CAR RECOMMENDER

by

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November, 2020

Student Declaration

This is to declare that this report has been written by us. No part of the report is copied from other sources. All information included from other sources have been duly acknowledged. We aver that if any part of the report is found to be copied, we shall take full responsibility for it.

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BONAFIDE CERTIFICATE

Certified that this project report "**CAR RECOMMENDER"** is the Bonafide work of Amrit Majhi, Akshat Pandey, Samaksh Bansal who carried out the project work under my supervision.

<<Signature of the

Supervisor>> (Due to COVID-19

, signature is exempted)

Supervisor – Dr Dhanpratap Singh

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INTRODUCTION

Recommendation systems are taking more importance in online businesses, where the ability to propose a new item or product that a user will like can increase sales substantially. In this project, we propose to implement a web page where users can view certain types of items, for example cars, and give their feedback about them implicitly (clicking on item, spending time reading its description, sharing it.) Then, the system will run algorithms to come up with similar items to show to the user.

Recommender System (RS)

It is a software tool, which is used to recommend an item of interest for the user. By its design, RS is a personalized system for the user. Generally, RS is of great use for the users who lack experience / knowledge of choosing multiple alternatives and to evaluate the alternatives, which is more relevant than the others. There are two types of RSs. The first one is personalized RS and the second one is non-personalized RS. The more research is towards Personalized RS as its counterpart will be very generic in nature. Some of the examples of personalized RS include, movie RS, Item RS from Amazon, book recommendation, music recommendation etc. Individuals may seek the opinion (regarding book, music, CD, movie etc.) from others in order to make decisions. The core idea of the design of the RS revolves around this theme

Goals and Objectives

* To increase the sales

* To sell more diverse items

* To improve the user satisfaction

* To increase the user loyalty

* To better understand the user requirement

Outcome of Car Recommender Project

It suggests the design of web-based car recommender system. User model is designed based on the feedback about the car, likes and preferences about the car-user clicks and keyword search items. Item model is designed with all appropriate features of the car, which include mileage, price, power, transmission, brand etc. By matching the user model with item model, appropriate recommendations are generated in the system.

Various steps involved in this process are

1.   Data collection
2.   Data pre-processing
3.   Execution of the recommender algorithms
4.   Evaluation of the results
5.   Interpretation of the results

CAPACITY	ENGINE & TRANSMISSION	COMFORT	SAFETY
Seating Capacity	Top Speed	Air Conditioner	Anti-Lock Braking System
No. of Doors	Acceleration (0-100 kmph)	Power Steering	Parking Sensors
Length		Rear A/C Vents	
Width			Central Locking
Height	Engine	Engine Start/Stop Button	Driver Airbag
Rear	Displacement(cc)		Passenger Airbag
		Remote Trunk Opener	
Fuel Tank	Maximum Power		Side Airbag-Front
Volume	Maximum Torque	Remote Fuel Lid Opener	Rear Seat Belts
Tyre Size	Engine		Smart Access Card Entry
Tyre Type	Description	Accessory Power Outlet	
Wheel Size	Turning Radius	Foldable Rear Seat	Seat Belt Warning

Components of RS

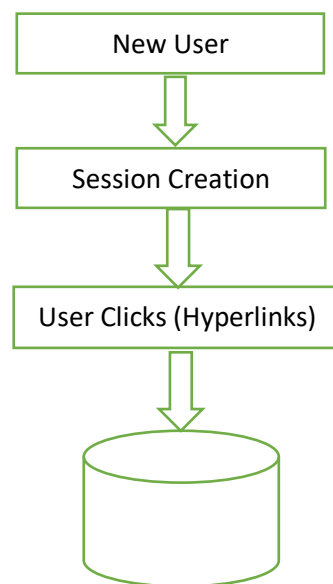Users, Items, Transactions (Relations between user and RS) are the core components of a RS.

Items
Items are represented by a set of properties and features. Features of the items can be represented as a list representation, or as a set of attributes or as agnotological representation of the domain.

