ISSN:0975-9646

Survey on Online Spam Review Detection Methods

Kalyani Adhav[1], Prof S.Z Gawali[2], Prof Ravindra Murumkar[3]

[1]*Research Scholar of Bharati Vidyapeeth University, College of Engineering, Pune, Maharashtra, India.,*
[2]*Department of Information technology, Bharati Vidyapeeth University , College of Engineering, Pune, Maharashtra, India*
[3]*Pune Institute of Computer Technology, Department of Information technologyPune, Maharashtra, India.*

Abstract-In the past, word of mouth for publicity of any product was limited to person-to-person communication. As the technology changes for publicity, way of traditional marketing also changes from person-to-person communication to online reviews. As a feedback these online reviews are important to customer and to companies or vendors. These reviews are helpful to make decisions regarding quality of products or services. Companies or vendors use opinions to make a decision for marketing strategies, performance evaluation of services or product, for improvement. However, the intentions of all customers or users are not true while writing reviews. Reviews may be written to promote or to demote the product. It is necessary to find out how many reviews are spam or genuine. Spam reviews are of various types like misleading review, non review, Brand only review. Review can be written by a single person or by group member's i.e. group reviewer.

This survey paper discusses about how different techniques like Factor Graph Model, Behavioral Footprint , Rating Consistency check, temporal Pattern Discovery model, GSRank.

Categories and Subject Descriptors:
Natural Language Processing, Text Analysis, Social and Behavioral Analysis
General Terms -*lgorithm, Experimentation*
Keywords- ***Spam Review detection, Group Opinion/Review Spam, Singleton Review, Feature Selection. Machine Learning Models, Text Mining, Classification***

1. INTRODUCTION

Here we focus, discuss and analyze the different techniques given in various papers to detect the spam review. Techniques like 'GSRank algorithm' [3] which performs the state-of-the-art supervised classification. 'Factor Graph Model' that detects spam reviews and reviewer [6]. Unsupervised learning method 'ASM (Author Spamicity Model)' that is used to detect the spammers by some behavioral distribution [1]. Single spam review detection by temporal pattern discovery using 'temporal curve fitting' and 'LCS (Longest Common Subsequence) algorithm' [6].

Review can be written by single person is called as singleton review and review written by group is group review also called as spammer group.

1.1 Types of Review Or Opinion

Three types of spam given in [6,7] are as follows

1.1.1 Untruthful Reviews: These reviews may include URL of any other product for commercial advertisement or it may be duplicate reviews which are positive, negative for product.

1.1.2 Brand only Review: These reviews are directly related to the brand.

1.1.3 Non Review: This can be roughly categorized into two main subtypes: (1) advertisements and (2) other irrelevant reviews containing no opinions (e.g., questions, answers, and random texts)

In general features considered for spam detection [6, 7]:

1. Review centric features
2. Reviewer centric features
3. Product centric features

2. RELATED WORK

2.1 GSRank Method [3]:

In this it includes state-of-art semi supervised supervised classification algorithm. By using GSRank, rank the groups based on their behavior to detect the spam.

To label the review or calculate the spamicity of review this assigns the point as 1 for spam, 0.5 for borderline, and 0 for non spam.

To study the feasibility of labeling and the quality of judging uses the Fleiss' multi-rater kappa method.

Author considers some indicators for spamming activities as below:

(1) Group Time Window (GTW):
(2) Group Deviation (GD):
(3) Group Content Similarity:
(4) Group Member Content Similarity (GMCS):
(5) Group Early Time Frame (GETF):
(6) Group Size Ratio (GSR):
(7) Group Size (GS):
(8) Group Support Count (GSUP):

All these features or group behaviors refer as $f1$ to $f8$.When group attains a feature $f > 0$, it is spam group.

Also it is necessary to consider the individual member behavior as given below.

- Individual Rating Deviation (IRD):
- Individual Content Similarity (ICS):
- Individual Early Time Frame (IETF):
- Individual Member Coupling in a Group (IMC):

2.2 Factor Graph Model

Detect the fake reviews fake reviewer by using Factor Graph Model [6]. Review and reviewer features are used for co-training algorithm. Supervised learning method is used.

Factor graph is design to detect the single spammer or group spammer.

Factor Graph Model: Designed by considering local feature of reviewer, fake value given by reviewer, feature of review, cross domain factor.

