Behavioral Analysis Of Customers In Social Media Through Review And Profile Using Fuzzy Set Method

C. R. Marcelin Vasantha, Dr. V. Manimozhi

ABSTRACT: Customer reviews are the essential tool to gather the interests of the users. But extracting useful details from a review of a customer is a challenging task. Thus usefulness of the customer reviews are analysed in this work. The customer reviews for particular products are categorized under three major groups such as usefulness, irrelevant, harmful. Each category is allocated with the review score that are given by the customers. We have calculated the customer reviews using fuzzy set. It is one of the best and easiest methods. In fuzzy set, the values lie between 0 and 1 and it is called membership value. In this work, we calculate the customer reviews with the range of 0 and 1. The result is proved to be efficient in finding the usefulness of review than existing systems.

Keywords: Fuzzy set method, customer review, product

1. INTRODUCTION

EVALUATION OF SOCIAL NETWORK SITES

In day to day life internet is an important factor. It is the wide area network connecting across the world. In this work we study about social media networks which are used for business and entrepreneurs to achieve better result. Most of the business uses the social media networks to perform their relationship with customers or users. There are many social media like whatsapp, twitter, you tube, etc. Social media help us to improve the profit in the business level and also help us to spread the small business entrepreneurs. The purpose of using social media networks in the business is to communicate between the customers for getting feedback about customer service, product development and other systems.

1.1 BEHAVIOUR ANALYSIS

In this work, behaviour analysis of customer can be calculated which is expansive, massive, and indicative of user preferences, opinions, interests and relationships. The behaviour analysis collect overall reviews from the customers or users. In this work, we analyse the three types of users like IT person, student, and grocery shop man.

1.2 OPINION ANALYSIS

Analysing the opinion from customers is about gathering what they feel and think about the products in e-commerce websites. Social media also plays an important role to convey the opinions from customers. In this work, analysing the three types of users reviews when the user give the opinions like (usefulness, irrelevant, harmful) for particular products are made. In this work, section 2 contains literature survey, section 3 contains methodology and illustration, section 4 concludes the work.

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2. LITERATURE SURVEY

Malik Shahzad and Shabbir et al [1] proposed a technique to expose how social media impact on small business entrepreneurs. It also explained how to improve small business using social media applications. In day to day life all small business use the social media applications to popular their business improvement. This work describes how it can be utilized in a positive way. Hajra Waheed et al [2] defined a method to determine the user behaviour in social network sites. SNS are used to interact with the people. The relationship of activities have analysed by SNS with user behaviour. Finally the user behaviours are used in different interpretations. Qian Liu et al [3] proposed a fine grained opinion mining which is an aspect extraction method. This method extracts the opinion from opinion text as well as this method is based on lifelong learning framework. semantic similarity and aspect association based when the method is implemented. Santhosh Kumar .K .L et al [4] designed a technique to express and recognize the users’ emotion based on their reviews they are currently using the product which is called opinion mining and sentiment analysis. Hanqian WU et al [5] determined an extraction method i.e. fine grained product feature which is using three tasks such as extract the feature opinion pairs using dependency parsing based method, to determine the similarities to feature of the cluster using analyse the attributes of two features of synonyms with relation of opinion words and they determined finally an enhanced extraction method i.e. implicit feature using review (combined) information. Farek Lazhar et al [6] proposed an opinion extraction method. This method is use on dependency grammar to extract the feature opinion pairs of explicit as well as using the domain ontology to extract the opinion pairs of implicit features by exploiting individuals, attributes, relation between concepts. Support vector machine (SVM) is guided for classification task. Rajat Sharma et al [7] implemented an online portals ranking user reviews to enhance decision making process and user experience. This experience is used for other users. User reviews using credibility of the content author and content analysis. They implemented the scores which are used to rank reviews using cumulative weighted score. Vivek Panchal et al [8] proposed product review sentiment
analysis. TRS are used in Trustworthiness Evaluation. They
determined the sentiment classifiers in sentiment analysis
which are used in user review as positive, negative, neutral.
They computed the generation of a global reputation score
of the product, trust of the user who posts a review and
review's trustworthiness.

3. METHODOLOGY
Customers generally require quality data when they buy
new products. With the growing fame of the internet, online
feedback has become an essential proof for the customers
who are eager to have an idea about the quality of the
product. This study proposes a conceptual method and
hypothesizes a product and consumer particular features
affect consumers’ reliability on online feedback and hence
serve as important factors which govern the efficiency of
the online feedback. In this study, the proposed method
mainly concentrates in comparing the feedbacks with
consumer profile details. The consumer profile involves
many information like name, age, gender, marital status,
size of the family, income, caste, race, profession,
nationality etc. All the feedbacks obtained are compared
with the consumer profile after comparing the product
review with respondent's review, the product respondent’s
feedback is researched. The Weightage of review is
 calculated basing on the review comparison. The outcomes
turn out to be highly effective in analysing the relevant and
irrelevant consumer characteristics for the target market.
Finally it provide a usefulness of the customer review.