Users
RS can have multiple diverse Users. In order to achieve personalization, different parameters like ratings of the user, de-myographic attributes like age, gender, profession, income etc., behavior attributes like browsing patterns, click stream data, search pattern etc. of the users are involved in the design of user models.

```
┌─────────────────────────┐
│        New User          │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│     Session Creation     │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  User Clicks (Hyperlinks)│
└─────────────────────────┘
             │
             ▼
          ⛁ (database)
```

Transactions.
It is a recorded interaction between a user and the RS. In general, transaction is a feedback (usually ratings) provided by the user. These ratings may be collected explicitly or implicitly. recommender associated with Amazon.com.
strongly disagree" can indicate user opinion regarding an item
(usually via questionnaire).

In transactions, implicit ratings are collected based on the user's
actions (search key, clicks, browse pages etc.)

Types of Recommender System (RS)

Content-Based:
This system recommends items that are similar to the other items that the user liked in the past. The similarity of items is calculated based on the features associated with the compared items.

Collaborative Filtering:
This system is called as "people-to-people correlation." Collaborative filtering is considered to be the most popular and widely implemented technique in RS. It works on Neighborhood methods, which is focused on relationships between items or between users.

Demographic:
This system recommends items based on the demographic profile of the user.

Community-Based
This system recommends items based on the preferences of the user's friends.

Knowledge-Based:
This system recommends items based on specific domain knowledge about how certain item features meet users' needs and preferences of the user. This system will work better than others at the beginning. But if they are not fully equipped with learning components, then it may fail.

Constraint-Based Systems:
This system is similar to Knowledge based RS. This system recommends based on explicit rules about how to relate customer requirements with item features.

DESIGN

It suggests the design of web-based car recommender system. User model is designed based on the feedback about the car, likes and preferences about the car, user clicks and keyword search items. Item model is designed with all appropriate features of the car, which include mileage, price, power, transmission, brand etc. By matching the user model with item model, appropriate recommendations are generated in the system.

| User model(feedback,likes, preferances and keyword search items) | → | Recommender System | ← | Item profile(mileage,power,price,transmission,brand etc.) |
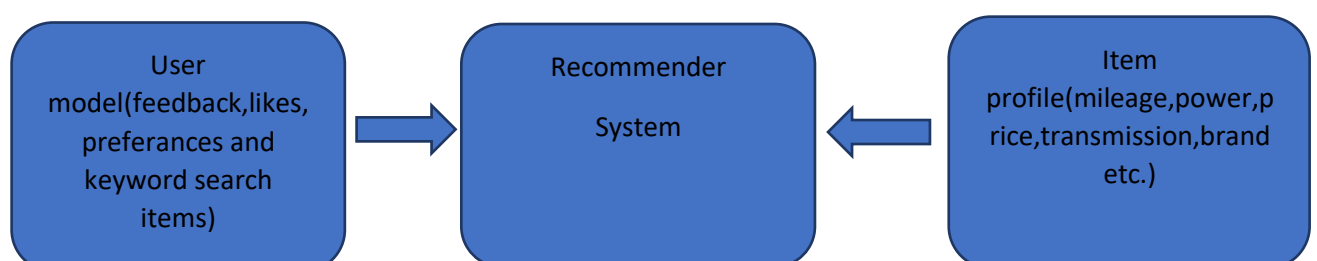
Division of Work
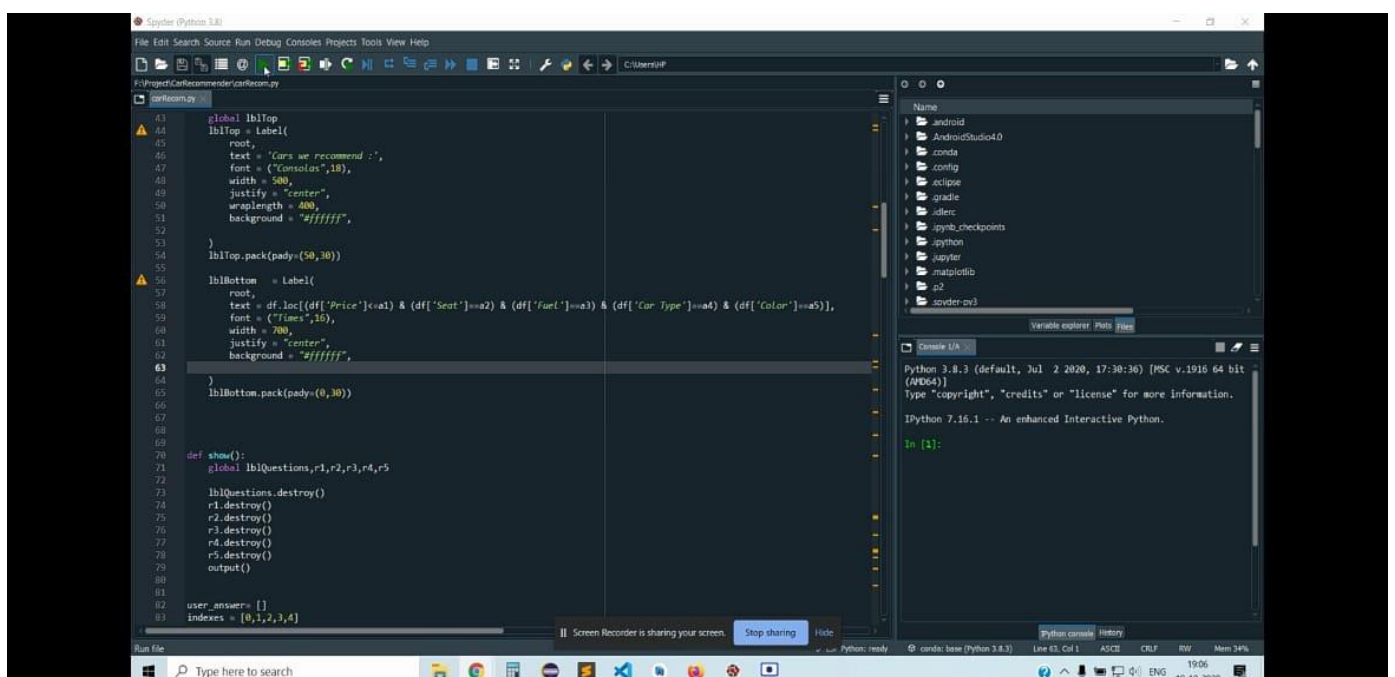
*Amrit:

