

The Hospitals Residents Problem with Bounded Length Preference List under Social Stability

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Abstract : In this paper, we consider The Hospitals Residents problem with Social Stability (HRSS), where hospitals and residents can communicate only through the underlying social network. Those residents and hospitals which don not have any social connection between them can not communicate and hence they cannot be a social blocking pair with respect to a socially stable matching in an instance of hospitals residents problem with social stability. In large scale matching like NRMP or Scottish medical matching scheme etc. where set of agents, as well as length of preference lists, are very large, social stability is a useful notion in which members of a blocking pair could block a matching if and only if they know the existence of each other. Thus the notion of social stability in hospitals residents problem allows us to increase the cardinality of the matching without taking care of those blocking pairs which are not socially connected to each other. We know that finding a maximum cardinality socially stable matching, in an instance, of HRSS is NP-hard. This motivates us to solve this problem with bounded length preference lists on one side. In this paper, we have presented a polynomial time algorithm to compute maximum cardinality socially stable matching in a HRSS instance where residents can give at most two length and hospitals can give unbounded length preference list. Preference lists of residents and hospitals will be strict in nature.

Keywords : matching under preference, socially stable matching, the hospital residents problem, the stable marriage problem

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