Graph Search Methods: Application to Single Machine Job Sequencing Problems

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Thesis Summary

Best-first search (BFS) algorithms run fast on the average, but require substantial memory to store the generated nodes and can hardly be used for solving large problems. On the other hand, depth-first search (DFS) algorithms use tree search space. Using a tree search space instead of graph search space may generate duplicate copies of nodes and hence DFS algorithms may search a node over and over again along different paths to the node. This dissertation attempts to bridge the gap between the two extremes.

We propose a new graph search algorithm ETCBB, which can utilize available memory efficiently and can work successfully even when memory is insufficient to store all the nodes. In order to find out the applicability and the performance of the new algorithm, we have studied various classes of single machine hob sequencing problems. These problems are of practical importance and are known to be difficult to solve. We have extended the properties of these problems and have shown that in spite of diverse problem characteristics, ETCBB can successfully employed to solve these problems. The performance of the algorithm has been found to be superior to the existing approaches.