ABSTRACT

Job shop scheduling problem (JSP) is strongly NP-hard problem and is usually difficult to find its optimal solution. Direct and heuristic approaches are the two major methods used for resolving JSP. Many researchers have employed the direct approaches such as Enumerative techniques, Branch and Bound techniques and Priority dispatching rules to solve various scheduling problems.

In the past, researchers have mainly focused in single objective separately such as minimization of makespan and tardiness. In single objective optimization, the aim is to find a schedule that minimizes the overall completion time, which is called the makespan. In earlier research works, such as Branch and bound approach and Shifting Bottleneck procedure were used to generate schedules, but it has not been efficient for large size problems. Therefore, effort has been made in this research to search and develop efficient hybrid heuristics to solve large size problems as well as to produce quality solutions.

Job shop scheduling problems naturally involve multiple objectives. There are only a few attempts to tackle the multi-objective JSP. Two or more conflicting objectives are considered in multi objective JSP. The multi-objective optimization deals with two goals. The first goal is to find a set of solutions as close as possible to the Pareto-optimal front. The second goal is to find a set of solutions as diverse as possible. The presence of multiple objectives is common in many real world problems and makes the
problem interesting to solve. This research has made an attempt to deal this
multi objective optimization.

In cost optimization problem, meeting due dates is often the most
important objective of scheduling. The due-date constraints have not been
frequently considered in job-shop scheduling problems in the past. In job shop
scheduling problem, in order to avoid delay penalties including customer’s
bad impression, cost of lost future sales and rush shipping cost, an objective
function with minimization of total holding cost is considered in this work. To
deliver the jobs at prescribed due date, total holding cost is minimized with
various hybrid heuristic approaches.

Hybrid Sheep Flocks Heredity Model algorithm, Artificial Immune
System Shifting Bottleneck Algorithm are developed and implemented on
single objective, multi objective and total holding cost benchmark problems.
Hybrid Sheep Flocks Heredity Model algorithm has been proved as an
efficient tool while solving single, multi objective problem and total holding
cost optimization problem when compared with Artificial Immune System
Shifting Bottleneck Algorithm and other literature results.