TrueReview: An Objective Product Rating and Ranking Based on User Reviews using Ai and Data Analytics

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ABSTRACT

Since the moment human step into the high technology era, the world that people live in has changed subversively. As more and more unprecedented advancement being discovered, modern life of today's people is now incredibly convenience. However, when the internet has played a pivotal role in everyday life, among the information that we are getting, countless of them are fraudulent. This paper designs a website to filter the influence of fake comments made to the product. We applied our application to the most commonly used shopping platform, Amazon, and conducted a qualitative evaluation of the approach. With a large amount of trained data, the sentiment analysis program can filter the fraudulent and odd comments and to give a more accurate score regarding a product by reading through each comment. This will definitely help consumers determine whether a product is fine or not.

KEYWORDS

Product review, website, machine learning, JavaScript, HTML

1. INTRODUCTION

Online shopping is grueling, picking one from a giant product that fit the most can take a lot of time [1]. Imagine searching for a simple item and thousands of tabs emerged out, not a very pleasant experience [2]. Among them, there are things people cannot see that are behind the curtain. There are people making money by stealing other people's information; there are also people making money by posting false information. Fraudulent pieces of information are omnipresent on the internet, it is hard to not put yourself in a jeopardizing situation when you have no idea what your circumstance is. But people nowadays cannot really live without using an online shopping platform once in a while. So, filtering and summarizing a product is a delirious need on the internet. The ranking websites are now ubiquitous, there is IMDB [3] for movie and TV show rank, there is U.S. News for best university rank, but there is not really a shopping rank that can help customers make the right decision, so there comes The Real Shopping Ranks! There has to be some improvement in the shopping experience. A well generated informational website should be given to customers for them to make a better shopping decision. While making the information on shopping platforms more transparent, it is also a step forward for making a better cosmopolitan online community.

Some of the ranks generating techniques and systems that have been proposed to generate information, for such as movies shows or colleges, all around the internet, which allow the user to

see the translucent information. However, the biggest issue is that there is no rank is generated specifically for improving the shopping experience [4]. The only rank customers can use is by the shopping platform, which usually includes sponsors and fake promotions and is not trustworthy. Also, their implementations are usually biased, samples with more people buying them will increasingly get more reviews, and so on. Even if people trust the rank given by a shopping platform, the options for people are too less to see products from different perspectives; such as popularity, price, delivery time, are not available. Many times, customers may seek help from other buyers, but they are no believable either. Some of them are paid to write positive comments, or on the other way, paid to write extremely negative comments. Customers who really want to buy often swamp while reading long comments that seem to take forever. The tools that are available are so scarce, because of that, many people appeal that they would rather go shopping in store without being influenced by others. Internet is like a deep and dark mire, people with their own knowledge usually lead them to the wrong direction. A data- based rank is needed to be invented for customers as a reference when buying goods. This can not only save customers' time, help them make the right decision, but also, to discover the potential of sentiment analysis when applied to real life situation[5][6][7].

In this paper, we follow the same line of research by some of the present ranks like IBDM, US News, and Amazon's ranking. Inspired by shopping experience in Amazon, most of the data are extract from Amazon.com. There are some good features that can indicate some useful information about their goods, such as the large sample scale, pictures in different sizes, and score movements. Upon the great number of products in Amazon, we want to make it less messy than it is right now. Our goal is to provide a detailed, trustworthy shopping ranks that can allow customers to swiftly make the right shopping decision. Our rank can generate a non- biased rank by collecting product information and worth trust comments after the filtering program. The score can indicate whether a product is fine or not. This is meant to save customers time and prevent them from doing too much research and bought the product they do not actually like. Time is your money, efficiency is your life, it is especially important to do things fast in this modern society. Rank show everything, without jumping over tabs, a clean table will help people find the one they want.

In the application scenario, we demonstrate how machines can combine and generate information for shopping usage. We show the usefulness of our approach by a comprehensive case study on the evolution of sentiment analysis. Sentiment analysis is to processing natural language and study affective states from text. The machine has been applied sentiment analysis function and can give a positive/negative point for texts. By using that, machine can break down each part of the text and read through it to generate a summarizing average point. The un matching of comment and stars will no longer exist in the view of average point system. This allows customers to identify the quality without reading through all the comments.

The paper is structured as follows: Section 2 includes the challenges we faced during the experiment and designing the sample; Section 3 on the next focuses in detail on our solution in relation to our challenges; Section 4 presents the relevant details about the experimental structure, following by section 5 are related works to this research. And the end of the paper is section 6, which gives the concluding remarks, as well as pointing out the significance of our research and future works of this project.

