A
PROJECT REPORT
FOR
SUBJECT: LAB II- PROJECT PHASE II
ON
"Discounting rate prediction model based on the customer's profile for Ecommerce website"

Submitted in partial fulfillment of the requirement for the award of
Bachelor of Engineering
In
Computer Science and Engineering
Punyashlok Ahilyadevi Holkar Solapur University
By

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
WALCHAND INSTITUTE OF TECHNOLOGY
SOLAPUR - 413006
(2019-2020)

Certificate

This is to certify that the project entitled

"Discounting rate prediction model based on the customer's profile for Ecommerce website"

Is submitted by

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Project Approval Sheet

The Project Entitled

"Discounting rate prediction model based on the customer's profile for Ecommerce website"

Submitted by

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Acknowledgment

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UNDERTAKING

We solemnly declare that project work presented in the report titled
"...
Discounting rate prediction model based on the customer's profile for
Ecommerce website
...."
is solely my project work with no significant contribution from any other person except for the project guide. Small contribution/help wherever taken has been duly acknowledged and that complete report has been written by the members of the project group.

We understand the zero-tolerance policy of the WIT, Solapur, and University towards plagiarism. Therefore we as Authors of the above-titled report declare that no portion of the report has been plagiarized and any material used as a reference is properly referred/cited.

We undertake that if found guilty of any formal plagiarism in the above-titled report even after award of the degree, WIT, Solapur and Solapur University reserves the rights to withdraw/revoke the degree granted and that WIT, Solapur and the University have the right to publish our name on the website on which names of students are placed who submitted plagiarized report.

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Abstract

E-commerce has changed the way of business all over the world. The range of ecommerce is getting broad and becoming convenient as well as scalable. Over the last few decades, several major e-commerce organizations have emerged such as Amazon, Flipkart that sell the majority varieties of merchandise and also competitions like big basket are playing a major role in this highly competitive business.

All of these businesses offer product catalog from which customers can choose and purchase, multiple payment options and ability to scale up with the platform. The one key part most ecommerce websites do not provide Offering discounts to customers based on their loyalty; this feature helps the retailers to increase their benefits and give the best price to customers also.

This feature in ecommerce will help to increase the margin of shoppers and increase the count of their customers by giving the best deals to them. This can be achieved by calculating the loyalty of customers and based on loyalty score giving personalized discounts to each customer.

In this project the customers are classified into different categories depending on their loyalty, by using this discount is offered to customers. To achieve this a machine learning model is built which predicts which discount should be given to customers either low, medium, high or no discount.

Introduction

In the offline market, the retailer analyzes each and every customer profile. If a customer is loyal and revisits the shop for more goods and he asks for a discount, the retailer gives a special discount to the customer based on the customer's loyalty. The discount given to each customer is different. This strategy is used in the offline market to increase revenue, to increase the number of customers.

Discount prediction for ecommerce websites is the concept of offering goods at different prices which varies according to the customer's profile. Until now all ecommerce websites undertaken some strategies for pricing of products like Adjust your price according to the competition, Adjust price at a specific time of day, Adjust price according to web traffic, Adjust price based on conversion rate[1], but they lack over to make pricing of the product based on customer's loyalty. And it also has the challenge to calculate customer loyalty as it depends on various factors.

With the recent development of business, many industries have become more active in revenue management systems. Uber's Riding-share platforms have implemented a dynamic pricing strategy, known as 'surge' pricing, it has a significant impact on motivations for more driving times[2]. Retailers like Zara have implemented a systematic dynamic markdown pricing strategy [3].

Online retailers have a stronger desire for dynamic pricing strategies. Amazon.com sells 119million products. Taobao.com, the biggest ecommerce platform in China, sells billions of products at present. Operation specialists have to set prices for these items periodically to remain competitive, which will be mission impossible when the number of items goes this high. As a result, Amazon has implemented automatic pricing systems and it is reported that Amazon.com can change prices every 15 minutes.

This system aims to build a machine learning model that predicts discounts by using customers' profiles for ecommerce websites.