Report making for the project "Car Recommender"

*Akshat:
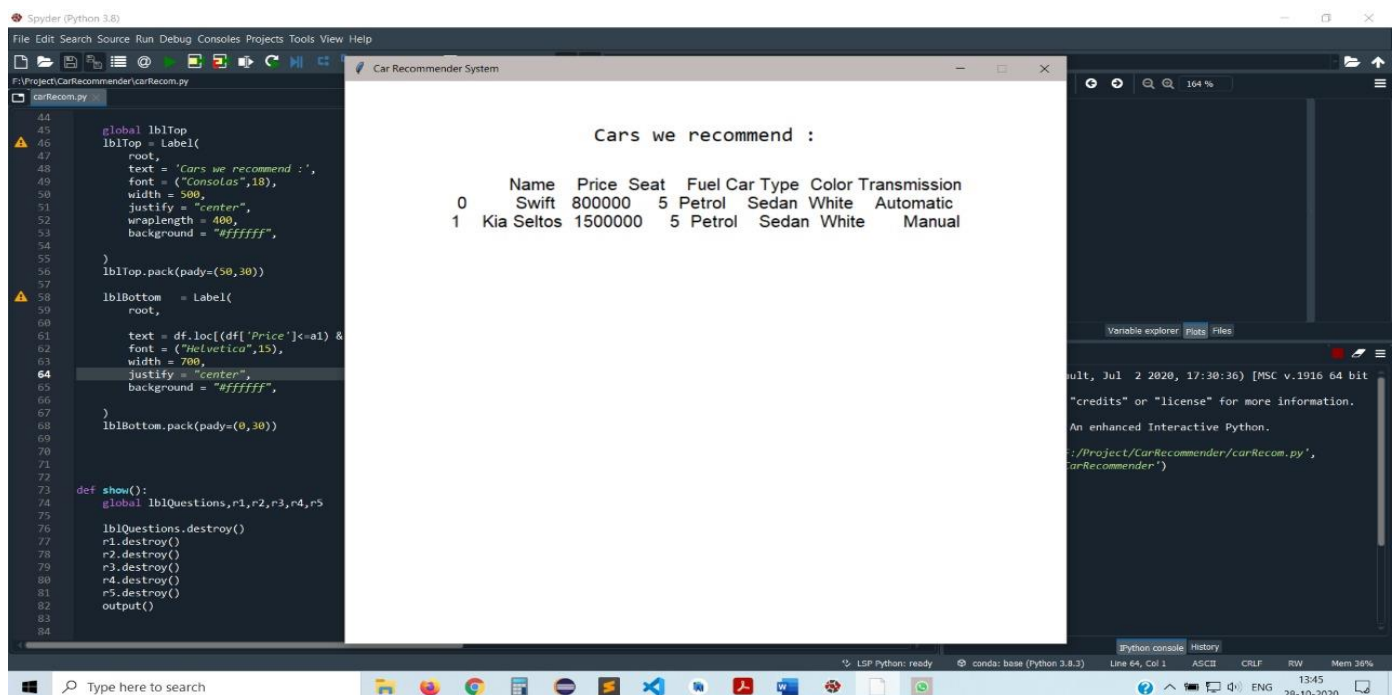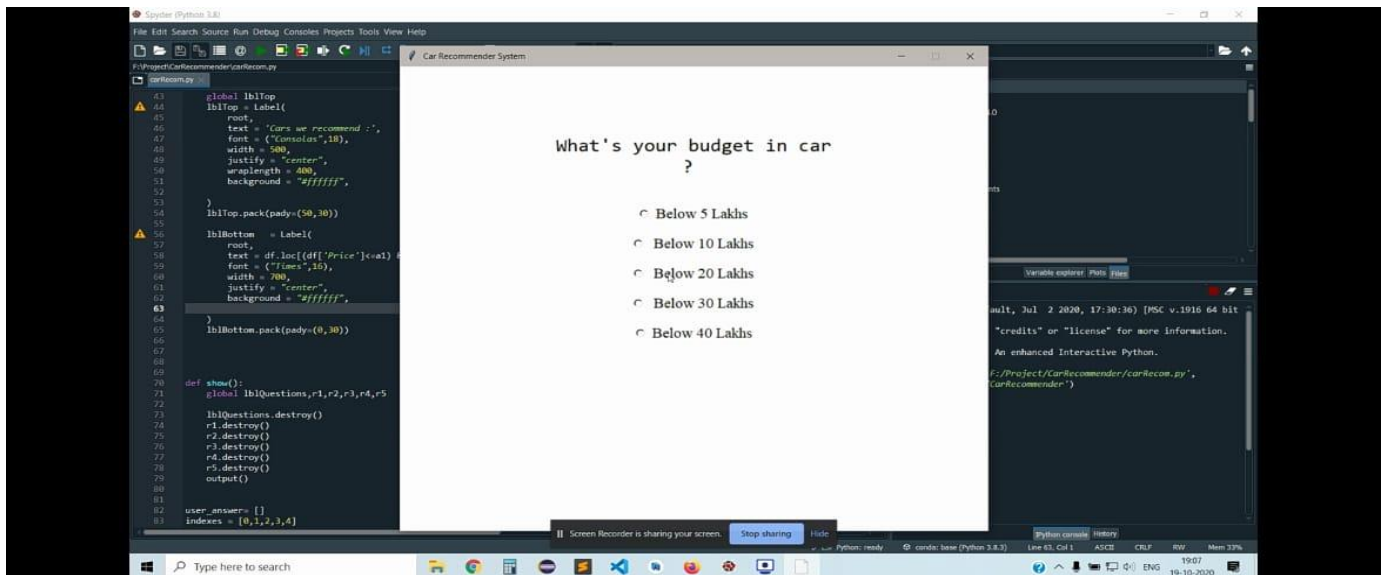