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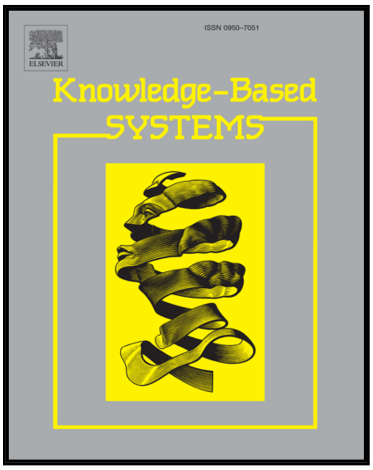

Modeling of Fuzzy-based Voice of Customer for Business Decision Analytics

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Abstract

Identification, interpretation and response to customer requirements are the key success factors for companies, regardless of their industry. Failing to satisfy customer requirements can damage a company's reputation and cause heavy losses. In this study, we have developed a new approach for properly interpreting and analyzing the fuzzy voice of the customer using association rule learning and text mining. This unique methodology converts textual and qualitative data into a common quantitative format which is then used to develop a mapped Integrated Customer Satisfaction Index (ICSI). ICSI is a framework for measuring customer satisfaction. Previous measures of customer satisfaction ratio failed to incorporate the cost implications of resolving customer complaints/issues and the fuzzy impact of those complaints/issues on the system. In addition to including these important and unique factors in the present study, we have also introduced a dynamic Critical to Quality (CTQ) concept, a novel method that provides a real-time system to monitor the CTQ list through an updated CTQ library. Finally, a procedure for customer feedback mining and sentiment analysis is proposed that handles typographical errors, which are unavoidable in every real database. The results of this study suggest that incorporating the fuzzy level of negativity and positivity of comments into the model instead of treating negative and positive comments as binary variables, leads to more reasonable outcomes. In addition, this study provides a more structured framework for understanding customer requirements.

Keywords:

Voice of customer; text mining; sentiment analysis; product development; fuzzy logic; association rule and machine learning; data mining; decision support system; Integrated Customer Satisfaction Index (ICSI); Critical to Quality (CTQ)

1. INTRODUCTION

The success of a product or service in the world market depends on customer satisfaction. Thus, the primary mission in any industry is to cater to the needs of the customer. Accurate determination of customers' needs and a precise interpretation of their expectations are absolutely necessary in order to give them the utmost satisfaction. Improving customer satisfaction includes a wide range of research aspects from minimizing the cost and time of services in supply chain networks, auto industry, service industry and customer relation to product-based procedures such as new product development (see [1, 2]). To improve customers' loyalty and satisfaction various techniques such as dynamic optimization, time-cost analysis, machine learning and text mining methods may be used (see [3, 4, 5])

The Voice of the Customer (VOC) is a critical process that accurately records customers' input describing their needs and expectations for products and services. Specifically, the voice of the customer is a market research technique that produces a detailed set of customer wants and needs, organized into a hierarchical structure, and then prioritized in terms of relative importance and satisfaction with current

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