3.1 ANALYSIS OF REVIEW QUALITY
A method is devised for calculating the quality of
information in product reviews. The evaluation of review
quality is treated as a classification problem and thus
employs an effective information quality framework to
obtain review features. Three classes of review quality:

1. **High Quality Review**: A complete and timely
information about the product should be provided
by a high quality review which is helpful for other
customers to make a strong decision about the
product. It contains the maximum score 3 in the
table of review quality score.

2. **Medium Quality Review**: In a medium quality
review, though the content is relevant to a product,
yet it is not information enough. Though such
reviews are interesting, they hardly persuade
readers to make decisions. It contains the next
maximum score 2 in the table of review quality
score.

3. **Low Quality Review**: Only a small amount of
information about the product is seen in a low
quality review so the readers do not take strong
decision about the product according to this review.
It contains the minimum score 1 in the table of
review quality score.

**Review score**: The review score given below is based on
review quality.

<table>
<thead>
<tr>
<th>Review Quality</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>3</td>
</tr>
<tr>
<td>Medium</td>
<td>2</td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
</tr>
</tbody>
</table>

- The grand score is 3 in review quality
- 2 is the expected score

Depending on the customers review quality, observation
are made. The single user review quality is analysed here.
The review quality comes under any one of the aforesaid
category. Analysis result would be considered on the basis
of review quality, consumer profession and his behaviour.

3.2 ANALYSIS OF CONSUMER BEHAVIOR QUALITY
The following noticed consumer behaviour is analysed. Few
factors from consumer behaviour has been analysed. Each
factor is compared with consumer profession and consumer
review quality. The chi-squared method has been availed
for analysis process. The analysis result exhibits the
standard of consumer reviews. The factors are classified
into three type of behaviour that are:

3.2.1 Behaviour Data
Duration Usage – the duration he spent in the social media
regularly.

3.2.2 Influence
Number of friends on social media having met individually,
fans / followers / likes, comments. Posted contents on
social media, sharing the interaction, mode of interacting
with family and friends.

3.2.3 Searching behaviour
It gathers the behaviour of the customers in the social
media. It contains information about how the users
searched the product online, the time he spent to search,
the information he shared about the product and
discussions he made about the product.

3.2.4 Behaviour Score
Behaviour score is estimated from custom behaviour factor
completeness. Twenty factors from customer behaviour has
been determined and analysed. This factor consolidates the
consumer activities. For instance, if the consumers satisfies
behaviour factors, a score is assigned. Behaviour score is
estimated depending on the satisfaction level. It can be
estimated from the number of factors fulfilled by a
customer. If the customer meets 10 factors, then the
observed score is high. Availing the chi square method, the
consumer's final behaviour is calculated.

3.3 REVIEW COMPARISON
The weightage of reviews in the social networking site
(SNS) is involved in this study. To produce an effective
result regarding the product quality, this comparisons
becomes much significant. Each media platform has
its own unique method to give a genuine information about
the business to its potential customers. "There is an
increasing habit among the customers to proactively look for feedbacks which is encouraging for firms which has a positive online reputation”, states the firm in its estimation of information. Online feedback is compared to customers.

**Product category**

A product category is a kind of product or service. Product types are typically invented by a company or an industrial organization to form products. This involves a hierarchy of categories which resembles a tree structure. The product categories can be of a flat structure like a list of product types.

**Types of user category:**

- Relevant user
- Irrelevant user

The aforementioned two kinds are obtained from consumer profile.

**a) Relevant user**

The relevant user are the consumer who is more relevant to the product that is being purchased by him. The outcomes of the product quality are carefully examined and the efficient result is traced by the relevant user. This kind of consumer is known as relevant consumer. Relevant consumer review is termed as effective review, since they have gained a good knowledge about the product.

**b) Irrelevant user**

Irrelevant user is a consumer who do not have relevancy to that product. Such consumers are called as irrelevant consumer.

**3.4 FUZZY SET METHOD**

A fuzzy set is defined as a universe of discourse it consists of total ordering. That has a height of normal fuzzy set is equal to the maximal membership value, and having values of two arbitrary elements of membership grade value is greater than or equal to the two arbitrary boundary elements of smaller membership grade value. The pair \((U, M)\) is the fuzzy set where \(U\) is a set and \(m: U \rightarrow [0,1]\) a membership function. Universe of discourse (sometimes denoted by \(\Omega\) or \(X\)), which is reference set \(U\) and for each \(x \in U\) the value \(m(x)\) is called the grade of membership. The fuzzy set theory provides precise results in mathematic operations. The better model phenomena has achieved by this theory that like degree-vagueness and uncertainty.

