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An Improved Automated System To Filter The Unwanted Messages In OSN User Wall

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ABSTRACT
Online Social Networking (OSN) is today's emerging interactive medium of communication. OSN helps an individual to keep in touch with their friends, family and the society. The recent problem of OSN is people posting vulgar messages that annoy other people on seeing them. The restriction should have been improved in displaying the unwanted messages posted on their wall. This paper presents a novel mechanism Collaborative Filtering to provide the access to the user to control the messages written on their own wall. The Extreme machine learning classifier is applied to automatically label the message with high prediction accuracy.

Keywords: Collaborative filtering, online social networking, extreme machine learning, text classification

INTRODUCTION

The Online Social Networks (OSN)[1][2][3] such as Facebook, twitter becoming more popular which allows an information exchange through social links[4][5]. The OSN introduced a new way of communication sharing and it allows connecting to various useful pages such as education sites, shopping, and business. The OSN service consists of several user each have their own profile, social links, educational websites link and other additional links and its user shares a several types of content like images, video's, audio's and text messages, Online Social Network is a key to keep in touch with friends and families.

The Online Social Network is maintained by dividing it into three blocks namely Social Network Manager, Social Network Application, and Graphical User Interface [3]. The Social Network Manager provides the general OSN functions such as profiles, relationship management. The Social Network Application provides the application of external social networks. Graphical User Interface [6][7] is the area where the user interacts with the system. The proposed work lies on second and third phase, OSN user wall messages are composed by short text [3], the common classification methods does not provide the accurate result due to short text, because they do not provide sufficient word occurrences. The Short text Classifier (STC) [8] should concentrate on extracting and selecting the set of characterizing and discriminant features. In this paper the short text is classified [9] by the machine learning techniques, based on its content it automatically assign with each short text message. The text representation [3] is the difficult process in the classification work. Appropriate set of features are extracted from the data set, the most appropriate features such as document property and contextual features for the short text is difficult to extract. The information filtering mechanism [3][10] is an important factor used for various purpose such as posting the information on their own wall, commenting the other post in private or public wall. Particularly information filtering is used to provide the access to the user to control their own wall from unwanted messages [3][11]. Now a day OSN becoming more popular, but still now its support for prevention of unwanted messages is limited.

This paper provides the access to the user to control the messages written on their own wall. The collaborative filtering [12][13][14] is applied in this work for the text representation to categorize[15][16][17] the text in a given document. The Extreme machine learning [18][19] mechanism is a fast learning process which is simple to use, this classifier is applied to automatically label the message with high prediction accuracy.

RELATED WORKS

Bharath Sriram et al (2010) proposed a system to overcome the limitations of traditional mechanism such as bag of words to classify the short text messages. The authors used a set of domain-specific feature which is extracted from the user profile from this feature author classifies the text into generic classes where each class contain various specification. From the various users, tweets are collected and from that input sample 97% accuracy is obtain in text classification.

Marco Vanetti et al (2013) present a system which is applicable in Online Social Networking that allows the user to control the messages posted on their wall. The author achieved this concept through a flexible rule-based system and a soft classifier machine learning mechanism. The content based filtering does the major work in this work that is the short text feature extracted effectively by the set of rules applied and the soft classifier automatically labeling messages in support of filtering process.

Yadav, s et al (2013) proposed a system to maintain a decent profile of a user by avoiding the indecent messages posted by the unknown users. The author used a text pattern matching system to filter the user open space. A social learning website is designed for this work and the unwanted text is extracted from some particular users and this collection is kept as a blacklisted vocabulary which allows the control to the user and pattern matching of text. Based on this pattern only the text is consider to post on the wall or not.

Gediminas Adomavicius et al (2005) proposed an overview of various current recommendation systems. The author describes a three recommender system such as content-based, collaborative, and hybrid recommendation approaches and their limitations. And some extension is added to these methodologies to improve their efficiency. The separate recommenders are combined and content-based characteristics to collaborative models and collaborative characteristics to content-based models. The author conclude from this recombination of the recommendation system the efficiency is increased by recombing the behavior of the methods.

