Report

**Problem:**

Timetable scheduling using Particle Swarm Optimization.

Examination subjects must be slotted to certain times that satisfy several of constraints. This assignment uses PSO(Particle Swarm Intelligence) to solve the problem of timetable scheduling.

The most important constraint of the exam timetable is that the same student cannot take

two different exams at the same time. In other words, the exams cannot clash for any student. This is the only hard constraint. However, we also consider the several soft constrains:

• Very strongly prefer no more than two exams per day

for any student.

• Strongly prefer not to have exams consecutive on the

same half day for a student.

• Prefer not to have exams consecutive on different half

days of the same day for the same student.

**Algorithm used:-**

In beginning, we randomly produce a group of 20 candidate

solutions as particles. Each particle is equivalent to a candidate solution of a problem. The performance of 20 candidate solutions is first evaluated and ordered. The best

previous position of the kth particle should be put in P(i, k) at the ith iteration. The best position amongst all the particles from the first iteration to the ith iteration should be put in

Gi. Then new timetables of next generation are produced by following several steps:

• Movement of the particles is processed by the following procedure:

1. Each particle X(i,k) must be changed two slots at random by itself.

S(i+1,k) = rand − mutateX(i,k)

2. Copy a slot for a subject randomly from the local best P(i,k) to particle S(i,k).

W(i+1,k) = rand – changeS(i+1,k) , P(i,k)

3. Copy a slot for a subject randomly from the

global best Gi to W(i+1,k) at random.

X(i+1,k) = rand − changeW(i+1,k ),Gi)

The evolutionary cycle will repeat over and over again until

an optimal timetable is found or a certain maximum number

of iteration is reached.

Notes on experiment:

The overall quality of the timetable is evaluated by the evaluation function that adds up all violations of all constraints by testing it with each student’s exams. Each constraint has an associated weight or penalty defined in an intuitive

way as follows:

1.A single clash has a penalty of 10.

2. An instance of four and three exams in on day has a penalty 4 and 3 respectively.

3. An instance of two exams consecutive in the same half day or in different half day has a penalty 2 and 1 respectively.