The fake review and reviewer detected by using the prediction function f

$$f: (V,E) \rightarrow (Y,Z) \qquad [6]$$

Where Y is set of reviewer fake value and the Z is set of review fake value.

To design the Review Factor Graph model three factors are defined (1) Local feature factor (2) group factor (3) cross domain factor

The Loopy belief Propagation algorithm is used to estimate or achieve near-optimal solution.

Reviewer related features gives more accuracy in detecting spam review.

2.3 Behavioral Footprints

This method detect the fake review by using Behavioral Footprints based on unsupervised model. The Author Spamicity Model is used [1].

Notations are used for Content Similarity, Maximum Number of Reviews, reviewing Burstiness, Ratio of first Reviews, Extreme Rating , Rating Deviation.

Proposed method , able to evaluate the result of unsupervised opinion spam using supervised classification without any manually labeling of data.

2.4 Temporal Pattern Discovery

The proposed method is based on multi scale multidimensional time series detection [6].

Statistics are collected which are strong indicator for singleton review.

Temporal curve fitting and LCS (Longest Common Subsequence) algorithm combined to find abnormal section in each time series.

If any singleton review is detected, scale down the window size, so exact abnormal point get detected and locate the suspicious review.

To detect the spam review, three step approach used, (1)For each dimension Bayesian change point detection algorithm to fit the curves, (2)After this Simple template matching algorithm is used to the fitted curves to detect bursty pattern, (3)After this sliding window finds the blocks in time series corresponding the burst in all dimension of time series .

3. CONCLUSION

Above discussed paper consider different features (attributes) as indicator for detecting spam reviews for single review or group review. Still there are some common attribute which help to identify spam review in all most all method can be group together consider for spam detection .

Labeling individual fake review is difficult than group review.

Standard rules are not available for labeling review.

4. FUTUREWORK

By modeling the reviewer behavior using other machine learning method on some common attribute will help to set standard rule for training dataset.

ACKNOWLEDGEMENT

This work is done with the support of Department of Information Technology of Bharati Vidyapeeth, Pune and Head of the Department Bharati Vidyapeeth, Pune

REFERENCES

[1] Arjun Mukherjee, Abhinav Kumar, Bing Liu ,Junhui Wang ,Meichun Hsu, Malu Castellanos, Riddhiman Ghosh, "Spotting opinion spammers using behavioral footprints", *Proceeding KDD '13 Proceedings of the 19th ACM ,New York, NY, USA ©2013 ISBN: 978-1-4503-21747*

[2] Arjun Mukherjee, Bing Liu, Junhui Wang, Natalie Glance, Nitin Jindal ," Detecting group review spam*," ACM Proceedings of the 20th international conference companion on World wide web, pp.*93-94,2011.

[3] Arjun Mukherjee, Bing Liu, Natalie Glance ,"Spotting fake reviewer group in consumer reviews," *ACM Proceedings of the 21st international conference on World Wide Web*, pp.191-200,2012.

[4] C. L. Lai, K. Q. Xu, R. Y. K. Lau, Y. Li, L. Jing, "Toward A Language Modeling Approach for Consumer Review Spam Detection," *Proceedings of the IEEE International Conference on E-Business Engineering, pp.* 1-8. ,2010.

[5] Lai,Chapmann C.L. Xu , K. Q.Lau, Raymond Y K; Li, Yuefeng, Song, DaWei, "High-Order Concept Associations Mining and Inferential Language Modeling for Online Review Spam Detection,"*2010 IEEE International Conference on Data Mining Workshops,pp.*1120-1127,2010.

[6] Detecting Review Spam," *Seventh IEEE International Conference on Data Maing*,pp.547-552,2007.

[7] Nitin Jindal, Bing Liu," Opinion Spam and Analysis," *ACM Proceedings of the international conference on Web search and web data mining*, pp.219-229, 2008.

[8] Sihong Xie, Guan Wang, Shuyang Lin, Philip S. Yu, "Review spam detection via temporal pattern discovery", *August 2012 KDD '12: Proceedings of the 18th ACM SIGKDD*

[9] Yuquing Lu, Lei Zhang, Yudong Xiao, "Simultaneously Detecting Fake Reviews and Review Spammers using Factor Graph Model", *WebSci'13, May, 2013 Paris, ACM978-1-4503-1889-1.*