Real-Life Optimum Shift Scheduling Design

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Abstract. In many industries, manpower shift scheduling poses problems that require immediate solutions. The fundamental need in this domain is to ensure that all shifts are assigned to cover all or as many jobs as possible. The shifts should additionally be planned with minimum manpower utilization, minimum manpower idleness and enhanced adaptability of employee schedules. The approach used in this study was to utilize an existing manpower prediction method to decide the minimum manpower required to complete all jobs. Based on the minimum manpower number and shift criteria, the shifts were assigned to form schedules using random pick and criteria-based selection methods. The potential schedules were then optimized and the best ones selected. Based on several realistic test instances, the proposed heuristic approach appears to offer promising solutions for shift scheduling as it improves shift idle time, complies with better shift starting time and significantly reduces the manpower needed and the time spent on creating schedules, regardless of data size.

1 Introduction

The demand for fast and reliable operations in any organization or business has never been greater, especially in manufacturing, logistics, transportation and various other industries. With the rising costs of operations and management, all businesses are struggling to keep their expenditures low. The greatest potential area for cost saving is manpower administration, through which most organizations pursue approaches that can reduce resource wastage and optimize workforce utilization. This solution is hardly new; [1] presents an optimization software solution for crew rostering to a prominent airline company, which resulted in annual savings of more than USD 20 million. In most organizations, having the ideal amount of manpower is critical as it does not only reduce cost, but also enhances effectiveness and decreases bureaucracy. Therefore, sizable spending by organizations on a viable system for scheduling and rostering is justified and even indispensable as it provides a forecast of the optimal amount of manpower needed. Designing schedules with multiple shifts entails numerous challenges; it is governed by a set of rules or operation constraints