Journal of Soft Computing and Information Technology (JSCIT)
Vol. 1,No.4, December 2012

A New Hybrid Intelligent Strategy for University Course Timetabling Problem for Real Applications

Maryam Hasanzadeh[1], Amir Hossein Karami[2], Jamal Rahimi khorsand[3], and Shahram Sharifnia[4]
[1]Corresponding author: Assistant Professor, Department of Engineering, Shahed University, Tehran, Iran, hasanzadeh@shahed.ac.ir
[2]MSC. student of Department of Engineering, Shahed University, Tehran, Iran, amirhossein_karami@ymail.com
[3]BSC. Student of Department of Engineering, Shahed University, Tehran, Iran, jamal_rahimikhorsand@yahoo.com
[4]Graduated student of Department of Engineering, Shahed University Tehran, Iran, shahram_sharifnia@yahoo.com

Abstract
The university course timetabling problem (UCTP) is a hard combinatorial optimization problem. Because the search space of this problem is very large, human timetabling is a sophisticated job; as a result, there have been many attentions over the recent years from computer researchers to present an automated timetabling approach for UCTP. In a general point of view, UCTP is a problem in which some courses must be assigned to valid timeslots. There are some constrains and preferences in this problem. Most constraints and preferences come from curriculum of teachers and students. If a timetable satisfies all constraints, it is called a feasible timetable. In UCTP, the outcome timetable must be a feasible timetable. The less violation preferences have, the better timetable would be created. Since UCTP is a constraint satisfaction problem (CSP), in this paper in order to create feasible timetables, a novel CSP-based algorithm is presented. In addition, a genetic algorithm (GA) combined with local search methods is used to optimize the feasible timetables. The experimental results show that the suggested method produces appropriate results in a reasonable time considering a real data with large state space as input data.

Keywords**:** *University course timetabling problem (UCTP), constraint satisfaction problem (CSP), genetic algorithm (GA).*

1. Introduction

The university timetabling problem means either university exam timetabling problem or university course timetabling problem. This paper aims at university course timetabling problem (UCTP). According to Carter and Laporte, UCTP is "a multi-dimensional NP-Complete problem in which students and professors are assigned into courses or classes" [1].

The use of computer for timetabling problems has a long history, which dates back to almost when computers were first invented. The first generation of computer timetabling programs developed in the early 1960s mainly in an attempt to reduce the associated administration work. Thereafter, programs were soon demonstrated discussing constraints such as classes and teachers [2].

By 1964, a heuristic approach to timetabling had been introduced by Broder [3] and Cole [4]. Moreover, in 1967, Welsh and Powell disclosed the similarity between timetabling problem and the graph coloring one [5]. The Welsh and Powell algorithm was similar to Broder's and Cole's method [3].

Various approaches for timetabling were proposed such as constraint-based methods, population-based approaches (i.e., ant colony optimization [6-9], bee colony optimization [10], particle swarm optimization (PSO) [11,12], genetic algorithms (GAs) [13-17] and memetic algorithms (MAs) [18-20]), meta-heuristic methods (i.e. tabu search [21], simulated annealing, and great deluge [22]),