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Fake Review Detection Using Machine Learning Techniques

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ABSTRACT: Customers increasingly rely on reviews for product information. However, the usefulness of online reviews is impeded by fake reviews that give an untruthful picture of product quality. Therefore, detection of fake reviews is needed. Unfortunately, so far, automatic detection has only had partial success in this challenging task. In this research, we address the creation and detection of fake reviews. First, we experiment with two language models, ULMFiT and GPT-2, to generate fake product reviews based on an Amazon e-commerce dataset. Using the better model, GPT-2, we create a dataset for a classification task of fake review detection. We show that a machine classifier can accomplish this goal near-perfectly, whereas human raters exhibit significantly lower accuracy and agreement than the tested algorithms. The model was also effective on detected human generated fake reviews. The results imply that, while fake review detection is challenging for humans, “machines can fight machines” in the task of detecting fake reviews. Our findings have implications for consumer protection, defense of firms from unfair competition, and responsibility of review platforms.

KEYWORDS: Fake reviews, Detection, e-commerce, eWOM, Marketing.

I. INTRODUCTION

In recent years, many researchers have developed methods to detect fake reviews using text mining techniques. Most such work has focused on analyzing one review or one reviewer at a time without considering the potential relationship between multiple reviews or reviewers. Online reviews and comments have become an important resource for various decision making processes, such as sale and buy decisions. The truthfulness of online reviews is thus critical for both buyers and sellers since fake reviews will affect customer’s decisions due to misleading description and deceptive selling. This can cause financial losses for innocent customers. Fake review detection has thus attracted a lot of attention. However, most shopping websites have only focused on dealing with problematic reviews and comments. Furthermore, the behaviour of fake reviewers is analyzed to develop possible reviewing patterns so as to detect fake reviews. The main aim of this project is to assist customers in selecting the best product by identifying phony reviews on E-Commerce sites using the review text, ratings given to product and other information. The project also performs the sentiment analysis on customer reviews to classify the reviews as positive or negative based on the text written in the reviews, ratings of the product etc.

II. LITERATURE REVIEW

1. E-commerce site’s fake review detection and sentiment analysis using ml technique (2022)

J Bharatkumar, Kartik M, Kiran Shetty, K Shreyas Pai, Sunil Kumar S. Naive Bayes Algorithm was used to build the fake review detection model, and the accuracy it provided is compared to that of the Random Forest Classifier. Customer can take right decisions while making online purchase through E-Commerce sites. The predicted result is being represented in the web interface which will be useful for the users to interact.



2. A framework for fake review detection in online consumer electronics retailers (2019)

Rodrigo Barbado, Oscar Araque, Carlos A. Iglesias. Ada Boost classifier has been proven to be the best one by statistical means according to the Friedman test. Reaching a maximum result of 82% when using Random Forest or Ada Boost classifiers.

3. A method for the detection of fake reviews based on temporal features of reviews and comments (2019)

Wenqian Liu, Jingsha He, Song Han, Nafei Zhu. Proposed system was developing an isolation forest algorithm to detect the outlier reviews of products based on the reviewing records of reviews and comments. This review outlier detection method detects the outlier products by temporal trends of reviews and comments.

III. SYSTEM STUDY

EXISTING SYSTEMS

The existing system is implemented by using with two language models, ULMFiT and GPT-2, to generate fake product reviews based on an Amazon e-commerce dataset. The NLP technology to generate a robust dataset for fake review detection and then compare manual and automated (ML algorithm) performance to detect computer-generated fake reviews. SVM is a classic baseline algorithm used in NLP tasks (including fake review detection). Using the better model, GPT-2, create a dataset for a classification task of fake review detection. A machine classifier can accomplish this goal near-perfectly, whereas human raters exhibit significantly lower accuracy and agreement than the tested algorithms. The model was also effective on detected human generated fake reviews.

DISADVANTAGES

- ✓ Assumptions about class conditional independence, which may cause loss of accuracy of the algorithm.
- ✓ Independence assumption may not hold for some attribute.
- ✓ Reliability remains an issue. It is not widely available as other forms of interface are often superior.

PROPOSED SYSTEM

The project also proposes to classify the reviews as positive or negative based on the text used in the reviews, ratings given to the product so on. Natural Language Processing is a field of AI in which computers understand, analyse and extract meaning from human language in a definite way. By using these developers can mould knowledge to perform tasks such as translation, extraction of relationship, analysis of sentiment, recognition of speech. It is used to Summarize blocks of text using Summarizer to extract the most important and central ideas while ignoring irrelevant information. It Uses Sentiment Analysis to identify the sentiment of a string of text, from very negative to neutral to very positive. Lexical Analysis is the main period of the compiler fundamentally it takes the changed source code from language pre-processors that are written as sentences. Naïve Bayes Classifiers are collection of algorithms based on Bayes Theorem. It is a family of algorithms which share a common principle i.e. every pair of features being classified as independent of each other. Naïve Bayes classifier helps to classify whether the review is fake or not. It is one of the simple and most effective Classification algorithms which helps in building the fast machine learning models that can make quick predictions.

