Startoff

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Introduction

In Current scenario accessibility to e-commerce technology has become a necessity. However, small industries are not able to compete with large industries as they neither have the capital or the technological know-how for e-commerce sites. Here we are creating a platform where small-scale industries can market their products to the public.

Motivation

In current pandemic ravaged scenario, small businesses have seen a decrease income. However, big e-commerce sites have seen massive rise in income. So, this points to e-commerce being necessary for propelling the small industries.

SCOPE of the Project

This project's aim is to provide a e-commerce solution for the small-scale industry in the given time frame. The solution provides analytical tools for improving the business. Inventory management system manages their inventory. It provides platform where learning material can be shared to improve their knowledge. It provides a platform where investors can invest in the platform. It digitizes the market for these businesses allowing them to reach greater number of customers.

Methodology

MERN stack is being used to build the web application. It is a full-stack solution following the 3-tier architecture: MongoDB as database, ReactJS as frontend and NodeJS as backend.

Using apriori algorithm to calculate the items user might buy based on user's own history of orders. The system maintains a set of orders being bought together. From this the system finds frequent item dataset and their support value, with a threshold value for support as 4. Any frequent item set with support greater than 3, the system is using them to find if user has bought any of the item from the set. If has bought then, we recommend other items in the set.

Recommender system makes prediction based on users' historical behaviours This service allows consumers to get recommendation for buying new products based on their previous data. After much analysis, we decided that user-based Collaborative Filtering with explicit ratings of items would be a better approach to our product recommendation service.

$$r_{ij} = \frac{\sum_k Similarities(u_i, u_k) r_{kj}}{number\ of\ ratings}$$

Eq.:Collaborative Filtering

$$r_{ij} = \bar{r} \frac{\sum_k Similarities(u_i, u_k)(r_{kj} - \bar{r_k})}{number\ of\ ratings}$$

Eq.:Collaborative Filtering (Weighted Average Rating)

JWT token is being used as a platform for authentication, as it is an open standard which defines a secure and contained way of transferring information between the server and interface.

The platform provides business analysis service which allows the forecasts using time-series analysis by extracting profit and cost price from user data. The shipping management service also provides Geo-location service which allows for accurate tracking of products. Equations below are used for calculations.

$$Net\ Present\ Value = \sum Present\ Value\ of\ Future\ Benefits - \sum Present\ Value$$

$$Benifit - Cost\ Ratio = \frac{\sum Present\ value\ of\ future\ benefits}{\sum Present\ Value\ of\ Future\ Costs}$$
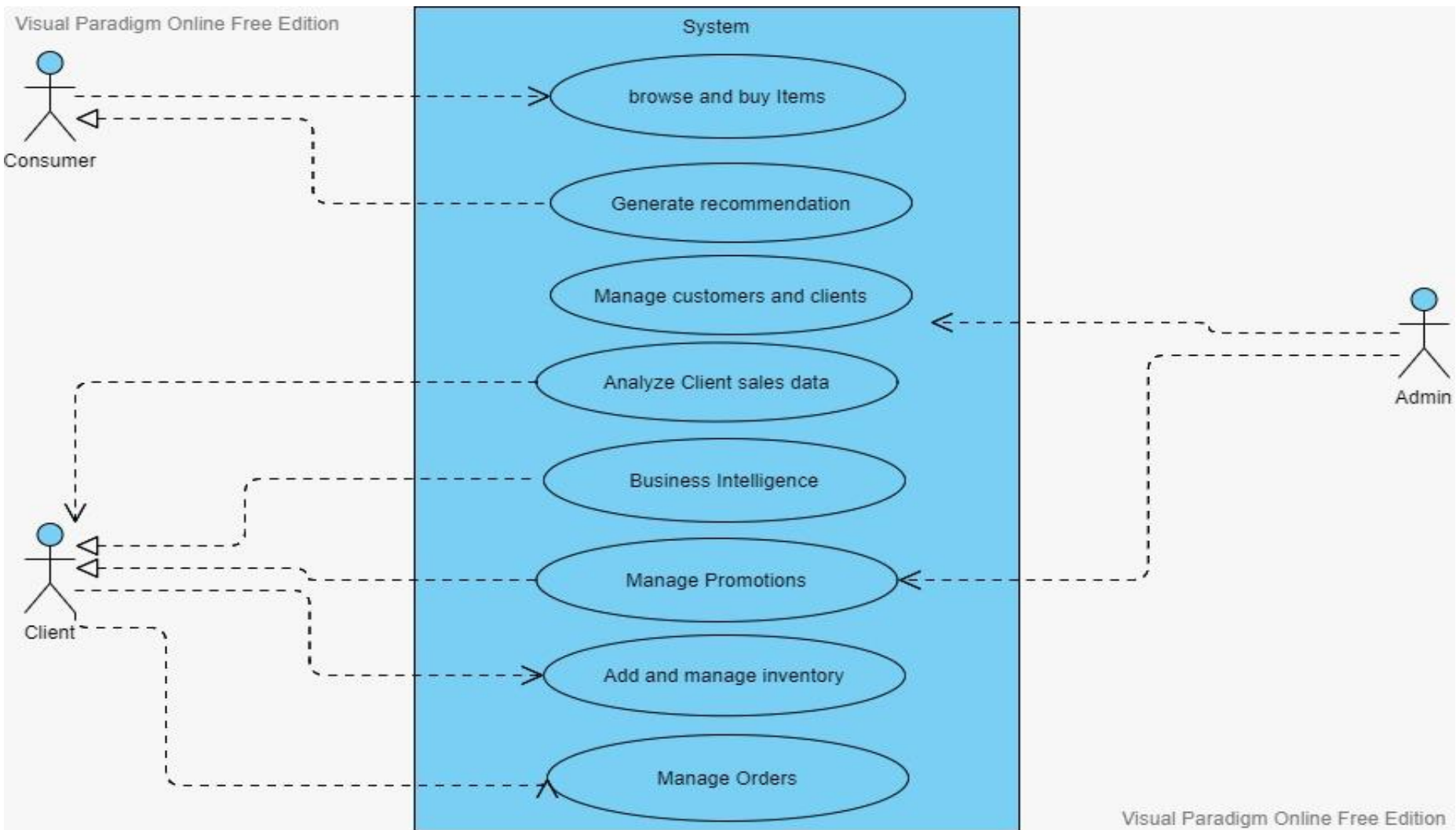

