Article

A Cloud Computing-Based Modified Symbiotic Organisms Search Algorithm (AI) for Optimal Task Scheduling

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Abstract: The search algorithm based on symbiotic organisms' interactions is a relatively recent bio-inspired algorithm of the swarm intelligence field for solving numerical optimization problems. It is meant to optimize applications based on the simulation of the symbiotic relationship among the distinct species in the ecosystem. The task scheduling problem is NP complete, which makes it hard to obtain a correct solution, especially for large-scale tasks. This paper proposes a modified symbiotic organisms search-based scheduling algorithm for the efficient mapping of heterogeneous tasks to access cloud resources of different capacities. The significant contribution of this technique is the simplified representation of the algorithm's mutualism process, which uses equity as a measure of relationship characteristics or efficiency of species in the current ecosystem to move to the next generation. These relational characteristics are achieved by replacing the original mutual vector, which uses an arithmetic mean to measure the mutual characteristics with a geometric mean that enhances the survival advantage of two distinct species. The modified symbiotic organisms search algorithm

($\mathbf{G}_S OS$)0.61–20.08spans between $100 to$1000 Million Instructions (MI). The solutions are found to be better than the existing standard (SOS) technique and PSO.

Keywords: cloud computing; cloud resource management; task scheduling; ecosystem; geometric mean; symbiotic organisms search algorithm; convergence speed

1 Introduction:

Cloud computing is a modern computing model that offers the virtualization of computing services as a utility to Cloud service users [1–4]. It is a concept for obtaining resources from a customizable shared resource, such as a group of networks, servers, storage, utilities, and applications, instantaneously and based on request. Cloud service providers use virtualization technologies to utilize resources better by allowing multiple virtual machines (VMs) to operate on top of a single physical computer. Consumers of cloud services are automatically provisioned based on Service-Level Agreements (SLA), which are usually formed by negotiations between Cloud service providers and Cloud service users/consumers. Issues related to inefficient mapping of tasks to cloud resources often occur in a cloud environment [5–8]. ask scheduling, therefore, refers to the efficiently scheduling of computational activities and rational allocation of computing resources under some restrictions in the IaaS cloud environment. Scheduling's job is to assign tasks to the most suitable resources in order to achieve one or more goals. Therefore, selecting an appropriate work scheduling algorithm to increase cloud computing resource efficiency, while keeping high quality of service (QoS) guarantees, is an important issue that continues to attract research attention [9–11]. As a result of the broad solution space and the complex existence of heterogeneous resources in cloud computing, the task scheduling problem falls into the group of NP-hard issues [12–15].

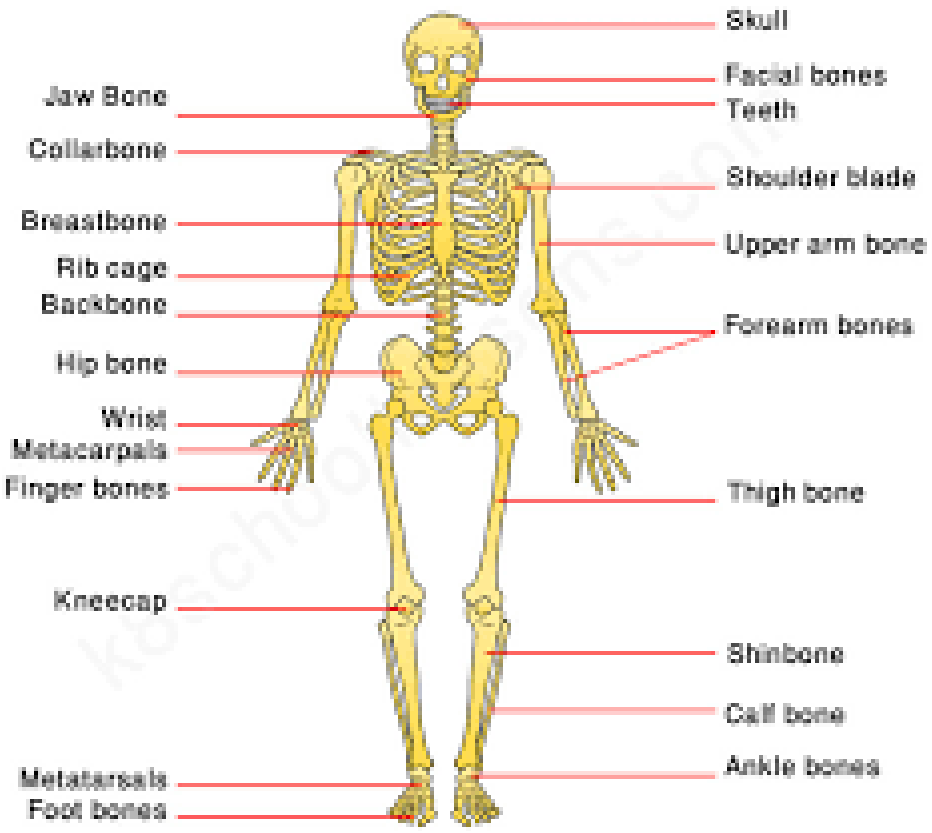

Figure 1: Human skeleton

data1	data2	data3	data4
10	20	30	40
bangladesh	India	Pakistan	Bhutan

Table 1: Data table