IV. METHODOLOGY

INPUT DESIGN

Input design is one of the most important phases of the system design. Input design is the process where the input received in the system are planned and designed, so as to get necessary information from the user, eliminating the information that is not required. The aim of the input design is to ensure the maximum possible levels of accuracy and also ensures that the input is accessible that understood by the user.

The input design is the part of overall system design, which requires very careful attention. If the data going into the system is incorrect then the processing and output will magnify the errors.

The objectives considered during input design are:

- Nature of input processing.
- Flexibility and thoroughness of validation rules.
- Handling of properties within the input documents.



- Screen design to ensure accuracy and efficiency of the input relationship with files.
 - Careful design of the input also involves attention to error handling, controls, batching and validation procedures.
- Input design features can ensure the reliability of the system and produce result from accurate data or they can result in the production of erroneous information.

NATURAL LANGUAGE PROCESSING (NLP)

Natural Language Processing is a field of AI in which computers understand, analyse and extract meaning from human language in a definite way. By using these developers can mould knowledge to perform tasks such as translation, extraction of relationship, analysis of sentiment, recognition of speech. It is used to Summarize blocks of text using Summarizer to extract the most important and central ideas while ignoring irrelevant information. It uses sentiment analysis to identify the sentiment of a text, from very negative to neutral to very positive. Sentiment Analysis can be used to identify the feeling, opinion, or belief of a statement, from very negative, to neutral, to very positive.

NAÏVE BAYES CLASSIFIER

Naïve Bayes Classifiers are collection of algorithms based on Bayes Theorem. It is a family of algorithms which share a common principle i.e. every pair of features being classified as independent of each other. Bayes' Theorem finds the likelihood of an occasion happening given the likelihood of another occasion that has just happened. Bayes' hypothesis is expressed numerically as the accompanying condition. Naïve Bayes classifier helps to classify whether the review is fake or not. It is one of the simple and most effective Classification algorithms which help in building the fast machine learning models that can make quick predictions. It is a probabilistic classifier, which means it predicts on the basis of the probability of an object. Naïve Bayes classifier successfully helps in classifying the review into fake or genuine.

CALCULATION OF AGREEMENT VALUE

The next process was calculating the agreement value that illustrates how similar the feature and its opinion orientation resulted from the polarity generation process with the other reviews. Result similarity was in the range of (0,1), 0 means that the second review didn't have the same opinion orientation for any feature, 1 means both reviews had the same opinion orientation for all the features.

OUTPUT DESIGN

Output design is very important concept in the computerized system, without reliable output the user may feel the entire system is unnecessary and avoids using it. The proper output design is important in any system and facilitates effective decision-making.

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

- Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.
- Select methods for presenting information.
- Create document, report, or other formats that contain information produced by the system.
- The output form of an information system should accomplish one or more of the following objectives.
- Convey information about past activities, current status or projections of the future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

DATABASE DESIGN

Database Design refers to the design of the data organization, in the backup storage systems. The general theme behind a database is to handle information as an integrated whole. There is none of the artificially that is normally embedded in the separate files or applications. A database is the collection of interrelated data stored with minimum redundancy



to serve many users quickly and efficiently. The general objective is to make information access very easy, quick, inexpensive and flexible for the user. The design plays an important and crucial role for the successful performance of the system.

This is the first phase in system design and it should define which part of the system should be handled by computers and which part by users. In this phase, business data flow diagram (DFD) will be used in both requirement description and in other processes at the lowest level and consider the role of computer in each process. Looking at business DFD as a logical model essential to the system, system DFD can be better described as “half-physical”. This is because although it has formed the processes to be handled by computer, it hasn’t expressed the way to implement them, the creation and usage of programs and data files.

Basically, the processes of the system DFD are built on the basis of logical processes of relevant business DFD. In fact, if one of the business processes is transferred to the designing phase or as a computerized or non-computerized task, it is still named the same in both business DFD and system DFD models. In case of a logical process is designed to be partially computerized and partially manually implemented, it is required that any new processes in the system DFD must be traced in the processes of the business DFD from which we will make the apart later.

The most important consideration in designing the database is how information will be used. The main objectives of designing a database are:

DATA INTEGRATION

In a database, information from several file are coordinated, accessed and operated upon as through it is in a single file. Logically, the information are centralized, physically, the data may be located on different devices, connected through data communication facilities.