2. CHALLENGES

2.1. CHALLENGE1

When trying to research in a new field, there will always be some issues that came up. Creating program and researching a topic requires patient. And I faced many unprecedented issues throughout the whole process. One of the issues that I struggled with was finding the crawling information. Since I am new to web design field, it took me long time to get use to the form of HTML. Also, as I was organizing the code, I often encounter the time when crawling fails. Because I was not familiar with the form, I faced many emerging problems. Fortunately, I overcome with challenges by keep trying. I can keep on doing what I was doing because I know that Sentiment Data Analytics Can offer people in real life a doable solution, bring them convenience and solve the present real-life problem. It is challenging to do something that are out of our comfort zone, but being able to contribute to the computational study and discover more potential about artificial intelligence is such a pleasure for us to do.

2.2. CHALLENGE2

When going into the real program steps, debug is a huge challenge. It happens sometimes that the program suddenly closed when it was working properly moment before. It took us hours to figure out different types of problems, even sometimes it could be little things like spacing in python. And this requires us to do a tremendous amount of independent research to construct this program. Working all the way to be able to finish the program took a lot of physical and mental strength, but the feeling of fullness when finish building the main structure is the feeling that cannot be told byword.

2.3. CHALLENGE3

As we go in depth to the research program, I noticed how lack my technical programming knowledge was. Building a intact program requires the programmer to be able to switch back and forth between different languages. So, in order to get the program on going, I spent much of time learning new programming language that I had not get in touch with. I spent a lot more time dive deeper into this topic and see the essence of it. It was difficult to balance school work and extra research study, though, I eventually made it. Besides all of the hard works, I learned many through the study. About how to do independent research and how to do a thing steadfast. Challenge will be over but the lesson from that will remain.

3. SOLUTION

The real shopping ranks is a computer-generated sentiment analysis ranking system [13]. With the navbar on the top, table, and detailed description on the bottom, product ranking detail will show up once keywords were typed and loading was done.

In current phenomenon, loading may take few minutes, and once the loading is finished, table with product details will be created along with each section Images, names, prices, and Amazon's ratings are utilized from the original product page. Other than that, the pivotal part of the rank is the sentiment score. Scores are generated by processing reviews using Sentiment Analysis. AI machine learning using the Textblob library can gives us a number range between 0 and 1 regarding to the positivity of the sentence segment [14][15]. With a large amount of trained data, we can filter the fraudulent and odd comments, and give a more accurate score using the product comments. Nonetheless, the score that shows on the website are not just about the sentiment score

given by our machine. Combining partial of Amazon score and sentiment score, the final score will be partially of both and will be a highly valued number for users. This will help consumers determine which product is truly the best.
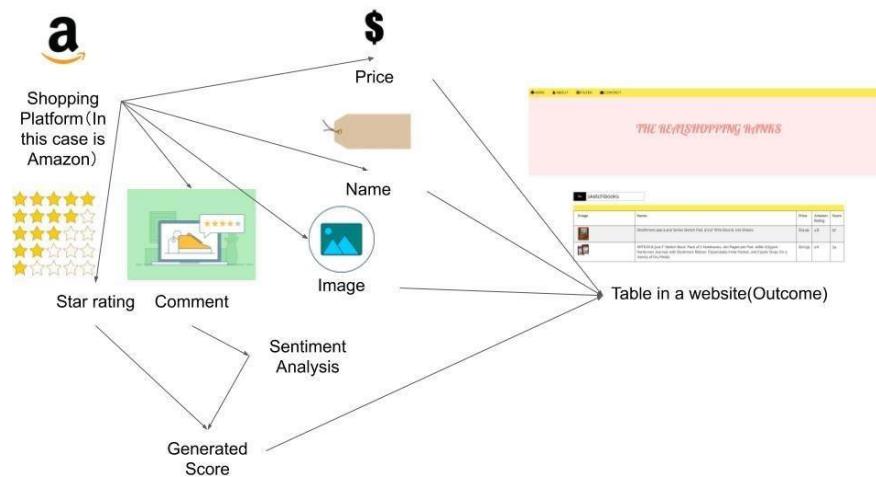

Figure 1: overview of TrueReview

The real shopping ranks were designed by using multiple coding languages, such as Python, HTML, JavaScript, and CSS. Each played an important role in this program. We also imported many different libraries to each of the programming languages which helps us more efficiently built the program. Python was mainly used in the crawling process; data were extracted from the Amazon shopping platform. We essentially used Textblob [8] and Beautiful soup [9] for most parts of our python code. Beautiful soup first helped us abstract the pieces of information so that Textblob can analyze textual information and turn it into sentiment points. The points were range between 0 and 1, 0 being the least positive and 1 being the most positive. Python was able to go into the website and captured any useful information for our project. HTML, on the other hand, played the most important role in our program.

