Workforce Optimization: Fair Workload Balance and Near-Optimal Task Execution Order

Authors : Alvaro Javier Ortega

Abstract : A large number of companies face the challenge of matching highly-skilled professionals to high-end positions by human resource deployment professionals. However, when the professional list and tasks to be matched are larger than a few dozens, this process result is far from optimal and takes a long time to be made. Therefore, an automated assignment algorithm for this workforce management problem is needed. The majority of companies are divided into several sectors or departments, where trained employees with different experience levels deal with a large number of tasks daily. Also, the execution order of all tasks is of mater consequence, due to some of these tasks just can be run it if the result of another task is provided. Thus, a wrong execution order leads to large waiting times between consecutive tasks. The desired goal is, therefore, creating accurate matches and a near-optimal execution order that maximizes the number of tasks performed and minimizes the idle time of the expensive skilled employees. The problem described before can be model as a mixed-integer non-linear programming (MINLP) as it will be shown in detail through this paper. A large number of MINLP algorithms have been proposed in the literature. Here, genetic algorithm solutions are considered and a comparison between two different mutation approaches is presented. The simulated results considering different complexity levels of assignment decisions show the appropriateness of the proposed model.