Comment1

In the end of section 3.4 there is a definition of Pj and Tj. It is not clear how these quantities are incorporated in the PSO algorithm. In particular how Tj is initialized.

Answer

I have corrected the name of the quantity, the correct one is Wj and I have explain how this quantity incorporated in PSO and initialized.

Pj is a packet allocated to queue j, pr(Qj) is the priority of queue j, and Wj is the remaining time of Qj.

Pj is forwarded when it becomes in front of the non-empty highest priority queue and the remaining time (weights) of queue j is greater than zero. If Qj is nonempty and Wj equals to zero, then the packet that is in the front of the next priority queue is forwarded.
Wj in psoWRR is the dimensions of the particles which correspond to each priority queue as shown in figure 1. Wj is decreased by subtracting the latency time of the forwarded packets from the weights of the queue until Wj becomes 0.

Comment2

In the presented algorithm it is not clear how the calculated fitness is related to the quantities Xi.

Answer

In psoWRR the population consists of particles and each particle consists of three dimensions. A dimension at time t, which represent the current iteration, is named X_i^t. I have clarified the quantities Xi in the manuscript as follows:

Where X_i^t is the dimention i of a particle at time t and V_i^tvelocity of a particle at time t.

Updating the dimensions of all the population of particles happens once at each iteration until the optimal fitness value is reached or the stopping condition becomes valid.

Comment3

It is not described why the best value of parameter w is 1.5 .

Answer

I have described why w=1.5 is the best value for this parameter as follows:

The results of previous experiments manifest that 1.5 is the best w value for the psoWRR algorithm. The fitness value of psoWRR gave the best value for various numbers of packets and in the majority of experiment results, fitness value is maximized when w=1.5. Also, w=1.5 is an intermediate value as it is not small to slow down the convergence or very large to make premature convergence.

Comment4

Is there a justification of using the term 1/DP in the formula regarding the dropped packages?

Answer

The fitness function should be maximized and make its value approximate or equal to the sum of packets in all queues. Therefore, all the variables in the equation is maximizing the fitness value if the particle dimension values are increasing the number of forwarded packets (FP) and decreasing the number dropped packets (DP). The variable DP is added to equation (1) by dividing 1 by DP. The value of 1/DP is increased as the number of dropped packets are decreased. In the code, to avoid division by zero when DP equals 0, we consider 1 is the minimum value for DP.

Comment5

In formula 1 the expression (weight-sum) needs a more comprehensive explanation.

Answer

I have explained weight-sum in the manuscript as follows:

The value of weight-sum equals the sum of dimensions values within each particle. The particle in psoWRR consists of three dimensions. Therefore, the value of weight-sum is the sum of the values of the three dimensions.

Comment6

The concept generations that is depicted on Figure 4 needs to be explained better.

Answer

I have replaced the word generation with the word iteration and modified the paragraph and figure 4 as follows:

The number of iterations in the psoWRR algorithm is also an important parameter that must be optimized. A high number of iterations does not ensure the optimal swarm convergence, as it may lead to overfitting and consumes time and memory space. Therefore, we need to find the best and smallest number of iterations that optimize the weights' values of the multilevel queuing system in routers. The relationship between the number of packets and fitness values is studied according to the following number of iterations: 3, 5, 10, 15, and 20. Both 10 and 15 iterations gave good values for fitness within various number of packets, i.e., the number of forwarded packets is approximating the whole number of packets. In these experiments, although higher number of iterations may provide better results without suffering from overfitting, we have considered 20 for highest number of iterations is to limit execution time and keep it as small as possible. Figure 4 shows the result of experiments for the number of generations' parameter adjustment. For a small number of packets, even 3 and 5 iterations result in optimal fitness values. For the number of packets ranging from 40 to 100, both 10,15, and 20 iterations gave the best fitness values. We consider 10 and 15 to be the best number of iterations as they gave the best fitness values in a smaller number of iterations. Although 20 iterations gave the highest values for some experiments, we have considered 10 and 15 as the best because the difference of fitness values among the three numbers of iterations are very convergent.

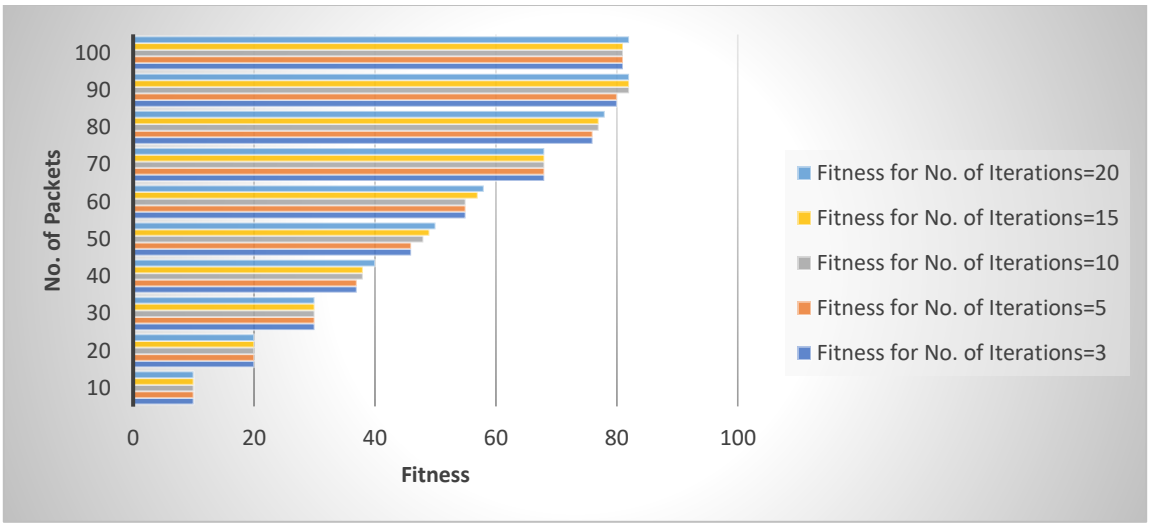

Figure 4 Relation between number of packets and fitness for iterations ranging from 3 to 20

Comment7

In the following text: "*Fitness Evaluation The fitness evaluation algorithm is shown in Equation (1). This step of the algorithm includes calculating the number of packets of each queue, then according to the quantum time, the process is removed from the corresponding queue*" should packet be used instead of process?

Answer

Done