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Measurement of job satisfaction using fuzzy sets

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Abstract

The measurement of job satisfaction is carried out using the set of variables of some criterions defined by the experts. This measurement is basically based on linguistic evaluations of the variables. In the paper these linguistic values are represented by fuzzy sets as preference levels. A fuzzy set theory was combined with conjoint analysis and used for measurement of the job satisfaction of hotel employees. The algorithm for solving of fuzzy job satisfaction has been designed. The attributes for evaluation of job satisfaction are determined and employees' opinions were recorded in the form of preference degrees. The statistical data describing satisfaction levels of hotel employees are collected. The membership degrees for each attribute are determined and using a similarity measure the closest of opinions of the employees and experts' are determined. These closest degrees are ranked, and the evaluation of job satisfaction has been performed.

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Keywords: Job satisfaction; fuzzy conjoint model; similarity degree.

1. Introduction

Recently a set of research works have been done on job satisfaction. Some of these studies use percentage and mean values for the analysis. Likert scale is used to study and evaluate job satisfaction of library staff at the University of North California[3]. The paper[4] uses Likert scale for evaluation of job satisfaction in South African University. The paper[5] uses five and seven points Likert scale to evaluate job satisfaction by analysing the measures of statistical mean, standard deviation and correlation. In[6] gives analyse of job satisfaction of college teachers. The

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use of artificial intelligence techniques in assessment and evaluation of performances of teachers has been considered in research papers[7,8] .

The analysis of job satisfaction of hotel employees is important in service business. Hotel enterprise is as an important part of hospitality. The level of job satisfaction of hotel employees has influence to their behaviour, and then has influence to the customer's satisfaction directly. Consequently the job satisfaction of employees affects the efficiency of the hotels. The satisfaction of employees increases their retention, productivity, a higher level of service quality[9]. There are few studies on job satisfaction of the hotel employees. The relationship between demographic characteristics of hotel employees and job satisfaction has been examined in[10,11,12]. These researches are basically based on statistical analysis.

Fuzzy set theory provides an excellent framework for describing imprecise meaning of preferences and their subjective nature. Recently a set of research works have been done for evaluation of job satisfaction using fuzzy set theory. The paper[13] used fuzzy set theory for evaluation of job satisfaction of academic staff. Fuzzy sets theory is also used for evaluation of students' perceptions on computer algebra[14], teaching quality[15], teachers' beliefs[16], credit card services[17]. In these researches, different approaches have been used for solution of job satisfaction problem.

The paper is organized as follows. Sec.2 gives descriptions of the fuzzy sets and fuzzy conjoint analysis. The conjoint model used for evaluation of job satisfaction of hotel employees is presented. Sec. 3 describes the experimental results. The flowchart of the algorithm used for evaluation of job satisfaction of hotel employees using conjoint analysis is presented. Sec. 4 includes comparative results of existing methods. Finally, in Sec.5 the conclusions are presented.

2. Fuzzy conjoint model for measurement of job satisfaction

Conjoint analysis was used to study preferred levels of individuals and relative importance of the multiple attributes of market goods[18]. Individuals can evaluate the multi- attributes using responses that are approximately interval in a measurement level. The requirements of one group may have a conflict with the requirements of other groups and evaluation these factors among diverse customer needs is critical. In our case, a multivariate technique is used to demonstrate how respondents develop preferences. Conjoint analysis allows to estimate the relative importance of selected attributes. Respondents express their preferences by providing the importance of the attribute.

The preferences of respondents are basically vague, uncertain and they have a subjective nature based on feeling individuals. Fuzzy set theory provides an excellent framework for describing preferences, their subjective nature. Due to subjective uncertainty, imprecise meaning of preferences, fuzzy set theory was combined with conjoint analysis. The variables used in job satisfaction are linguistic variables and their values are estimated by preferences of individuals. For example: satisfied, very satisfied, unsatisfied etc.

Fuzzy conjoint analysis proposed by Turksen and Willson (1994) is used for the analysis of consumer preferences in marketing[18]. Fuzzy sets are used to represent the values of the attributes evaluated by respondents. The membership degree of element y_j for the linguistic label representing item A is defined as

$$\mu_R(y_j, A) = \sum_{i=1}^{n} \left[\frac{w_i}{\sum w_i} \right] \cdot \mu_{F_i}(x_j, A) \tag{1}$$

where w_i is a score of linguistic value given by i-th respondent, $w_i \Big/ \sum w_i$ is the weight that represent level of satisfaction, $\mu_{F_i}(x_j, A)$ is the membership degree for respondent j for item A according linguistic label x_j=1,2,…,n, n is a number of linguistic term, A is an item/a question.

The membership degree represents the fuzzy set of response of the respondent. This fuzzy set is compared with fuzzy set defined by expert. The comparison is done using fuzzy similarity measure which is based on Euclidian distance of two fuzzy sets. The similarity measure is calculated as follows.