In this platform, JavaScript and CSS were able to customize the outcomes of our program and transform it into useful work. Going into JavaScript, it can functionate all parts of the information and made the website became "live"; Liking many logical functions with data were implementing in here. CSS, on the other hand, format the website and display the functions and information to each proper place. In the final display, we would not be able to create this neat website without using many of the lovely functions from W3.CSS. On the demo picture below of our actual website, we contained three main sections and one main ranking function. Three sections are Home, About, how it works and Contact information. Each resemble the detail of the story behind the program. Beside some customized website outfit, the actual ranking table is in the pivotal part of the website page. It will be able to display once searching and loading was complete. To overview the process, the initial data information was captured by crawler using Python, beautifulsoup. Information were then processed by textblob library. And JavaScript connect the imported data with HTML.

Finally, the website was displayed by CSS with the helping from W3.CSS library. By using different sorts of methods and platforms, the real shopping ranks can only work properly and sending useful information to more users.
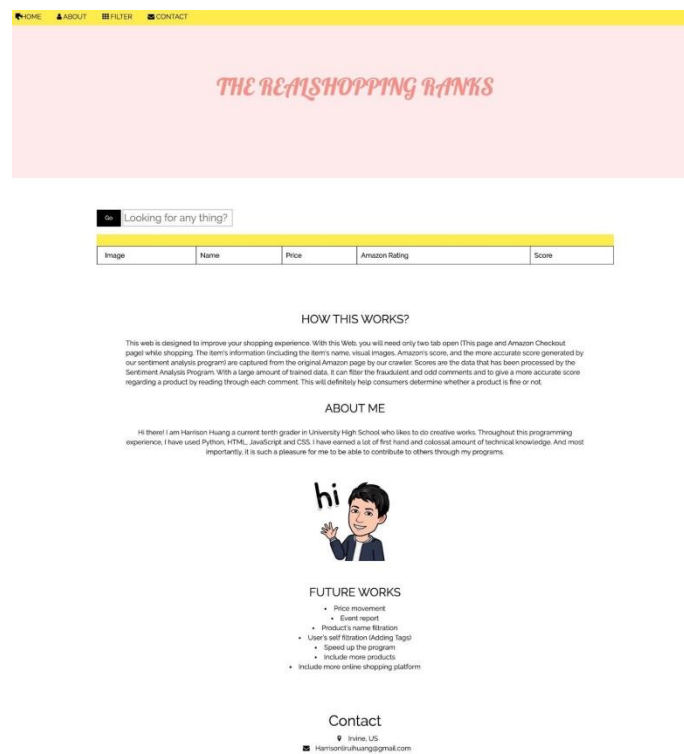
Figure 2: Interface of TrueReview

4. EXPERIMENT

The accuracy of the extracting data is extremely important. An analysis-based program can only be trustworthy when the data are extremely accurate. In our case, we want to know the percentage correctness of our crawling information. To do so, we hand record name, price, star rating of 10 products. We let the crawler to get those ten products' basic information to see if it is highly accurate. We will recode the correct number of information and report it in percentage.

After the running through the crawling process, the result was out. The data was 100% accurate compare to the hand record data. The crawling process is highly accurate. This helps us support the sentiment analysis process after the data collection, which make the analysis more accurate andmoretrustworthy.Theaccuracyofthedataisextremelyimportant,iftheinformationextract from the page is not exactly the same, then any more future analysis is not believable. Fortunately, our product information is accurate and our rating system is very authentic.

To test the accuracy of our program, we collected product comments from total of 100 products. Using our crawler, we were able to utilize the product information from the original shopping platform. But in this experiment, we focused on the product review data. We trained the machine and made it read through product comments and to compare the result with the original rating stars.

After the collection of data and the processing of the scores, the results came out. Most of the sentiment scores are lower than the actual score to our surprise. Because of the limitation of Amazon's rating system, there are only 5 stars to choose for rating a product. By using our sentiment system, we are able to range the score more widely and make the score more accurate and fit to what reviewers' original thoughts.

By doing the two experiment above, we were able to prove that our essential data and extensive data are accurate. The accuracy of the extracting data is huge. An analysis base ranking program cannot be trusted if the information given are fraudulent. The purpose of our program is to give accurate information and point out right directions for customers. We would not want our data to be inaccurate and trick the customers for second time. Although there are still space to improve, overall, we are very satisfied about how accurate our crawling and analysis system are.

5. RELATED WORK

Pranking with Ranking is a research paper written by Koby Crammer and Yoram Singer [10]. In the paper, they discuss about the evaluation of ranking system. They tried to find a more accurate ranking system while we are trying to create a sentiment based ranking system with the actual existed data. Our project focus more on generating product review rating which can give customers a better look at the products' quality. On the other hand, Koby and Yoram's work based on creating a new way of generating the ranks which covers more various field.

