

Chapter 34

Forecasting the Demand of Agricultural Crops / Commodity Using Business Intelligence Framework

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ABSTRACT

Information technology is playing a very important role in all the spheres of life, starting from healthcare to entertainment. The agricultural community is not far behind in utilizing information technology for increasing the efficiency and productivity of agriculture and allied activities. This chapter proposes how the concepts of BI (business intelligence), BI tools, data mining tools might be used for forecasting the agricultural demand of various crops reliably and more efficiently. The chapter clearly elaborates how BI tools could be used during various stages of ETL (extract, transform, and load) and how cleansed, quality data could be used by data mining tools for forecasting. Experiments are carried out for forecasting the demands for various agricultural crops by using the previous year's demand, and the results are encouraging. The experimental set up involved open source tools like Pentaho's Kettle and Weka.

INTRODUCTION

Business Intelligence (BI) has been around for more than a decade and is being used in various application domains. BI is about creating value for organizations based on data or, more precisely, facts. While it seems like another buzzword to describe what successful entrepreneurs have been doing for years, if not centuries, that is, using business common sense? From a modern business-value perspective, cor-

DOI: 10.4018/978-1-5225-7362-3.ch034

porations use BI (Sherman, 2014; Prasad & Acharya, 2011) to enhance decision-making capabilities for managerial processes (e.g., planning, budgeting, controlling, assessing, measuring, forecasting and monitoring) and to ensure critical information is exploited in a timely manner. And computer systems are the tools that help us do that better, faster, and with more reliability. BI is a broad category of application programs and technologies for gathering, storing, analyzing and providing access to data to help enterprise users make better business decisions. BI (Sherman, 2014; Prasad & Acharya, 2011) applications support the activities of decision support, query and reporting, online analytical processing, statistical analysis, forecasting, and data mining. BI includes a set of concepts and methods to improve business decision making by using fact-based support systems. BI has become synonymous with historical query and reporting tools for many years, the definition of BI in recent years has evolved to include technology that addresses data integration, predictive analytics and information deployment (Shmueli, Patel, & Bruce, 2010; Sherman, 2014; Prasad & Acharya, 2011). Predictive analytics often help companies address their most difficult business issues and achieve a competitive advantage in their respective markets. Forecasting is a discipline of analytics that provides the foundation for planning processes across organizations. Good forecasting provides a more accurate view of the future, helping an organization save time and reduce costs, while better serving its customers and managing its resources. When used with data integration and information deployment capabilities, forecasting becomes even more powerful by pulling from multiple data sources and disseminating forecast results consistently. Information technology for agricultural (Shmueli et al., 2010) use can be broadly classified for:

1. Tools which might be used to improve productivity
2. Tools which empower farmers to take informed and quality decisions

At present the information available for farmers is through conventional sources, which are slow and unreliable. As a result of the information not reaching in time to the farmers, there is lot of wastage in terms of crops getting spoiled, some crop getting excess production and some crops not getting produced at all. These factors ultimately result in controlling the prices of the commodities dependent upon a particular crop. Thus the Farmers would be in a position to take the benefit of the technology used in the proposed approach. BI allows the decision maker to understand their business environment in order to make informed decision. Decision-making requires evaluating performance (what happened), testing hypotheses (why and how things happened) and predicting future events (what may happen). Stated simply management needs to know if their strategies are sound if they are being carried out. Most formally a business intelligence system allows users to answer above-mentioned decisions. Forecasting involves predicting and analysis of the given data, which can be achieved by BI.

- **Predictive Analytics:** Predictive analytics represent any solution that supports the identification of meaningful patterns and correlations among variables in complex, structured, unstructured, historical, and potential future data sets for the purposes of predicting events and assessing the attractiveness of various courses of action.
- **Planning Decisions:** This includes analytical reporting based on a data warehouse (DW) (Shmueli et al., 2010) or data mart and operational reporting based on an operational database management system. Reporting tools often include pixel-perfect positioning of data and graphics, a scripting language equal in power to a full program programming language, and the ability to handle complex headers, footers, nested subtotals, and multiple report bands on a single page.

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