



University of
Strathclyde
Glasgow

Evolutionary timetabling: scheduling resource for better outcomes



Timetabling is an important activity in most of the business sectors, for example, class/exam timetabling for universities, production/maintenance timetabling for factories, game timetabling for sports leagues, or even conference timetabling for administrative offices.

Think about ourselves, we sometimes, if not always, need a timetable (plan) to tell us what to do, how to do and by when. But have you ever thought about how timetabling can be done in a more efficient and considerate way?

Other than doing it by gut feelings, experience, or excel-based exercise, a Particle Swarm Optimisation (PSO) method, which is inspired by simulating social interaction and communication in a bird flock or fish school, can make a big difference. Its usefulness has been demonstrated by applying it to a day care centre (DCC) in which resources are allocated to different activities for different users at different timeslots. Evidence suggested that this approach outperformed other well-known methods in terms of solution quality and efficiency.

DCC Timetabling

Timetabling for DCC is not much different from the others but it does significantly affect the quality of care service provided to the users. If not planned properly, it may increase the user admission/re-admission to hospitals and eventually contribute to the long waiting time and high demand which are the two most frustrating facts in healthcare sector around the world.

To make use of PSO, DCC timetabling is formulated as a maximum constraint satisfaction problem with an aim to find a timetable that can satisfy most of the constraints. Using the evolutionary (directed) way of constructing the best timetable, it is a must to meet all hard constraints (e.g. time limitation, user availability, etc) and as many soft constraints (e.g. policies, regulations, user preferences, etc) as possible. Meeting all hard constraints guarantees that the timetable is feasible (being applicable in real practice) and satisfying most of the soft constraints is to ensure that the timetable is considerate (taking user preferences into account). Without the need of exhaustive searching, a fairly good or near-optimum timetable can be obtained within a short period of time. Hooray!

More importantly, this study can also provide useful managerial insights to the DCC managers regarding performance improvement. For example, the DCC has been suggested to extend its opening hours on specific days and purchase more equipment for specific activities.

Contact

For more information about this study and other potential applications of evolutionary approaches, please contact Dr Andy TC Wong
andy.wong@strath.ac.uk

