

## Application of data mining technique in predicting worsted spun yarn quality

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Today's industry gives first priority to information technology. Since understanding the structures and relationships dominated of data can help industrial managers to attend in competitive market successfully, a special mechanism must be developed to process data stored in a system. Hence, the focus on widespread use of data mining gains increasing attention. The purpose of this paper is using data-mining technique in textile industry. More than 150,000 data includes testing of raw materials, manufacturing process parameters and yarn quality parameters, during one year in worsted spinning factory were collected. Next, yarn quality was predicted by using data-mining methods containing clustering and artificial neural network (ANN). In order to evaluate the proposed method, the results obtained were compared with conventional methods based on ANN. The results showed that the performance of data-mining technique is more accurate than that of ANN.

**Keywords:** data mining; artificial neural network; clustering; worsted spinning

### Introduction

Data have been rapidly collected and stored, in this information technology age that has emerged in the last 20–30 years. However, using them is not often an easy task and they cannot be used to integrate data volume. There is no shortage of information in today's business environment, but there is a shortage of how to use these information or data to be more competitive and make products more appealing. For instance, manufacturer should know what kind of raw material, efficient equipment and which adjustment in process performing should be used for producing high-quality end product. It is important for industries to know their customers, need and give them production priority. In other words, the success of an organization depends on correct processing of raw data. Data analysis science or data mining is emerged because of the importance in accessing the information. The history of using data mining dates back to the late 1980s (Lee, 1993).

In the textile industry, a large amount of data are also generating and storing. These data include the raw materials, machine settings, and quality parameters of product. By using data mining, effective parameters can be determined on product quality. Many studies have been conducted in the spinning industry to predict the yarn properties based on the fiber characteristics and spinning factors. Frydrychzhu (1992) presented a new approach to yarn characterization and yarn tensile

response based on fiber parameters such as strength and strain-at-break, length and fineness. Zhu and Ethridge (1996) used a neural network model for predicting the yarn irregularity, based on inputs of fiber property measurements with the AFIS instrument. Ahmad, Nawas, and Tayyab (2004) investigated the effect of cotton differing in micron air value and fiber length on yarn evenness and hairiness. Belteran, X. Wang, and L. Wang (2004) predicted worsted spinning performance based on fiber characteristics by using an artificial neural network. Ureyen and Kadoglu (2007) investigated the relationship between ring yarn properties and the fiber measurements obtained by the AFIS instruments and designed appropriate models for predicting yarn properties. Jackowska, Cyniak, Czekalski, and Jackowski (2007) predicted the quality parameters of cotton yarns in ring compact and rotor spinning machines by using ANN model. They predicted the parameters of yarn quality, such as tenacity, elongation at break, unevenness of linear density and hairiness, based on the characteristics of feeding streams. Aghasian, Gha-reaghaji, Ghane, and Parsian (2007) investigated the interaction between blended rotor-spun yarns of cotton and polyester fibers by using the hybrid model. Mwasi-agi, Ramesh, Rajamanickamb, and Jayaraman (2008) Used ANN model for predicting yarn tensile properties. Huang and Wang (2008) used artificial neural network for prediction breaking elongation of ring spun yarn.

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