



Review on Brand Spam Detection Using Feature Selection

M.S.Patil*, A.M.Bagade

Pune University

Pune, India

Abstract— Word of mouth is one of the way of marketing, and its usage is increasing because today marketing becomes more expensive and less effective. In the past, word of mouth was limited to person-to-person communication. Today, the internet allows conversations which are spread all over the world and influence millions of people. This fact, changes way of marketing from traditional person-to-person communication to online reviews, which is considered a key factor for purchasing decisions in marketing. These reviews are important to customer and to companies or vendors. Customers use the reviews to make decisions regarding quality of product which they are going to buy. Companies or vendors use opinions to make a decision to increase their sales. However, all reviews are given by customers or users are not given with true intention. Some reviews may be given to promote or to demote the product. Some reviews are given on brand of product, and some are given related to advertising of another product. This fact, need to find how many reviews are spam or non spam. In this paper, the work is proposed for detecting reviews on brand spam detection using Feature Selection.

Keywords— Review spam detection, Opinion Mining, Features Selection.

I. INTRODUCTION

Web is a place to get information on almost on any topic. Web has changed the way the people or web users interact with each other. If we consider web application like online shopping which has great benefit to web users is the ability to read product reviews, written either by experts or fellow online shoppers. There are two types of reviews company experience reviews and product reviews. Company experience reviews are often solicited reviews that appear on third party sites, such as ResellerRatings.com, Epinions.com, and RateItAll.com. These reviews can occur directly after the order is placed or after the customer has received the product. Company experience reviews are “big-picture” and can include information on the merchant’s shipping, checkout process, return policy, etc. Product reviews are typically non-solicited, on-site reviews that can be found directly on the business website. These reviews usually focus on product quality, price, and value, and they are essential for increasing customers confidence. Customers read and compare product reviews when trying to decide which type of product they want to buy. Both product and company experience reviews are beneficial to merchants and customers. They give customers a voice and help for developing their confidence and trust, which is lacking in the e-commerce marketplace. They help businesses to establish credibility and to increase online sales. There are several benefits of reviews to customers. First, no need to call a person to tell about what they want to buy. Second, increase confidence, when customers buy products online. Third, conduct thorough research of review it help them to make informed purchasing decisions. Fourth, use own voice that is they can immediately share their opinion about a product or company in a significant and meaningful way. Fifth, engage in the online community forming a cycle of customer. Sixth, get a description of the product online.

On company side or business side, reviews has following benefits: First, increase sales and raise conversion rate. Second, understand customers-how they feel about your brand, what they like and dislike about their products, and how they can improve their overall shopping experience. Third, monitor and improve customer service. Fourth, increase traffic to website. Fifth, increase customer loyalty, once customers take the time to sit down and write a review, it is likely that they will feel a stronger sense of loyalty to company brand. Furthermore, opinions are important for management of reputation and brand perception of product. Reputation management means finding out overall view about existing brand. Brand perception means how brand perceived by the customer.

This paper arranged in following section. Section I gives an introduction to benefits of reviews to customer and to company. Section II gives motivation for reviews spam detection. Section III is a literature survey of review spam detection. Section IV gives proposed work of review spam detection. Section V discuss result of proposed work. Section VI conclude with opinion spam detection.

II. MOTIVATION

. Reviews has benefits to both customer and company which will be seen in section I. But these reviews are beneficial if the reviews posted are appropriately without any wrong intention. There are numbers of review site on which reviews can be posted about people, businesses, products, or services. But these reviews have following disadvantages which gives motivation to review spam detection: First, bad publicity, some reviews are fake given for promoting or demoting product, giving a comment on another review or opinion, giving advertising links, giving a thumb up or down opinion, giving exclamatory marks, etc. Public intention to give an opinion is not true. If a customer is unhappy with service or

products, then they may feel the need to vent their frustrations online and reference website in their review/comments. This could be potentially damaging, hurting to company reputation. Of course, a website won't prevent such things happening, but it might allow to monitor and be aware of it. Providing the best possible customer care and learning from clients feedback is the best possible course of action to deal with this problem. Second, reviews in the form of customer feedback, surveys and questionnaires can sometimes be too scientific and methodical to capture the human thinking and characteristics of customers. Rigorous analysis and interpretation of feedback or answers provided by customers might not provide the right kind of insights that businesses need to better serve customers. So there is need to sort out true opinion. Third, difficultly reaching the right people because of the nature of the internet and there are number of businesses already on the World Wide Web. It is difficult to reach the right target audience with any website for analysis of reviews given on the site.

Hence, there is a need to develop application that gives exact result to company while analysis and interpretation of reviews which are further helpful for managing reputation and brand perception.