**3.4.1 ILLUSTRATION**

In fuzzy system we have categorize the three types of resultant values. The resultant value lies between 0 to 1

**Table 2 Fuzzy system categorize**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful</td>
<td>0.8 to 1</td>
</tr>
<tr>
<td>Irrelevant</td>
<td>0.4 to 0.7</td>
</tr>
<tr>
<td>Harmful</td>
<td>0 to 0.3</td>
</tr>
</tbody>
</table>

**1. USEFUL**

**USER:** if the user is an IT based person
**PRODUCT:** laptop
**REVIEW:** “Laptop is in good quality but charger is not good enough. The standby time is very less and laptop emits more heat while charging”.

**Table 3 Fuzzy system review- Useful**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Product quality</td>
<td>0.8</td>
</tr>
<tr>
<td>Customer behaviour</td>
<td>0.8</td>
</tr>
<tr>
<td>Review comparison</td>
<td>0.8</td>
</tr>
<tr>
<td>Average score</td>
<td>0.8</td>
</tr>
</tbody>
</table>

- The review is useful because the user is an IT person. He/ she purchase the laptop So the product is related to the user.
- The user in customer behaviour is more importance because user has more friends list in social network and also user search about products in more time.

**2. IRRELEVANT**

**USER:** The user is a student
**PRODUCT:** Cookware
**REVIEW:** “The cookware is in good quality, but the coated metal content is white”.

**Table 4 Fuzzy system review- Irrelevant**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Product quality</td>
<td>0.5</td>
</tr>
<tr>
<td>Customer behaviour</td>
<td>0.4</td>
</tr>
<tr>
<td>Review comparison</td>
<td>0.6</td>
</tr>
<tr>
<td>Average score</td>
<td>0.5</td>
</tr>
</tbody>
</table>

- The review is irrelevant because the user is a student he/she doesn’t known about the cookware product. So the product doesn’t relate to the user.
- The user in customer behaviour is less importance because user has less friends list in social network and also user search about products in less time.

**3. HARMFUL**

**USER:** if the user is a grocery shop man
**PRODUCT:** Black gram
**REVIEW:** “The black gram is in less quality as well as high cost”. 
The review is harmful because the user purchase the item is very less quality and high cost so the product is harmful to the user.

The user in customer behaviour is too less importance because user have a too less friends list in social network compare than 2 and also user search about the products in too less time.

### Table 5 Fuzzy system review- Harmful

<table>
<thead>
<tr>
<th>Product quality</th>
<th>0.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer behaviour</td>
<td>0.1</td>
</tr>
<tr>
<td>Review comparison</td>
<td>0.2</td>
</tr>
<tr>
<td>Average score</td>
<td>0.2</td>
</tr>
</tbody>
</table>

### Table 6 Fuzzy system review Comparison

<table>
<thead>
<tr>
<th>NO OF REVIEW</th>
<th>USEFULNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>proposed</td>
</tr>
<tr>
<td>R1</td>
<td>45</td>
</tr>
<tr>
<td>R2</td>
<td>58</td>
</tr>
<tr>
<td>R3</td>
<td>62</td>
</tr>
<tr>
<td>R4</td>
<td>75</td>
</tr>
<tr>
<td>R5</td>
<td>90</td>
</tr>
</tbody>
</table>

Chi square method is used in existing system to evaluate individual user review and give a result about the product but the usefulness is very low. In this method individual user reviews are confused to determined and not effective. The chi square test is a vastly used non-parametric statistical test which illustrates the magnitude of variation between the observed data and the data expected to be attained with a specific hypothesis. The observed and expected frequencies are said to be totally coinciding when $X^2 = 0$ and as the value of $x^2$ increases, the variation between the observed and expected data.

In statistical tests, chi square test is the most essential and availed method in statistical tests. Fuzzy set method is used to evaluate the overall review and give a result about the usefulness. In this method usefulness is high performance, more effective.

### 4 CONCLUSION

In this paper we calculated the usefulness of the customer reviews in step wise using proposed method. Compare with the chi square method, our proposed method is more usefulness and effective. Fuzzy doesn't have complicated mathematical analysis works and also the values are easy to evaluate i.e. between 0 to 1. So fuzzy set method reduce the computation time. This work analyses the customers review depending on the types of review, which serves as a main advantage. The relationship of the customer with a product determines the interest of the customer towards the product, which enables product seller to have a better relationship with customer. After three phases of study, the final review result is estimated. Hence, it provides an exact result about the quality of the product.

### REFERENCES


