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Abstract—In this paper, we are proposing an advanced recommendation system which per□orms natural language processing on the user reviews and gains a sentiment score □or various aspects o□ the product/service. The sentiment score based on user reviews provides a more □ine grained result □or the aspects rather than coarse grained approaches like collaborative □iltering which is purely based on users rating. Such classi□ied recommendation can be used to recommend products/services to users based on their pro□iles and also gather the negative sentiments about certain aspects to report areas o improvement to the businesses selling the products/services.
Keywords—Natural Language Processing, Sentiment analysis, Opinion parsing

I. Introduction
The Internet is booming and the state-o□-the-art e-commerce has now spread over every □ield. This boost has a major contribution □rom the rise o□ smartphones and their availability □or the masses. It has essentially brought the user close to the market because o□ the □acility o□ providing instant reviews and ratings. There is a multitude o□ products and services available on various e-commerce websites. Choosing the best among the better products available on the Internet is observed to be an arduous task.
This was the dawn o□ the recommendation systems which give the personalised product recommendations to the users. Many approaches have been explored and implemented in order to make recommendations more accurate and relevant to the user pre□erences(eg: Collaborative Filtering). However most o□ these approach considers only the □eatures o the product and not how those □eatures are rated by the users. Natural Language Processing(NLP) can be used to per□orm sentiment analysis on user reviews to extract sentiment toward the individual □eature(aspect).
II. Literature Review
The literature survey involved looking □or relevant IEEE papers published by students or well renowned authors. These papers played a role in giving us a guideline □or our approach toward the problem and an overall depth o□ the problem and its extent. It also helped us to get an idea about the extent to which the problem has been perused and dealt with. We were also able to de□ine the scope up to which our proposed system will take care o□ the issue. The challenges □aced by the authors o□ these papers gave insights and will help us to plan mitigation strategies i□ we □ace similar challenges in the implementation.
The key words or phrases we used to □ind the most relevant research papers are Natural Language Processing, Sentiment analysis, Opinion parsing, Aspect Extraction, Sentiment

Extraction.
In a paper, state-o□-the-art studies into two principal branches: review-based user pro□ile building and review-based product pro□ile building. In the user pro□ile sub-branch, the reviews are not only used to create term-based pro□iles, but also to in□er or enhance ratings. Opinions with a broad perspective can □urther be exploited to extract the weight/value pre□erences that users place on particular □eatures. In another paper, a novel approach to introduce aspect-based sentiment analysis into recommender systems is proposed.

The aspect o□ the product using the topic model is extracted and then the aspect-speci□ic sentiment words are identi□ied using the SentiWordNet (a sentiment lexicon). The use the result o□ sentiment analysis is then used to make user interests model and the product model. By comparing two models o□ each user-product pair, we obtain the similarity o□ the user's interest and the product.

The sentiment analysis system proposed in a paper per□orms two key □unctions, aspect extraction and aspect sentiment classi□ication. Aspect extraction has the aim to get the sentiment targets on which some sentiments have been expressed. These targets are usually di□ferent aspects o□ entities (e.g., products or services), which are products in our context. Aspect sentiment classi□ication classi□ies whether the sentiment expressed on an aspect is positive, neutral, or negative. The main advantage o□ this new model is the novel additional □unctionality o□ providing not only recommendations o□ items to users, but also recommendations o□ the most valuable aspects that may enhance user experiences with items.

III. Traditional and Existing System
Traditional Recommendation methods usually □ocus on utilizing product □eatures obtained □rom structured behaviour in□ormation, which only contains coarse grained user interests. The sentiments in textual reviews are not considered.

IV. Proposed System
The goals o□ our new proposed system includes two perspectives viz., customers and businesses. The customer perspective includes recommendation o□ products based on customer interests, pre□erence based product rating, noti□ication related to new developments based on user interests and user or product pro□ile building. The other perspective includes overall sentiment towards product in market, suggested areas o improvement □or product, □lexible report generation templates and current trends in the market.
Advancement that we are trying in our system is to provide accuracy by comparing to existing purely □eature based recommendation systems,, robustness by developing the ability to handle large datasets with minimal slowdown or crash, usability by making user inter□ace minimalistic with well spread-out □eatures having responsive layout and scalability by improving the ability to extend the system to a distributed environment.

Our new proposed system mostly divided into two main components viz., Data Preprocessor and Opinion Parser.

Fig 1: Block Diagram o□ Aspect and Review Based Recommendation System

In data preprocessing, we check □or opinion spamming by parsing content o□ all reviews

□or the same product, □or similar selective products. I□ any reviews are □ound to have exactly matching content, we mark all such reviews as irrelevant. Further we calculate the weight o□

Fig 2: Data Preprocessor

use□ulness according to the ratio o□ the number o□ people who have □ound the review use□ul to the number o□ people who have viewed the review.

Data preprocessing also includes grammar legitimacy check based on the content o review. The sentence is segregated into di□ferent parts o□ speech such as nouns/pronouns, verbs, adjectives, etc. Syntactical rules are applied to the sentence and the order o□ these words is checked. I□ there is an unusually high number o□ consecutive adjectives (sentiments), the review is considered to be □ickle and the weight o□ this review □alls considerably.