A HYBRIDIZATION OF GENETIC AND ANT COLONY ALGORITHMS FOR SOLVING UNIVERSITY COURSE TIMETABLING PROBLEM

Student's Name               : Devie Rosa Anamisa
Student's Reg. Number   : 5111201004
Supervisor                       : Prof. Ir. Arif Djunaidy, M.Sc., Ph.D.

ABSTRACT

Course timetabling can be regarded as a complex problem since it is constrained by several factors, such as the availability of lecturers’ schedules, courses being offered, and the availability of classes and their associated time slots. Many research works have been done to obtain a time table of courses that is capable of satisfying those constraints. However, many solutions for solving timetabling problems fail to produce satisfactory results, and hence several efforts for improving their performances are still worthy. In this research, the solution to the timetabling problem is modeled using a three dimensional space, where each dimension of the space represents the workdays, available lectures’ schedules, and time slots; respectively. Using this model, the timetabling problem can be perceived as a problem of how to allocate cells each of which represents a course taught by a particular lecturer into the available three dimensional space. A hybridization of genetic and ant colony algorithms is employed to optimally allocate the cells. The genetic algorithm is employed to maximally satisfy all constraints, while ant colony algorithm is involved to minimize collisions that may occur during the allocation of the cell. Various experiments were conducted to obtain optimal parameters setting for the number of generation and population of the genetic algorithm as well as to obtain optimal alpha and beta values of ant colony algorithm. Experimental results showed that the hybridization of genetic and ant colony algorithms developed in this research was capable of solving the course timetabling problem with satisfactory results. Success rate of 82% up to 97% were obtained in solving the course timetabling problem for several semesters at two different state universities. These success rates were obtained by setting the number of generation and population of the genetic algorithm to a value of equal or more than 50 and 20; respectively. Whilst, the value of one were obtained for both alpha and beta parameters setting for ant colony algorithm.