



Republic Iraq
Ministry of Higher Education and
Scientific Research
University of Basra
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Build a Hybrid Model (Neural-Genetic) to solve The Fuzzy Job-Shop Scheduling Problem with Application

Submitted To
The council of College of Administration &
Economics/University of Basra, as partial requirement of
M.Sc. Degree in Statistics

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2017

Abstract

The Job Shop Scheduling Problem (JSSP) is one of the complex polynomial problems, which are increasingly complicated by the increasing overlap of jobs and machines. Despite the many methods used to find good solutions, most solutions are ineffective in practice due to uncertainty of real processing times. This is consistent with the nature of the problem, as most of the processing times are inaccurate due to different working experience and machine performance. Therefore, the maturity dates are uncertain. This study adopted a methodology of work to build a hybrid model using the artificial intelligence systems, which is represented in Hopfield neural networks and the genetic algorithm.

Resolving any Fuzzy Job Shop Scheduling Problem is through fuzzing the processing times by a triple fuzzy number and fuzzing due date by a double fuzzy number. Hopfield's neural networks are used to improve the performance of the genetic algorithm by generating an initial generation of P size, represents near-optimization solutions, used by the genetic algorithm to perform mating, crossover, and mutation. in order to obtain the best possible sequence of job orders which may contribute significantly to making the appropriate decision in order to achieve the objectives of the establishment and thus achieve the satisfaction of the customer by delivering the product on time, reduce the time of completion and maximize the use of resources.

The study was applied to Al-Ghadeer Printing and Publishing Co. Ltd., where the fuzzing processing times and the fuzzing due date of the four different jobs were processed by eleven machines according to the nature of the job and based on the data in the company records.

Finally, the study was able to reach a set of conclusions, the most important of which is to achieve the hypothesis of the involved research. The hybrid model proposed by the researcher will be better in obtaining the optimal jobs sequence, to reduce the finish time and to reach customer satisfaction by delivering the product at the due date through the method of the neural networks and the method of the genetic algorithm.