The paper is organized as follows; section III describes the detailed explanation of proposed concepts. And section IV describes the data collection, performance of the classifier, relevant parameters and ability of user to control unwanted messages finally section V concludes the paper.

PROPOSED METHODOLOGY

The proposed system focus on providing an automated system which removes the indecent messages posted on the user wall by effective text representation and classification methods. This is done by giving the access to the user to control the message posting on their wall. The researches present a various kind of approach for text representation and text classification. Proposed work is constituted by the collaborative filtering and extreme machine learning algorithm. The filtering process is enhanced by the black list, and then the Short Text Classifier (STC) selects the short text features that force the Filtering rules to perform.

A. Short Text Classifier

The text classification procedure work well on the data set, even though it is very large. But classification of short text is such a difficult process. Because the OSN user wall messages are compose by short text, the common classification methods does not provide the accurate result due to short text, because they do not provide sufficient word occurrences. The Short text Classifier (STC) should concentrate on extracting and selecting the set of characterizing and discriminant features. In this paper the short text is classified by the machine learning techniques, based on its content it automatically assign with each short text message.

B. Text Representation

The text representation is the difficult process in the classification work. Appropriate set of features should have extracted from the data set, the most appropriate features such as document property and contextual features for the short text is difficult to extract. In the proposed work the text classification is also done by collaborative filtering, initially it does the feature extraction process and from that information it provide the recommendation.

C. Collaborative filtering

The collaborative filtering mechanism recommends the documents to the user based on similarities of other users, and it is mainly used for classification. The initial process is finding the user similarities and the next procedure is computing predicted rating and the final step is provides the recommendation to the user by applying the predictions.

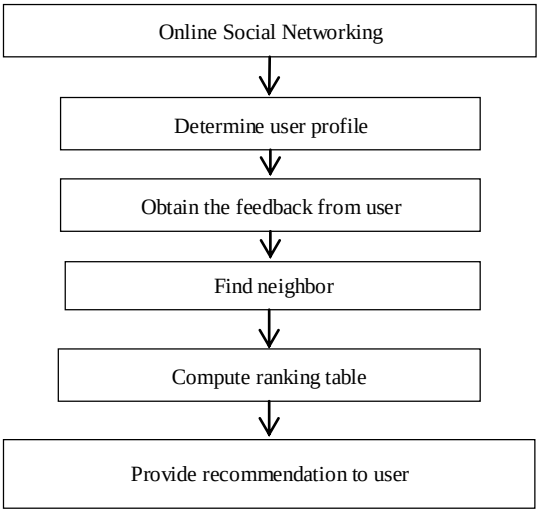

Figure 1. Collaborative Filtering process

To generate the prediction for a user the neighbors of that node is identified first. Then the correlations with other user are computed to prediction rating. In this work the constrained Pearson correlation is used.

$$correl(x_i, x_j) = \frac{(x_i - p)^T (x_j - p)}{|x_i - p||x_j - p|} \quad (1)$$

Where x_i and x_j are rating vector of two users and p is neutral rating. From the above equation the neutral rating which is subtracted from rating vector is removed to find the cosine similarity measure. The equation becomes

$$correl(x_i, x_j) = \frac{x_i{}^T x_j}{|x_i||x_j|} \quad (2)$$

Weight average of each neighbor's rating is calculated to compute the prediction for a user.The weight average is calculated by the following formula. From equation 3 we can predict a user's rate up to this level, by having large rating information we can predict the better recommendation to the other users.

$$NR_{i,j} = \frac{1}{|N(u_i)|} \sum_{u_k \in N(u_i)} correl(u_i, u_j) * r_{k,j} \quad (3)$$

Final stage is providing the recommendation by adding the p back to the prediction. If the user follows the recommendation and send any feedbackto correct the prediction the proposed system analyses the taste of the user.