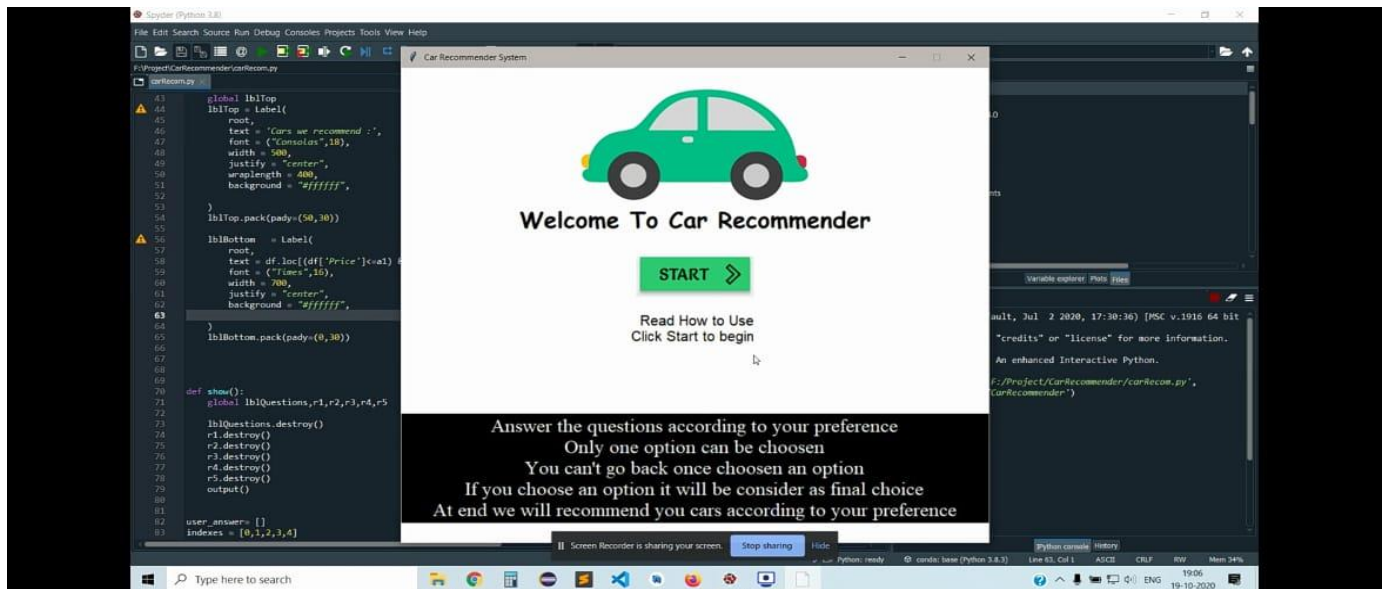
Provided excel sheet containing data regarding varieties of cars