III. LITERATURE SURVEY

Opinion Spamming or review spamming refers to "illegal" activities, e.g., writing fake reviews, also called shilling that try to mislead readers or automated opinion mining and sentiment analysis systems by giving undeserving positive opinions to some target entities in order to promote the entities and/or by giving false negative opinions to some other entities in order to damage their reputations. Opinion spam has many form, e.g., fake reviews (also called bogus reviews), fake comments, fake blogs, fake social network postings, deceptions, and deceptive messages.

A. Types of spam

In [12] N. Jindal et al. identifies three types of spam as follows:

- 1) *False Opinion*: Such a reviews contain false opinions on products and thus they are harmful.
 - Positive spam review: These reviews are expressing an undeserving positive opinion of a product with the intension of promoting that product.
 - Negative spam review: These reviews are expressing a malicious negative opinion on a product with the intension of damaging reputation of product[12].
- 2) *Review on Brands only*: These reviews not given on the product, but on the brand or manufacturer or seller[12].
- 3) *Non-Reviews*: Such a reviews contain no opinions. They affect automated opinion mining systems and not affected by person who is reading that review. There are two main types of this non-review:
 - Advertisements: In this type, reviewers list a set of product features or accessories. They are considered spam because they are not giving any opinion There are three main kinds of advertisements:
 - Same product: These reviews are advertising for same product by describing some features or use of the product, e.g., giving product specification standards.
 - Different Product: These reviews are advertising for a different product belong to different brand.
 - Different Seller: These reviews are advertising for a competing site selling the same product. The review promotes a different seller or website for the product, e.g., "This is a great product but you can bought from www.flipcart.com in less amount" [12].
 - Other non-reviews: This has following types:
 - Question or answer: The reviewers ask or answer questions or doubts about the product from other reviewers, e.g. "Can you agree with me".
 - Comment: The review comments on some other reviews, e.g., "This Review is too funny."
 - Random text: The review just contains some random text completely unrelated to the product, e.g., thumb up/down, smiley, etc.

B. Fact Consider To Detection Of Review Spam

To come out of problems of review spam we have to consider following points which are given in :

- 1) *Reviewer abnormal behaviours*:
 - Public data available from websites, e.g., reviewer id, time of posting, frequency of posting, first reviewers of products, and many more.
 - Website private/internal data ,e.g., IP and MAC addresses, time taking to post a review, physical location of the reviewer, etc.
- 2) *Review Content*:
 - Lexical features such as word n-grams, part-of-speech n-grams, and other lexical attributes.
 - Content and style similarity of reviews from different reviewers.
 - Semantic inconsistency: For example, a reviewer wrote "My wife and I bought this car ..." in one review and then in another review he/she wrote "My husband really love ...".
- 3) Product related features: E.g., product description, sales volume, and sales rank
- 4) Relationships: Complex relationships among reviewers, reviews, and entities ,e.g., products and stores.

C. Spammer Types

While finding spam review we can find two types of spammer Individual Spammer and Group of Spammer. The Hiding techniques used by,

1) An individual spammer

- Register multiple times at a site using different user-ids.

- Build up a reputation.
- Write either only positive reviews on own products or only negative reviews on the products of competitors, but not both.
- Give reasonably high rating, but write critical review.

2) *A group of spammers*

- Write reviews when product is launched to take control of the product.
- Every member reviews same product to lower rating deviation.
- Divide group in sub-groups so that each sub-group can spam at different web sites.
- Write reviews at random or irregular intervals.

D) *Way of Spam Detection*

Three different way to do spam detection are:

1) *Review centric spam detection*

- Compare content similarity.
- Detect rating spikes.
- Detect rating and content outliers.
- Compare average ratings from multiple sites.

2) *Reviewer centric spam detection*

- Watch early reviews.
- Compare review ratings of the same reviewer on products from different brands.
- Compare review times.
- Detect early remedial actions.

3) *Server centric spam detection*

We can maintain log of IP address, time of publishing review, site information, etc.

E) *Spam Detection*

In [1], is the first attempt to study of spam detection that gives two methods for spam detection as duplicate detection and spam classification. They consider duplicate review is positive reviews, i.e. spam and others are negative reviews, and they use it for training a model to find out non-duplicate review. But text content is not enough for identification so that they use Naïve Bayes classification to classify spam and non spam review. They find out three types of duplicate positive reviews that used as a spam: (1) duplicates from different user id on the same product, (2) duplicates from the same user id on different products; and (3) duplicates from different user id on different products.