Adaptive ranking system for information retrieval is a research paper adapted by Shih-Chio Chang, Anita Chow and Min-Wen Du [11]. They talked about how importing customized weighted system and tags into ranks can make it more accurate. Our project, on the other hand set a 3:7 rate weighted correlation between sentiment score and amazon's score. We can easily provide a general information while their project can give more possibility to customers and make customers decide what kind of rank they want to see.

The team that research on Ranking products by mining comparison sentiment dive deep in the sentiment analysis in ranking products [12], and this is actually very similar to what we are doing. In their program, provide different ways of ranking a product instead of actually doing a program. We, on the other hand, extract all reviews and average them. In their research, they conclude multiple ways that sentiment analysis can be involved into ranking system. And for us, although our program is not perfect, but we were able to actually apply sentiment analysis to ranking system and send useful message to other people.

6. CONCLUSION AND FUTUREWORK

To conclude, there many gruelling issues in modern shopping platforms, customers may spend hours finding a product that fits them the most. The main reasons are that the unrelated products, fraudulent comments, and too many buying options slow down their shopping speed. Time is even more valuable than gold, in wanting to help others saving time and realizing how bad online shopping experience in our daily life is, we proposed a sentiment-based ranking program. We wanted to conclude product information from multiple websites into one single table as well as a generated sentiment score. By using HTML, Python, JavaScript, and CSS, we were able to construct the main structure of the rating system. After crawling data by Python and Textblob, analysis text using beautifulsoup we turned the piece of information into an actual website by using JavaScript, HTML, CSS, and W3.CSS library. Along with wrapping up the program, two experiments were being done. One proof that our crawling information was accurate and other proof our sentiment score being real and trustworthy. Since we are doing a data-based ranking analysis program, we will need to be giving out high valued information. A shopping program will not be successful if it cannot give accurate information and point out the right direction for customers. By performing experience, we were able to prove experimentally that our program is believable.

In the current state, our program made many compromises which led to limitations of our program. The running speed of our program is at a low level. Because of that, we can only have two products comparison in one time, which limit many of the potential possibility of our program. Similarly, because of the loading speed, we cannot let our program to complete reading every single comment under one product, which made the sentiment score a little bit off of where it should be.

Speeding up our program is the main future work we were going to try to solve in the future. The process of crawling data, processing scores, and loading the page takes a lot of time, but we must optimize our algorithm to speed up our program. With the speeding up of the program, we could make the website more valuable and discovering its more potential possibilities.

REFERENCES

[1]   Limayem, Moez, Mohamed Khalifa, and Anissa Frini. "What makes consumers buy from Internet? A longitudinal study of online shopping." IEEE Transactions on systems, man,and Cybernetics-Part A: Systems and Humans 30.4 (2000):421-432.

[2]   Morales, Lisa. "Method and System for Online Shopping and Searching For Groups OfItems." U.S. Patent Application No. 12/907,617.

[3]   Dodds, Klaus. "Popular geopolitics and audience dispositions: James Bond and the internet movie database (IMDb)." Transactions of the Institute of British Geographers 31.2 (2006): 116- 130.

[4]   Khandelwal, Shashikant. "Method for relevancy ranking of products in online shopping." U.S. Patent No. 8,510,298. 13 Aug.2013.

[5]   Bakshi, Rushlene Kaur, et al. "Opinion mining and sentiment analysis." 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom). IEEE,2016.

[6]   Liu, Bing. "Sentiment analysis and opinion mining." Synthesis lectures on human language technologies 5.1 (2012):1-167.

[7]   Maas, Andrew, et al. "Learning word vectors for sentiment analysis." Proceedings of the 49th annual meeting of the association for computational linguistics: Human languagetechnologies. 2011.

[8]   Loria, Steven. "textblob Documentation." Release 0.15 2(2018).

[9]   Nair, Vineeth G. Getting Started with Beautiful Soup. Packt Publishing Ltd,2014.

[10] Crammer, Koby, and Yoram Singer. "Pranking with ranking." Advances in neural information processing systems.2002.

[11] Chang, Shih-Chio, Anita Chow, and Min-Wen Du. "Adaptive ranking system for information retrieval." U.S. Patent No. 5,321,833. 14 Jun.1994.

[12] Sun, Jian-Tao, et al. "Ranking products by mining comparison sentiment." U.S. PatentNo. 8,731,995. 20 May2014.

[13] Edlund, Stefan B., et al. "Metadata search results ranking system." U.S. Patent No. 6,718,324. 6 Apr.2004.

[14] Michie, Donald, David J. Spiegelhalter, and C. C. Taylor. "Machine learning." Neural and Statistical Classification 13.1994 (1994):1-298.

[15] Alpaydin, Ethem. Introduction to machine learning. MIT press,2020.