

Production Systems Design: Time Series Approach to Forecasting

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Abstract

In any industry, it is imperative to maintain a clear perspective on trends for potential purchasing demand. With insight into how demand will fluctuate, decisions can be made to ensure the proper supply of goods or services will be available to meet customers' needs. As to the definition of forecasting, its primary function is to predict the future values. Forecasting provides an estimate of future demand, with the primary consistent goal being to minimize forecasting error. Better forecasts result in lower inventories, reduced stock-outs, smoother production plans, reduced costs, and improved customer service.

There are two separate approaches to forecasting. The forecasting techniques consist of qualitative and quantitative forecasting. Qualitative forecasts are generally based off soft skills such as impressions or intuition. These factors are difficult or almost impossible to quantify. This method is used when data is limited, unavailable, or not currently relevant. This method may also be used when no demand history exists for a particular product or service. As such, the forecast's outcome will heavily depend on the skill and experience of the forecaster and available impressionable information. Qualitative Forecasts use subjective inputs such as opinions for consumer surveys, experts, and historical impressions. In this case, a panel of experts may assemble to collect idea then move forward with a forecast outline. Scenario writing may be used to develop a conceptual scenario of future trends based on a well-defined set of assumptions. Qualitative methods often include brainstorming sessions to assemble a baseline idea platform to move forward with. Quantitative Forecasting approaches on the contrary are based on analysis of historical data of one or more time series. Mathematical models are used to calculate potential demand fluctuation. The various methods of calculation are varied based on desired outcome information and available initial information available. Available quantitative forecasting methods consist of the following methods: Time Series Analysis, Linear Regression, Simple Moving Average, Weighted Moving Averages, Exponential Smoothing and Exponential Smoothing with Trends. These models while all unique in their own way have their pros and cons which will be explored extensively in the poster presentation.

Keywords

Time Series Analysis, Linear Regression, Simple Moving Average, Weighted Moving Averages, Exponential Smoothing and Exponential Smoothing with Trends.

Biographies

Demetri Blackwood is a Senior studying Industrial Engineering at Kettering University. In addition to this poster presentation, earlier this year Mr. Blackwood had published a conference paper through a National Science Foundation (NSF) grant, the proceedings of which were presented at the annual American Society of Engineering Education (ASEE) Conference in Tampa, Florida.

Tanashki Frater, is a rising Junior studying Industrial Engineering at Kettering University. Ms. Frater is also a Co-op student at Lear Corporation in Southfield, MI where she works in the Advanced Quality Manufacturing Department.

Navardo Henry, is a rising Senior Studying Industrial Engineering at Kettering University. Mr. Henry is also a Co-op student at Manga International in Battle Creek, MI where he works in a Project Management Capacity. Prior to his role at Magna he worked at Bosch in Florence, Kentucky in the Logistics and Material Handling Department.

Chelsea Wright, is a Sophomore studying Industrial Engineering at Kettering University. Ms. Wright is founder of the non-profit – Girls Who Know. She is also a Co-op student at Mac Arthur Corporation where she works in the capacity of Engineering Associate.