DATA INTEGRITY

Data integrity means storing all data in one place only and how each application to access it. This approach results in more consistent information, one update being sufficient to achieve a new record status for all applications which use it.

CONCEPTUAL DESIGN

The next step is to form a concise description of the data requirements using a high level data model. This description would be independent of storage requirements. This step involves identifying entities involves in the system, and the relationship between the different entities. Entities and relationships are depicted in the form of a diagram called the Entity relationship Diagram.

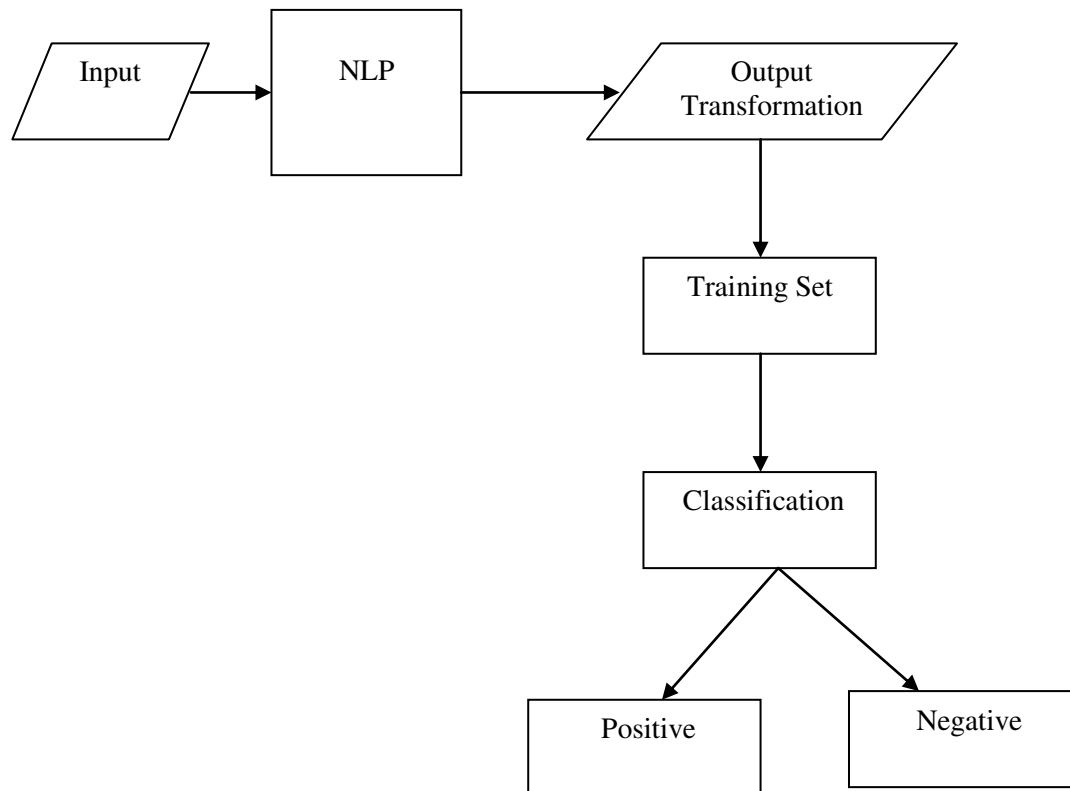
LOGICAL DESIGN

Most Database systems have an implementation level data model. Any good conceptual design techniques will specify the mapping from the Conceptual model to a variety of implementation models. The translation of entities and relationships to tables other database objects is done at this level. This process involves normalization and other Design Consideration.

PHYSICAL DESIGN

Some database systems allow the database administrator to make decision about Physical storage. These decisions would be usually driven by Performance Consideration.

ARCHITECTURE DIAGRAM



IV. CONCLUSION

In the world of e-commerce, reviews are the best signs of success and failure. Business that has good reviews get a lot of free exposure on websites and pages that have good reviews show up at top of the search results. Fake Reviews are everywhere online. Online fake reviews are the reviews which are written by someone who has not actually used the product or the services. Because of the cut-throat competitions, sellers are now willing to resort unfair means of making their product shine out .This work introduces some supervised machine learning techniques to detect fake online reviews and also be able to block the malicious users who post such reviews. Machine learning classifiers do much better in this regard, with almost perfect accuracy in detecting reviews generated by other machines. This implies that “machines can fight machines” in the battle against fake reviews. As far now, we have limited research focusing more on the content of the reviews. Future research is needed for experimenting with more datasets and platforms. Future work involves not only reviews, but also behavior of the person based on his other reviews on the same platform; as a result can come up with a better understanding of an individual behavioral pattern which can further increase the accuracy of determination and segregation of reviews.

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