In [2], they identify three types of spam reviews as untruthful reviews, review on brand only and non review, then they gave following strategy for spam detection as: First detection of duplicate and near-duplicates using shingle method. The detection of review on brand and non review is based on machine learning and manual labeled example. Finally, detect untruthful opinion spam that finds out three types of duplicates. In[3], identify eight criteria as Proportion of Positive Singletons (PPS), Concentration of Positive Singletons (CPS), Reactive Positive Singletons (RPS), Review Weighted Rating (RWR), Contribution Weighted Rating (CWR), Truncated Rating (TR), Sentiment Shift (SS), Positive Review Length Difference (PRLD), then find the score matrix with these criteria for all hotels. The aggregation methods are used as Singular value decomposition (SVD) and Unsupervised Hedge algorithm to obtain suspicious review. In[4], another work related to spam detection is finding unusual review pattern using Class Association Rules (CAR) that satisfy user given minimum support and minimum confidence constraints. In[5], propose three approaches for finding deceptive opinion. First, Genre Identification test has carried out for each review to find out relation frequency distribution of part of speech tags in a text and is depended upon the genre of text. Second, Psycholinguistics Deception detection uses a tool as Linguistics Enquiry and word Count (LIWC) to detect four categories: Linguistics processes to find functional aspects, Psychological Processes to find all social, emotional, cognitive, perceptual and biological processes and anything related to timing and space, Personal Concern considers any references to work, leisure, money, religion, etc. Spoken categories have primarily filler and agreement words. Third, Text categorization approach allows us to model to both content and context with a n-gram features.

In[6], this is recent work in review spam detection is concerned with a problem of singleton review, i.e. the reviewer written only one review using time series pattern discovery in that they find the correlation between rating and volume of singleton reviews because as the review increases, rating is increases or decreases dramatically. They give a hierarchical framework for robust Singleton review spam detection. In[7], proposes the method for untruthful review spam detection that done using text mining model and integrated into semantic language model and Non review spam detection that done by identifying different stylistic, syntactical and lexical features and SVM classifier applied to them.

F) *Spammer Group*

A spammer group is referred to group of reviewers who work together who work together writing fake reviews to promote or demote a set of target product.

In [8], proposes different behavior models based on review pattern. They focus on pattern of review content and ratings to define models, i.e. Targeting Product (TP), Targeting Group (TG), General Rating Deviation (GRD), Early Rating Deviation (ERD) and finally shows that spammer has more impact on rating. In [9], proposes the review graph to show the relationship among reviewers, reviews and store that reviewer has reviewed. It also proposes computation method to calculate trustiness of reviewer, honesty of reviews and reliability of stores.

In[10], concentrate on Detecting spammer groups who write the reviews on the different product because it is easier to detect than groups who write on the single product. To meet this, propose a technique consist of three steps as: First step is to find out candidate Spammer Group using frequent pattern mining by extracting review facts to find transaction with Reviewer Id and Product Id. Second step is to compute Spam Indicator values has been following eight criteria: Time Window (TW), Group Deviation (GD), Group Content Similarity (GCS), Member Content Similarity (MCS), Early Time Frame (ETF), Ratio of Group Size (RGS), Group Size (GS), Support Count (SC). Third step is ranking spammer group using SVM Rank. In [11], find out two behavior indicators first are Group Spam Behaviour indicators that consist of above eight criteria[10] and second, Individual Spam Behaviour Indicators has four criteria as Individual Rating Deviation (IRD), Individual Content Similarity (ICS), Individual Early Time Frame (IETF), Individual Member Coupling in a group (IMC). Again, this study uses frequent item set mining to find spammer group and the use a behavioral model that derived from the relationship between product, individual reviewer and group reviewer and lastly uses GsRank to rank the spammer group.

IV. PROPOSED WORK

The proposed work discuss the review on brand spam detection. These reviews are not posted on product, but on brand, manufacturer or seller of product. To find this spam, there is need to find features in reviews using feature selection algorithms. Feature selection algorithms are of two types: feature ranking and subset selection. Subset selection finds the set of all possible features for given data. We use decision tree to make a decision of reviews brand.

Algorithm: To Find Review on brand Spam Detection.

Input: Tree of set of possible features of the product in that leaf node giving more details features of its predecessor.

Output: A focus feature of reviews.

1. Find out the set of features from reviews that do not give wrong interpretation of phrases in the reviews.
2. For all possible combinations of features from reviews by checking from the root to leaf node of tree.
 - i. Find out features co-references and remove antecessor .
 - ii. Find out frequency of low referenced features and remove it.
3. If step two give features that match to the features in the tree, then according to level of a tree we say that review is on brand or not.

V. RESULTS

To find out whether review was given on whole movie or its features, firstly lexicon was created for movie information using API. Then lexicon are match with features of each review to decide the focus of review. For experimental purpose there is need of extracting movie information for lexicon creation and movie review for detection of spam review. Both data are extracted from website like www.rottentomatoes.com using API provided by website. The following Fig.1 shows lexicon created and Fig.2 shows spam detected for Turbo movie.