D. Classification

The classification process of the proposed work is done by the extreme machine learning algorithm.

Extreme machine learning

Extreme machine learning (ELM) is an efficient and simple learning algorithm proposed by huang et al for Single Layer Feed-forward Neutral networks (SLFNs). ELM model is constituted by input layer, single hidden layer, output layer.

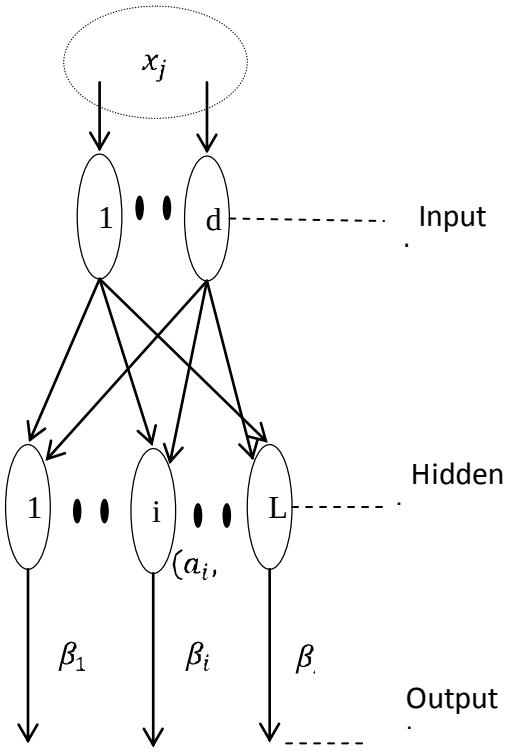

Figure 2. Extreme Machine Learning

The ELM structure is shown in figure 2. ELM is faster, ease of implementation than the other traditional algorithm and, ease of implementation, in figure 2, d is input layer nodes, L is random hidden layer nodes, β is output layer nodes, and f(x) is hidden layer activation function.

For Z training data set (ai, bi)where a∈ Rd1 and b ∈ Rd2, the SLFN with K hidden unit, in our proposed work the data set (ai, bi)refers the blogs and the OSN users, Rd1 333 training data set and Rd2 333 testing data set, the input weight is rating which is taken between 1 to 5 rating factor. Output weight is obtained by the following algorithm.

Algorithm for ELM

f(x): activation function
W_i: input weight
γ_i: Biases
β_i : Output weight
Z= (a_i, b_i)- input set
Begin
Find f(x) for Q hidden unit

$$\sum_{i=1}^{Z} \beta_i f_i(x_j) = \sum_{i=1}^{Z} \beta f(W_i.x_j + v_i) = o_j$$

Assign input weight randomly W_i and bias γ_i
Assign E= $f(W_i.x_j + v_i)$
Compute Eβ=S
Calculate $\beta = E * S$
End

E. Filtering Rules (FR)

The purpose of the filtering rules in proposed work is aim of diverting the filtering system based on two factors. One is notifying a message which must instead blocked or profile attributes detecting modification for defeating filtering system. The FR provides the specification of what content should not be post on the OSN user wall and allow the user to impose constrain on the message creator to avoid the unwanted messages.

FR can be applied based on several criteria, the proposed work impose a condition on user profile attributes. This criterion can be applied to either to young creator or creator with a political view. The message creator specification is CreatorSpec which denotes the set of OSN user. It has the one of the following form.

1. AN OP AV, is the first form where AN is user profile attribute name, AV is Profile attribute value and OP comparison operator compatible with AN domain
2. (s, RT, MIN_{Depth}, MAX_{Trust}), relationship constrain form. This form shows that All OSN users participating with s in a relationship of type RT, with a depth* and trust value, where depth should be higher than MIN_{Depth} and trust value should be less than MAX_{Trust}.