Fig: General Use-case diagram

Results

Product recommendation system was made which displayed the top recommended products to the users. It formed a n*m matrix; n is the number of users and m the number of products. We used PCS dimensionality reduction to resolve those users without any linked products. After that we have found similarity for all user with each other's rating values. This gave the predicted rating valued for non-rated items. After sorting then for each user, we recommend that product to the user.

Using MERN stack to decrease the network load, decreasing the page load and increasing functional speed for better usability. JWT authentication also helps in this regard with its low token size and low latency.

JWT Authentication token size	438 Bytes
JWT Authentication token latency	42ms
Product Recommendation latency	27ms
Product Recommendation data size	0.7 Kilo Bytes
Time Series Analysis	260ms
Stock market Analysis	1800ms

Time-Series analysis was used to find and map the profits.

Fig.:Time-Series Analysis

This diagram shows the data of a business and how their profit has changed with time

GeoLocation was used to take user's longitude and latitude as to empower area related functionalities User's data: current position, altitude, velocity, direction of movement, etc can be tracked and used for delivery services. This was done usng JavaScript API pilot for this function. Location can only be tracked after user consent is given.

[{"productId":5,"productName":"product5","image":"img1.jpg","desp":"description of product","price":300,"sellerName":"seller1","sellerId":"1","sellerContact":"9841023456","stock":100,"rating":5,"reviews":[{"reviewid":1,"userid":6,"username":"user","userimg":"img1.jpg","rating":3,"reviewDesp":"something something","reviewDate":"11/12/2021"},
{"reviewid":2,"userid":5,"username":"user2","userimg":"img1.jpg","rating":4,"reviewDesp":"something something","reviewDate":"11/12/2021"},
{"reviewid":3,"userid":3,"username":"user2","userimg":"img1.jpg","rating":5,"reviewDesp":"something something","reviewDate":"11/12/2021"}],"offers":[{"offerid":1,"offerDetails":"discount on this product now","expDate":"11/12/2025"},{"offerid":2,"offerDetails":"this service available","expDate":"11/12/2025"}]},
{"productId":6,"productName":"product6","image":"img1.jpg","desp":"description of product","price":300,"sellerName":"seller1","sellerId":"1","sellerContact":"9841023456","stock":100,"rating":5,"reviews":[{"reviewid":2,"userid":2,"username":"user2","userimg":"img1.jpg","rating":4,"reviewDesp":"something something","reviewDate":"11/12/2021"},
{"reviewid":3,"userid":3,"username":"user2","userimg":"img1.jpg","rating":5,"reviewDesp":"something something","reviewDate":"11/12/2021"},
{"reviewid":4,"userid":6,"username":"user2","userimg":"img1.jpg","rating":2,"reviewDesp":"something something","reviewDate":"11/12/2021"}],"offers":[{"offerid":1,"offerDetails":"discount on this product now","expDate":"11/12/2025"},{"offerid":2,"offerDetails":"this service available","expDate":"11/12/2025"}]}]

Fig: Recommendation Product Raw data sample

Conclusion

In this paper we have shown that an e-commerce platform specifically for small-scale industries is required, as they are not able to compete with large-scale industries in manufacturing, advertisement or e-commerce site development. This platform can be further developed to have better E-Learning platform, attracting many would be entrepreneurs. Improving the financial analysis tools will help both Clients and the Investors in bolstering their revenue and attracting them to our service.

References

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[2]Narasimhan, Murali, Camelia Simoiu, and Anthony Ward. "Exposing commercial value in social networks: matching online communities and businesses." (2014).