

Deep Evaluation on Reinforcement Learning Performance with Lead Time Sensitive Demand in Production Planning

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ABSTRACT

The purpose of this research is to evaluate and determine the best parameter setting in order to enhance Reinforcement Learning performance to overcome stochastic and uncertain demand which influenced by lead time in achieving maximum profit by producing units with proper amount. The globalization creates a competitive environment among businesses in which the manufacturer who able to deliver the best service and short lead time has the potential to gain more profit and expand their business. Regarding to that issue, Reinforcement Learning is the appropriate algorithm to be applied for this situation because its flexibility to control the production size per period can adjust easily with unstable and unpredictable demand. This advantage which differ Reinforcement Learning with the other common production and inventory policies, such as Inventory Policy and Allowance Inventory Policy. The experiments are conducted to analyze the performance of Reinforcement Learning and the two inventory policies based on various setting of instances on mean demand, coefficient of variability (CV), lead time sensitivity factor (Beta), unit price, production cost, back order cost, and inventory cost. The result shows that Reinforcement Learning outperforms Zero Inventory in all setting of instances and outperforms Allowance Inventory where the production cost is low, but back order cost and inventory cost are high, mean demand is far lower than capacity, and level of CV is high. Therefore, Reinforcement Learning can be considered as a good guidance for manufacturers' manager in attempting to obtain optimal profit in many circumstances.

Key words: Reinforcement Learning