F. Blacklists

The next step of the proposed work is Black List (BL), this avoid the messages from unknown users. Based on the user list inserted in the BL, the system directly manages the process. A set of rules are given to improve the efficiency, this allow the users to specify rules regulating who has to be banned from their wall and how long. Therefore a user is banned from a wall and at the same time they can post on other wall. The BL provides the specification of who has to ban on the OSN user wall and allow the user to impose constrain on the undesired user to avoid the unwanted messages.

The specification of BL rule is (AT, creatorSpec, creatorBehaviour,S) where AT is the author of the OSN all who specify the rules. creatorSpec is a message creator specification that is explained in the filtering rules. The creatorBehavior consist of two component RFBlocked and minBanned. RFBlocked is measured by dividing the total number of messages where each user identified by FR and the number of message among those in total message. minBanned is computed by min, mode, window where min is minimum time in the time interval specified in window. Mode is user wall, S time interval that is identified by FL creatorSpec and creatorBehavior

EXPERIMENTAL RESULT

This section describes the data collection, performance of the classifier, relevant parameters and ability of user to control unwanted messages. Initially the data set is gathered by storing the different kind's words and these words collected from 7 different classes.

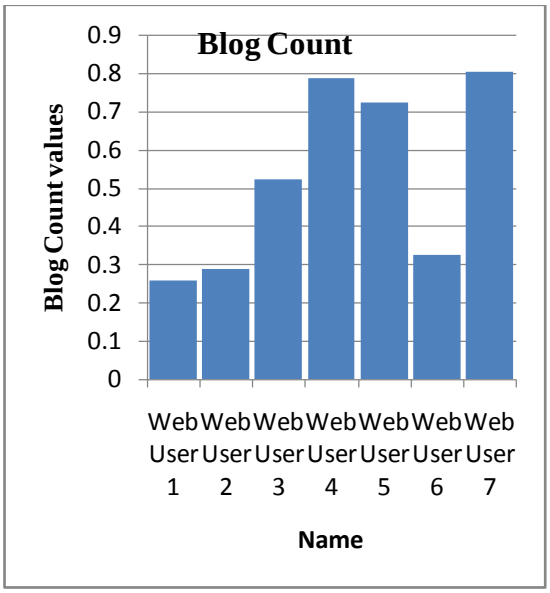

Figure 3. Report of Blog Count Measure

The above graph describes the report of blog count used by various users. Except Malar and Vinoth all are used a medium amount of blogs. These blog count measure for each user is stored and utilized for the ranking prediction process.

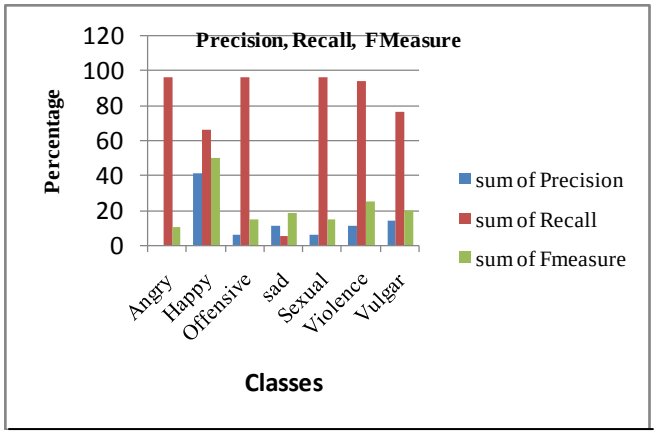

Figure 4. Total values of Precision, Recall and FMeasure

Fig. 4 shows the total values of Precision, Recall and FMeasure. From the above analysis the Recall value is higher for all kind of words than other two values and the precision value is zero in angry class. The precision value is used to evaluate the false positives and the Recall value evaluate the number of false negative and the last parameter FMeasure is the mean between the indexes.