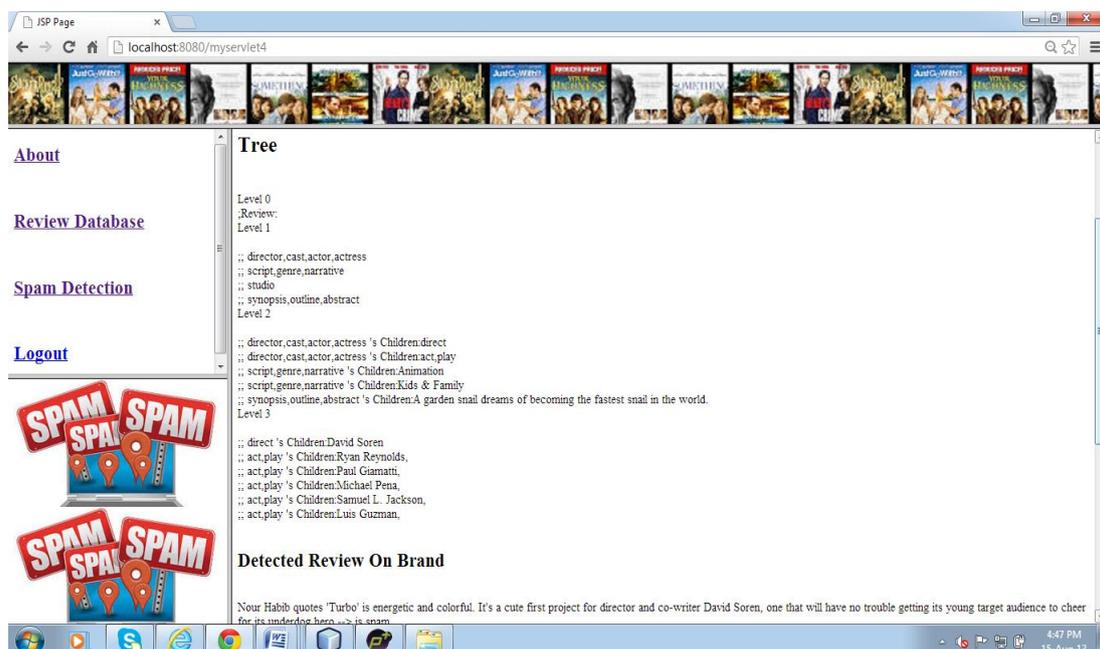


Fig.1 Tree created for Turbo Movie

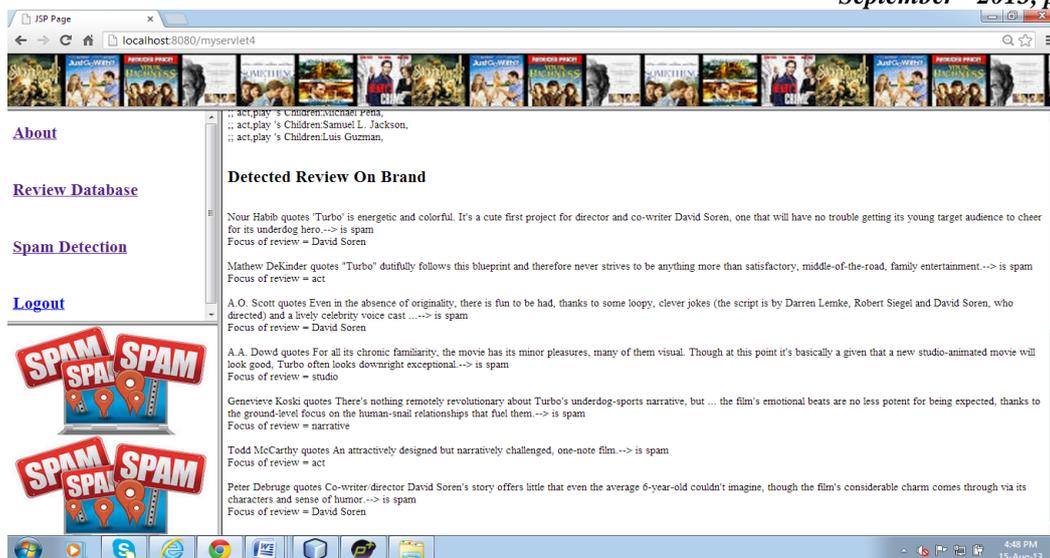


Fig.2 Brand spam detected in Turbo movie review

VI. CONCLUSION

This paper conducts research for online review spam detection of type review on brand. Web users as well as companies use reviews and opinion for decision making. But these reviews are come under disadvantages like bad publicity and then it is difficult to reach right people giving their opinion. It becomes necessity to detect opinion spam and opinion spammer. This paper mainly concentrates on review centric spam detection which gives more concentration on content of review. The result is useful to both customers to increase their confidence during purchasing any product, and to company to improve their sales performance using true reviews, to understand their customer and to improve the way of providing customer.

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