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### **Enhancing Shipment Forecast for CPG companies using Machine Learning and Demand Sensing**

Consumer packaged goods companies (CPGs) account for some of the biggest industries in the world, providing essential items on a regular basis. Supply chain management at CPGs is complex because several products are supplied through multiple channels and distribution methods. Products follow complex order patterns characterized by promotional events, seasonal influences, natural disasters, etc. Given this complexity, it is crucial to generate accurate short-term forecasts of order quantities that reflect the realistic demand of products. Such forecasts enable companies to drive an efficient supply chain response to improve customer service.

This paper uses machine learning along with traditional time-series forecasting models to generate enhanced weekly and daily forecasts by using historical demand signal data and point-of-sale data. The model first creates enhanced weekly forecasts, then breaks down enhanced weekly forecasts into daily forecasts. For the weekly forecasts, a combination of a traditional time-series forecasting model and a neural network is used to create a product-wise forecast. This model combination allows for capturing the complex weekly order patterns and provides an accurate forecast of product demand. Weekly forecasts are broken down into daily forecasts by using an ensemble of three models: a seasonal model, a trend model, and a neural network model. The paper discusses the methodology behind this approach in detail, along with forecasting results.

Varun Valsaraj is a Sr. Manager in AI & ML Center of Excellence (COE) team in SAS Research & Development. Varun has more than 10 years' experience in applying advanced technologies such as AI, machine learning and optimization techniques to solve challenging problems. He has led successful implementation of SAS Software at major companies such as USG, Nestle and Electrolux. SAS recognized him with CEO award of excellence for his ability to work across multiple functional units to deliver a great customer experience. Varun is passionate about developing new ways to solve challenging customer problems and his innovations has led to 4 patents, 12 journal and conference articles. He has an undergraduate BTECH degree from IIT Madras and master's degree in Civil Engineering from University of Texas at Austin.