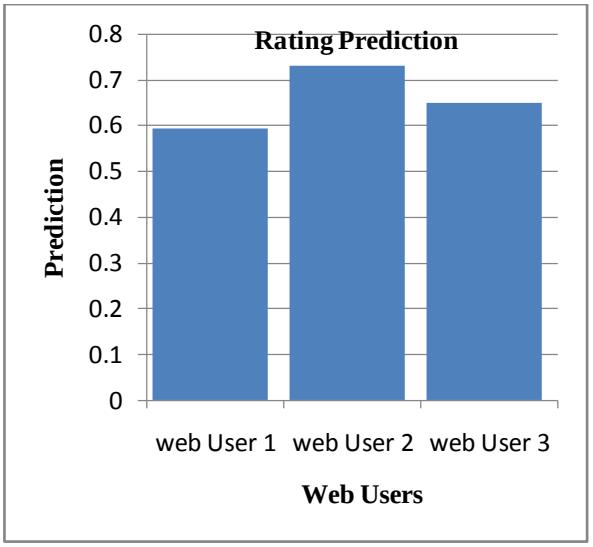

Figure 5. Ranking Prediction Measurement

The ranking prediction is calculated from the ranking table which is taken from the collaboration filtering result. Three users are consider in the final stage Anand, Devi and Ramya. Devi has higher ranking compared to other two.

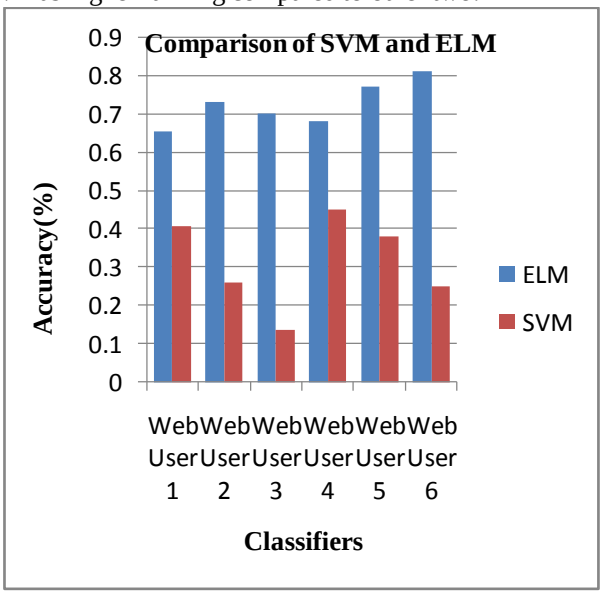

Figure 6. Comparison result of ELM and SVM

The efficiency of the proposed work is shown in the Figure 5. Compared to SVM the proposed classifier provides higher accuracy. The execution time interval is time taken for a single message to classify under different class and to filter the messages

Table 1. Classifier Accuracy Comparison

Web Users	Classifier Accuracy	
	SVM	ELM
Web User 1	40%	65%
Web User 2	26%	73%
Web User 3	13%	69%
Web User 4	45%	68%
Web User 5	38%	77%
Web User 6	25%	81%

Table 1 describes the Classifier accuracy. The proposed classifier ELM is Compared with the Existing SVM Classifier. While comparing the both Classifier the proposed ELM provide better accuracy for all kind of web users. Nowadays web users count is increasing rapidly. To show the Accuracy for the proposed Classifier this paper takes six web users. For these six web users the ELM provides the accuracy more than 65%.

CONCLUSION

Online Social Networking (OSN) is today's emerging interactive medium of communication. The recent problem of OSN is people posting vulgar messages that annoy other people on seeing them. The restriction should have been improved in displaying the unwanted messages posted on their wall. The proposed system focus on providing an automated system which removes the indecent messages posted on the user wall by effective text representation and classification methods. That is collaborative filtering and extreme machine learning algorithm where collaborative filtering does the feature extraction process and from that information it provide the recommendation. The extreme machine learning technique allows the user to post messages depend on the filtering rules.

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