*Samaksh:

Provided the required code for the project with successful implementation

Implementation and Screenshots of Our Project

Framework and Execution of Algorithm

Execution of the Recommender Algorithms In this project work, the item-to-item collaborative filtering algorithm is combined with user-to-user collaborative filtering algorithm to generate effective recommendations. The proposed algorithm works as shown in below figure. Similarity between the items (cars) is calculated using item to item Collaborative filtering recommender algorithm. The total number of clicks for every item (car) by each user in a session is recorded. Similarity between the items is calculated based on the probability of occurrence clicks for each item. Similarity between the users is calculated using user to user Collaborative filtering recommender algorithm. Similarity with respect to demographic features, user clicks and browsing history (search keywords) is calculated between users. The output of item-to-item recommender algorithm is combined with the output of user to user recommender algorithm to generate the final recommendations.

*Platform Used: Pandas

Working of Algorithm
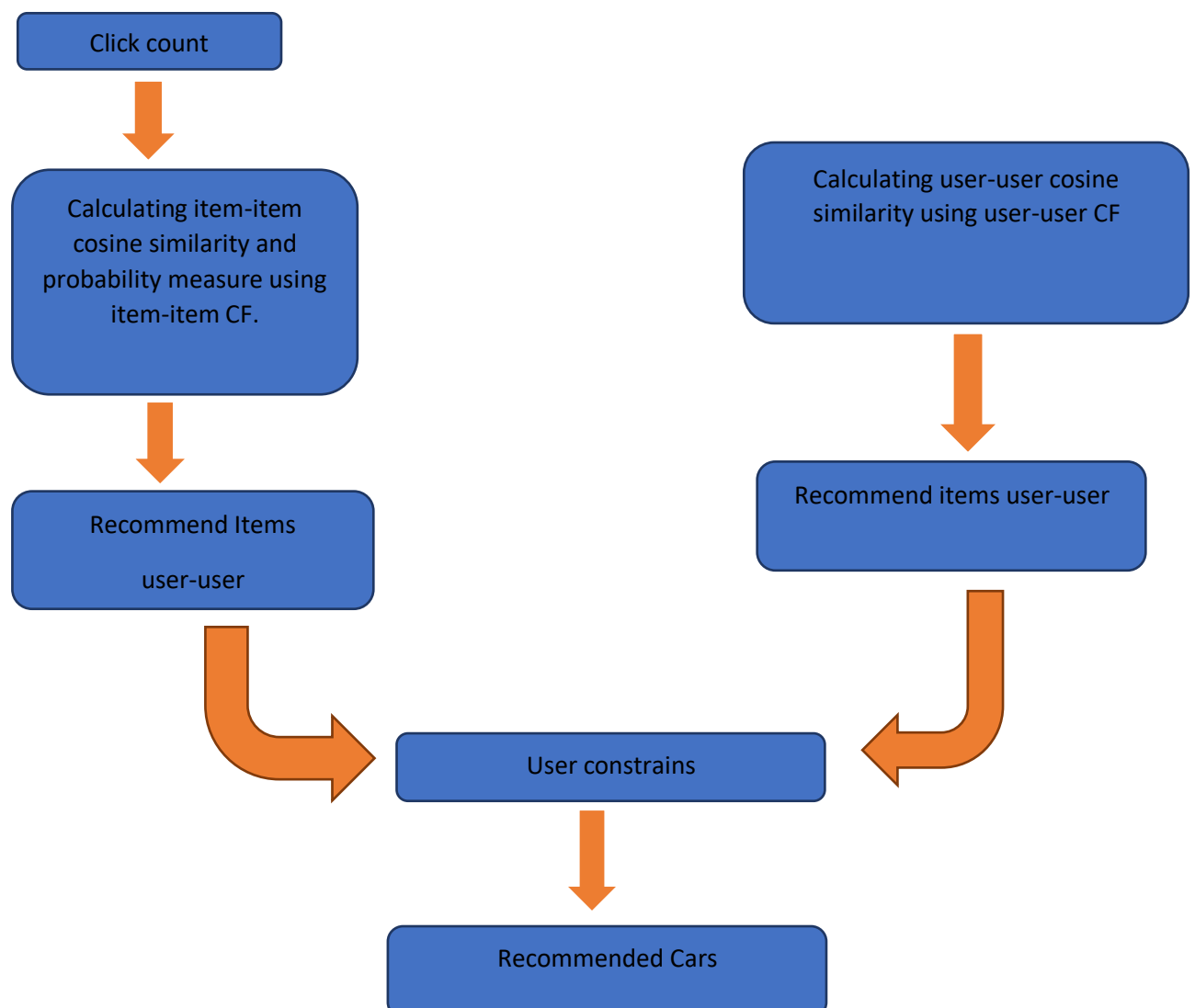
SWOT ANALYSIS

Opportunities:

As the global market rises and the demand of new brands on Indian economy leads to arrival of new models. All outside car manufacturers see Indian market as their place to grow in their share on global car economy. As world moves to the peak of a new era, recommendation become an unavoidable fact. Almost all the technical and non-technical things in today's world wave hands to recommendation. The main fact that the recommendations got deeply rooted in new technology is due to its accuracy, precision and reliability. Recommendation gives a personalized choice to user's requirements. In the proposed approach, the hybrid algorithm, which is the combination of user-to-user and item to item based collaborative filtering recommendation algorithm is efficient in suggesting recommendations.

Drawbacks:

The main problem with car dataset is that they are dynamic data because it is difficult to predict the car model that will be expelled from their brand. Further, the performance of the proposed system can be improved by using a real time network which allows to build websites and access the session details. This research work can be further extended as Knowledge based recommender systems by using different knowledge representations. Expert recommendations using expert system can also be considered using knowledge bases. In this current research work, 2D models are used to define user model and item profile which can be enhanced to ontological based user model and item profile