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Hybrid Harmony Search with Firefly Algorithm for Job Scheduling in Big Data

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ABSTRACT

The bulk quantity of data can be allowed to dig out and to mine unknown information using the applications of big data analytics. In the proposed work, scheduling of jobs can be accomplished using Firefly Algorithm (FA). The objective is to minimize the job execution time, make best use of resources load. The difficulty in scheduling of jobs can be rectified using Multi-Stage Stochastic Integer Programming (MSSIP) and used to process ambiguity. This paper resolve ambiguity problem in big data analytics. To resolve job scheduling problem, Harmony Search Algorithm (HSA) and Firefly Algorithm (FA) is used, so that it make use of resources efficiently. It permits the resources to take the scheduling decisions on their own. The outcome demonstrates that the ambiguity can be resolved and the convergence rate can be improved using MSSIP algorithms in big data analytics.

Keywords : Firefly Algorithm, Multi-Stage Stochastic Integer Programming, hybrid HS/FA, Scheduling, Harmony Search, Ambiguity, Convergence Rate

I. INTRODUCTION

In [1] Genetic algorithm based algorithm was developed to achieve best solution for job scheduling. Genetic Algorithm has its own special features in terms of its broad applicability, ease of use, and global perspective [2,3].The contribution of this work To overcome the drawback of mutation process Differential evaluation technique is used in [4]. In [5] the mutation process of Genetic Algorithm was removed and the mutation of Differential Evolution algorithm was included to and got optimal solution.

Firefly is a meta-heuristic approach for optimization problems[6]. The search strategy in FA comes from the actual behaviour of fireflies. Two significant issues in FA are the formulation of attractiveness and variation of light intensity [7].

In Harmony search and fire fly algorithm, the exploration of HS and the exploitation of FA are fully exerted. The hybrid HS/FA has a faster convergence speed than HS and FA. The firefly scheme was introduced to reduce execution time, and HS is used to mutate between fireflies when updating fireflies.

II. PROPOSED METHODOLOGY

The goal of the proposed methodology is to reduce the turnaround time of the job with a smaller amount resource are necessary to finish the job and competently handle data in scheduling procedure in dissimilar calculation locations, and how the data flow amid these jobs should be listed. The firefly algorithm (FA) is motivated by the blinking activities of fireflies. The main reason for a firefly's spark is to take action as a sign structure to attract other fireflies. Xin-She Yang devised this firefly algorithm by insolent [8].

All fireflies are unisexual, so that any entity firefly

will be paying attention to all other fireflies. Pleasant appearance is proportional to their intensity, and for any two fireflies, the less intense one will be a focus by the intense one; however, the strength reduce as their shared space enhances; If no fireflies intense than a given firefly, it will travel arbitrarily. The intensity should be connected with the goal function. We put forward a Harmony search algorithm joint with firefly method which consists of the strength, best policy, and mutation workers. The harmony search memory reflection has the information concerning each job and their examine time of the job in the harmony memory in view of time is in tune stand on the job examine time. In the proposed method the harmony memory time for job resources is rationalized using on the roulette wheel algorithm. It evaluates the strength key cost for every job and data.

The proposed algorithm, Harmony Search and Firefly Algorithm are used to discover the searching space and develop result. In the proposed method, a hybrid by inducing Harmony Search into Firefly Algorithm is used for optimization problem. This is used as mutation operator. By this method, the mutation of the Harmony Search and Firefly Algorithm can discover the novel search space and develop the population. So, it can surmount the need of the examination of the Firefly Algorithm. Random walks in Firefly Algorithm can be replaced and mutation operator is introduced into the Firefly Algorithm. It introduces two enhancements. The first is the addition of top fireflies design into Firefly Algorithm to diminish running time. Select the brightest firefly. The second is Harmony Search mutation operator used to progress the population range to avoid the early union.

III. JOB SCHEDULING USING HYBRID HARMONY SEARCH

Step 1: A consumer node offers a job declaration, which is transmitted to the entire provider node.

Step 2: On receiving of job declaration, each provider node guess whether it is possible to convene the target.

If yes, the provider node fire a submit holding the cost for the job openly to the consumer node; and

If no, the provider node pays no attention to the job declaration.

Step 3: After receiving all the submit, the consumer node chooses the provider node who indict the smallest amount and fires the job.

Step 4: Create primary population of fireflies with job provision time and job ambiguity time, job ambiguity resources

Step 6: Describe harmony memory time, field altering time, mutation time

Step 7: Describe light assimilation coefficient

Step 8: while (r< maximumGen) do

Sort the fireflies by light strength S;

For i=1: all peak fireflies (top) do

For j=1 : PQ (all fireflies) do

Step 9: if ($S_j > S_i$) then move firefly i towards j;

Else

For k=1 : E(all elements) do

if(rand < Harmony memory search) then

$r_1 = [PQ * rand]$

$x_\gamma (L) = x_{r1} (L)$

if (rand < QAR) then

$x_\gamma (L) = x_\gamma (L) + bw * (2 * rand-1)$

end if

else

$x_\gamma (L) = x_{min,k} + rand *(x_{min,k} - x_{min,k})$

end if

end for L

end if

Step 10: Revise pleasant appearance;

Step 11: Revise light strength;

Step 12: Calculate the light strength, S

Step 13: Sort the population by light strength, S ;

Step 14: r= r+1

end while

end

Inspect each user for the jobs then performs the job

service task. A Job Service give an boundary for introduction of jobs on a resource administrator and relate with the job once it has been transmitted to the resource administrator. The Job Service offers necessary matchmaking ability among the necessities of the job and the primary resource administrator for organizing the job. The Job Service uses information such as strategy, which is described at the meta-scheduler level, and resource information about accessible resource administer, queue, host, and job rank is given. In this proposed method, the Reservation service permit users or a Job Service to reserve resources to the resource administrator to agree their accessibility to run a job and their data are right to use by user depending on the user demand and their precedence. This service permits reservations for any type of resource.

