

## Prediction of Intermittent Demand Occurrence using Machine Learning

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### Abstract

Demand forecasting plays a pivotal role in modern Supply Chain Management (SCM). It is an essential part of inventory planning and management and can be challenging at times. One of the major issues being faced in demand forecasting is insufficient forecast accuracy to predict the expected demand and fluctuation in actual vs. the predicted demand results in forecasting errors. This problem is further exaggerated with slow-moving and intermittent demand items.

Every organization encounters large proportions of items that have small irregular demand with long periods of zero demand, which are known as intermittent demand items. Demand for such items occur sporadically and with considerable fluctuation in the size of the demand. Forecasting of the intermittent demand entails the prediction of demand series that is characterized by the time interval between demand being significantly greater than the unit forecast period. Because of this there are multiple periods of no demand in the intermittent demand time series. The challenge with these products with low irregular demand is that these items need to be stocked and replenished at regular interval irrespective of the demand cycle, thus adding to the cost of holding the inventory. Since the demand is not continuous, Traditional Forecasting models are unable to provide reliable estimate of required inventory level and replenishment point. Forecast errors would result in obsolescent stock or unfulfilled demand.

The current paper presents a simple yet powerful approach for generating a demand forecasting and replenishment process for such low volume intermittent demand items to come up with a recommendation for dynamic re-order point, thus, improving the inventory performance of these items. Currently, the demand forecast is generally based on past usage patterns. The rise of Artificial Intelligence/Machine Learning (AI/ML) has provided a strong alternative to solve the problem of forecasting Intermittent Demand. The intention is to highlight that machine learning algorithm is more efficient and accurate than traditional forecasting method. As we move forward to industry 4.0, the digital supply chain is considered as the most essential component of the value chain wherein the inventory size is controlled, and the demand predicted.

**Keywords:** Intermittent Demand, Inventory Management, Demand Forecasting, Intermittent Demand Classification, Machine Learning, Industry 4.0

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### 1. Introduction

SCM constitutes a significant portion of an organization's total cost and has a commensurable impact on the Company's performance [1]. Good SCM can improve customer service, reduce operating and inventory costs, and bring significant financial gains to an organization. With increasing

competition, companies are facing increasing customer expectations and products need to be delivered to the customer at the right cost, to the correct place, at the precise time and in the required quantity. It, therefore, becomes necessary for companies to invest in implementing modern supply chain technologies and strategies to get a competitive advantage over rivals.

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