A Hybrid Heuristic Ordering and Variable Neighbourhood Search for the Nurse Rostering Problem

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Abstract

In many hospitals the creation of nurse rosters is still carried out by hand. It is a very time consuming, frustrating and often unrewarding process. The rosters produced, although reasonable, are often easily improved and are not necessarily as fair as possible. The nurses responsible for their creation could be spending their time every month in a far more effective manner. Not only do the schedulers have to cope with last minute changes but they also have the added pressure of being fair (and being seen to be fair) to their staff. However in some situations computer systems are being used to provide automated schedule production (e.g. [BUR02, BUR01, BUR99]). Where computers have replaced the manual scheduling process useful working hours are now not being wasted. Also, there is anecdotal evidence to suggest that staff see a computer system as being impartial (if the aim is to produce a fair schedule). A computer system does seem to generate a feeling among the nurses that the rosters are actually equally favoured to everyone. Finally, the use of computer systems can often lead to more efficient scheduling which contributes to a better and more productive working environment. Nurse rostering approaches have been extensively reviewed in [BUR04].

This paper describes a Heuristic Ordering approach to the nurse rostering problem which is hybridised with a Variable Neighbourhood Search. VNS has been demonstrated to be a successful method in tackling complex real world instances of the nurse rostering problem [BUR02]. In this presentation, we will discuss a hybrid methodology in which the search can be extended and schedules significantly improved through the combined and repeated use of heuristic ordering, VNS and backtracking.

The algorithm has been evaluated against a commercial Genetic Algorithm on commercial nurse rostering data.

References

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