IV. RESULTS AND DISCUSSIONS

Number of tests is carried out in order to assess the performance of the algorithm. The outcome of our job is noteworthy and the resource allotment carried out to solve the problems that arise on clusters. As huge-size simulation use huge volume of power this projected method use parallel as well as cluster computing structure. The toolkit holds modeling and simulation of varied resources, users and application models. It present primal for construction of application job, plan of job to resources and their supervision. The performance of the projected job scheduling using harmony search with firefly algorithm is evaluated and it is observed to work efficiently. The ambiguity can also be resolved.

Results of the proposed work are shown below and a comparison is also made with the earlier scheduling algorithm is shown in Table 1.

Table 1: Parameters and cost-efficient quality

Sl.No	Parameter	Cost
1	Clusters	180
2	Nodes	30
3	Bandwidth Competence	200
4	Processing Competence	512-1031
5	Total Contributor	300
6	Total users	750
7	Rate of users	100-1000
8	Rate of resources	100-2000
9	Files	100-15000
10	Dimension of a file	100

Table 2 compare the performance evaluation results of the proposed Hybrid harmony search and existing harmony search for job scheduling, Cuckoo Search, Genetic Algorithm. The proposed hybrid harmony search has less execution cost when compared to existing algorithms. When the jobs get increased in the structure, usage of the resources also increased. The performance in provision of cost also increased moderately with existing algorithms. The execution cost of the proposed Hybrid harmony search algorithm is dissimilar from other algorithm because it resolves ambiguity problems.

Table 2: Performance of the structure in provision of cost

Jobs	Nodes	GA	Cuckoo Search	Harmony Search	Hybrid Harmony Search
50	14	502	452	356	313
100	34	771	672	564	512
150	84	1196	992	897	847
1000	104	1486	1162	956	854
2000	134	1672	1212	1013	946

Table 3: Performance of the structure in provision of resource consumption

Jobs	Nodes	GA	Cuckoo Search	Harmony Search	Hybrid Harmony Search
50	14	67	78	92	98
100	34	71	80	93	95

150	84	74	84	94	96
1000	104	78	89	97	98
2000	134	82	93	99	102

The performance of the projected Hybrid harmony search and the existing algorithms outcome are evaluated in provision of the resource consumption with jobs are depicted in Table 3.It demonstrates the outcome of the projected Hybrid harmony search has high resource consumption percentage when compare to existing harmony search, genetic algorithm and cuckoo search algorithm. When jobs get increased in the structure, consumption of the resources in provision of the percentage also increased with existing algorithms. The proposed Hybrid harmony search algorithm is dissimilar from other algorithm because it resolves ambiguity problems.

The job finishing time of the projected Hybrid harmony search scheduling is compared with existing harmony search, heuristic data scheduling and lower bound scheduling. This demonstrates that the Job Finishing Time of the projected structure is less. Proposed Hybrid harmony search algorithm is dissimilar from other algorithm because it resolve ambiguity problem for job and resources in competent way, but the existing algorithms will not resolve ambiguity problem.

V. CONCLUSION AND FUTUREWORK

The scheduler allocates jobs with least completion time to resources. In the projected methodology used the ambiguity difficulty of jobs can be resolved and resources are considered using Multi-Stage Stochastic Integer Programming (MSSIP) and to schedule jobs concerning ambiguity based on demands and accessibility of resource using harmony search by means of firefly algorithm. The difficulties of the harmony search can be surmounted by hybrid harmony search through firefly. The various categories of jobs too recognized with data alert scheduling in the structure and cost can be considerably reduced under unpredictable network settings.

The outcome specifies the efficiency of the projected algorithm manage high intensity of ambiguity. The entire structure is assessed and the proposed method is viable. This methodology can be further extended by adding novel quality of service methods; routine strategy consumption for selecting a suitable strategy under a certain circumstances; active strategy tuning where dissimilar strategy might be agreed at dissimilar time for the superlative fit.

VI.REFERENCES

[1]. Hadoop. Apache Software Foundation, http://hadoop.apache.org,2015.

[2]. K. Deb, "An introduction to genetic algorithms", Sadhana,vol. 24,no.4-5,pp.293315,1999.

[3]. S. M. Thede, "An introduction to genetic lgorithms", Journal of Computing Sciences in Colleges, vol.20, no.1, pp.115-123, 2004.

[4]. D. Godwin Immanuel, G. Selva kumar, and ,C. Christober Asir Rajan "Differential Evolution Algorithm Based Optimal Reactive Power Control for Voltage Stability Improvement" Applied Mechanics and Materials, Vol. 448-453, pp.2357-2362,oct 2013.

[5]. D.Godwin Immanuel, "Hybrid Intelligent Algorithm to Solve Multi Objective Reactive Power Control Problem" Contemporary Engineering Sciences Contemporary Engineering Sciences, Hikari Ltd. Vol. 8, 2015, no. 5, pp. 227-233.

[6]. Lihong Guo,1 Gai-Ge Wang,2 Heqi Wang,1 and Dinan Wang Hindawi, "An Effective Hybrid Firefly Algorithm with Harmony Search for Global Numerical Optimization", The ScientificWorld Journal Volume 2013, Article ID 125625.

[7]. G. Wang, L. Guo, H. Duan, L. Liu, and H. Wang, "A modified firefly algorithm for UCAV path planning," International Journal of Hybrid Information Technology, vol. 5, no. 3, pp. 123–144, 2012.

[8]. Yang, X. S. , "Nature-Inspired Metaheuristic Algorithms", Luniver Press. ISBN 1-905986-10-6.