Our system aims to give a discount to customers based on customer loyalty which is based on factors like the recency of customers, frequency of buying and the net value customer spent i.e. monetary value(i.e RFM factor) as well as giving more benefits to shoppers.

The price for a particular product is fixed when the customer adds that product to their cart then the customer can see the discounted price and how much discount he obtained based on loyalty.

To give a correct discount to the customer based on their loyalty, it is necessary to keep track of data such as:
   ● What discount is given to the customer on the previous transaction?
   ● What are the Recency, Frequency, and Monetary Value(RFM[4] factor) of a customer?

To add the feature of discount rate prediction based on the loyalty of customers requires calculating the loyalty of each customer and deciding what discount should be offered to increase the number of customers. Doing this task manually by human power takes longer and it is not feasible for shoppers to spend a lot of money on this process.

Therefore, the software is needed which can perform the task of giving discounts to customers based on their loyalty. So we can build machine learning models for that. The factors used by the ML model for training are:

    1] Recency :

        How recently the customer has purchased the thing.

    2] Frequency :

        How often the customer purchase the product

    3] Monetary Value :

        Total amount spent by the customer.

    4] Category :

        The category of the product to which it belongs (e.g. Cosmetic, Electronic, etc.)

2.1 Front End

2.1.1 Wordpress:

WordPress[5] is a content management system (CMS) i.e. it is a tool that organizes the whole process of creating, storing, and showcasing web-content in an optimal way. Wordpress powers both the back end and front end for web applications. Wordpress has features including a plugin architecture and a template system. WordPress is completely an open-source tool and is still being updated very frequently.

. It uses PHP and MySql database.

2.1.2 WooCommerce:

WooCommerce[6] is a flexible, open-source eCommerce solution built on WordPress. WooCommerce is a plugin that integrates easily with WordPress and adds ecommerce functionality to WordPress websites.Whether you're launching a business, taking an existing brick and mortar store online, or designing sites for clients, you can get started quickly and build exactly the store you want. It has hundreds of extensions so it offers some incredible functions out of the box.

2.1.3 HTML :

HTML[7] is a standard markup language for creating web pages and web applications. It can be assisted by Cascading Style Sheets (CSS) and scripting languages like JavaScript. The front end of a project is built using HTML and CSS. The browser does not display the HTML tags but is utilized to build content of the page also used in plug-in development.

2.1.4 CSS:

CSS[8] is used for styling the content of web pages including colors, layout, fonts. It will allow adapting the presentation of different CSS styles of documents written in a markup language like HTML.

2.1.5 jQuery:

jQuery[9] is a fast, cross-platform, and feature-rich javascript library. Its main purpose is to provide an easy way to JavaScript on websites to make it more interactive, attractive, and also add animation. jQuery simplifies HTML document traversing, event handling, and Ajax interactions for rapid web development.

2.1.6 Chart.js:

Chart.js[10] is an open-source JavaScript library for data visualization which allows drawing different types of charts using the HTML5 canvas element. We have used this to show a chart analysis of total sales, net value, a product sold at the admin side.

2.1.7 Bootstrap:

Bootstrap[11] is a free front-end open-source HTML, CSS, Javascript framework used for developing responsive web sites. It quickly designs and customizes mobile-first websites. It contains extensive prebuilt components, JavaScript plugins. It used to make the plugin front end more responsive.

2.2 Back End

2.2.1 Flask:

Flask[12] is a popular lightweight python web application framework and baseband on the WSGI toolkit. Flask provides a simple template to build web applications. Flask can be used to save time building web applications after being imported into python. It has no database, abstraction layer, or form validation or any other components but flask supports extensions. Flask is used to build the REST API of the project with Oauth1. Oauth1 is Authentication level 1 used for authentication purposes.

Features of Flask:
- Integrated supports for unit testing.
- Extensive documentation
- Unicode based

2.2.2 Python:

Python[13] is a powerful, easy to learn programming language which contains high-level data structures. It can also be used to create web applications. It runs on different platforms friendly, has a simple syntax, and allows developers to write a program with fewer lines. It makes code short and versatile.

