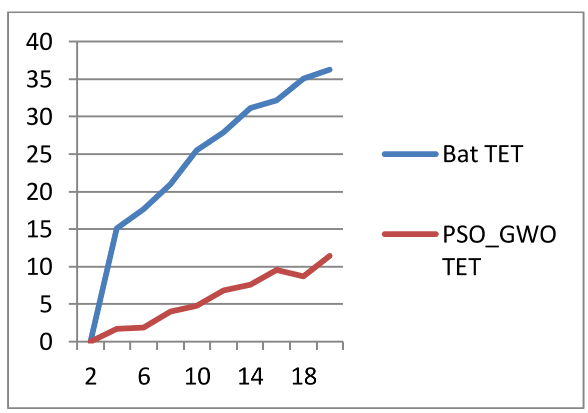

Fig.4: Comparison graph of TET of BAT and PSO_GWO using MONTAGE

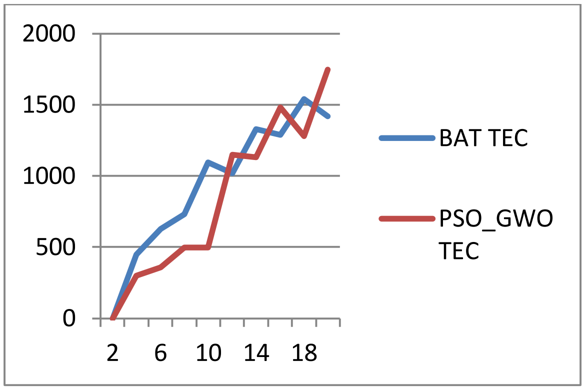

Fig.5: Comparison graph of TEC of BAT and PSO_GWO using MONTAGE

V. CONCLUSION

In this Paper PSO_GWO algorithm is used for the optimized result in the cloud environment for scheduling. The performance evaluation of this work is based on the metrics TETand TEC. The total execution time and total execution cost in PSO_GWO is less as compare to BAT algorithm. The BAT algorithm is used for the comparison of the results. The total response time of the proposed approach is faster than the existing approach.

VI. REFERENCES

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