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Comparative Study of Genetic Algorithm Based Approaches for Balancing Assembly Line

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Abstract: This paper proposes a comparative study between two different methods of Genetic Algorithm (GA) for balancing single-model assembly line. The assembly line balancing problem (ALBP) is the issue of assigning various tasks to multiple workstations such that the line is balanced. Therefore, the goal of the ALBP is to maximize the flow of products on an assembly line while minimizing the time that is wasted between stations. Hence, improper balancing of assembly line results in lesser utilization of machines and thereby leading to decreased throughput. Therefore, the objective of this paper is to balance assembly line by properly assigning the jobs to different machines. GA based approaches were used as the methodology to schedule the jobs in the right sequence, and balancing many different possible assembly lines. The first proposed GA is the Multi Offspring Genetic Algorithm (MOFGA) in which there is more offspring evolving from the same parent chromosome. The second proposed method was Multi Parent Genetic Algorithm (MPGA) in which many parents will produce a single offspring. The process of intensification and diversification was achieved in order to evaluate many alternatives. As a result, two new methods of GA were coded and a comparative study of these methods was done in order to find the best method for balancing assembly line. These methods, MOFGA and MPGA, were also compared with the results obtained from basic or traditional GA (TGA). The methods were tested with various data sets and the results were compared to find out the method that dominates the other methods.

Keywords: Assembly line balancing, multi offspring genetic algorithm, multi parent genetic algorithm