2.2.3 Pandas:

Pandas[14] is a popular fast, flexible, and easy to use data analysis and manipulation toolkit built on the Python programming language. Pandas permitting you to carry out your complete information analysis workflow in Python without having to switch to a more domain-specific language. Reshaping and pivoting of data sets is a key feature of pandas.

2.2.4 NumPy:

Numerical Python(NumPy)[15] is a library consisting of multidimensional array objects and collections of routines used to manipulate those arrays. Numpy is the most fundamental and effective package deal for running with facts in python. It is handy for mathematical and logical operations and manipulation of arrays. And also used to perform operations on data.

2.2.5 Keras:

Keras[16] is a python written open-source user-friendly, modular, and extensible neural network library which supports multiple back end engines but it's primary (default) backend is Tensorflow. It runs on the top of Tensorflow. Keras "Sequential()" model format which is a linear stack of layers is used to define neural network model and convolution layers are added to the neural network. Keras supports multiple GPUs and distributed training.

2.2.6 Scikit-learn:

Scikit-learn[17] is a python written machine learning library that features various regression, classification, clustering algorithms. Scikit-learn provides a supervised and unsupervised learning algorithm with an interface in python. The decision tree classifier in python using scikit-learn is used to build ML models using a decision tree algorithm. The decision tree goal is to build a model that predicts a value by simple decision rules inferred from data features.

2.2.7 Pickle:

Python pickle[18] module implements an algorithm for serializing and deserializing of a python object structure. The Python Pickle module provides a known capability for running arbitrary Python functions and, by extension, permitting remote code execution. Pickel is very useful while dealing with machine learning; however, pickle protocol is specific to a Python language.

2.2.8 PHP:

Personal Home Page(PHP)[19] is a server-side scripting language used to develop static or dynamic web pages. PHP code may be embedded with HTML code. Used in combination with various web templates, web frameworks. PHP inbuilt has support for working hand in hand with MySQL. PHP is a cross-platform scripting language so it can work on different operating systems. Used for WordPress and WooCommerce Plugin development.

2.2.9 phpMyAdmin(MySql):

phpMyAdmin[20] is a free software tool written in PHP, intended to handle MySQL administration over the web. It can create, drop the databases, CRUD operations, execute SQL statements and imports as well as export data into various formats such as CSV, SQL, XML, etc. It has an intuitive web interface. It administers multiple servers.

2.2.10 JSON:

JSON[21] is a lightweight format for storing and transporting data. Using JSON data is sent from the server to a web page. It is used to store data in an organized and easy-access manner. We have used JSON for data exchange i.e. send customers attributes to the ML model and get a result from the model. It is used for communication between discount predicting model API and WordPress plugin.

Existing Systems

In the current condition, the Ecommerce site is in a high pick. But in the eCommerce system, there is a catch which is that an eCommerce site gives the same discount to every customer. No system gives a discount based on the loyalty of a customer.

After exploring some plugins found, one of the plugins is called *"Dynamic Pricing With Discount Rules for WooCommerce"*[36] which helps to apply bulk discounts to WooCommerce products, which gives a discount based on rules which the admin set for an ecommerce site. For example, Discounts based on the number of items in a cart and subtotal amount of items added in cart, etc. Another plugin is called *"Discount Rules for WooCommerce"*[37] which helps to create any type of bulk discounts like 20% discount if the subtotal amount is 200 above , date based discount(validity)etc. Another plugin is called *"Dynamic Price and Discounts for Woocommerce"*[38] which enables the option to add discounts on a particular category or the option to add a discount based on a User Role, discount based on group of products etc.

All plugins mentioned above give a discount on the base of rules, like the total price of a cart, etc. The above existing solutions are rule-based, the admin of the store has to set rules and not provide personalized/individual discounts on the loyalty of customers. Some rules of plugin are supported only in the pro version of plugin which is paid.

The solution provided in this project is to give a discount based on the loyalty of customers. Giving personalized/individual discounts to customers based on their loyalty using machine learning in the backend.

Methodology

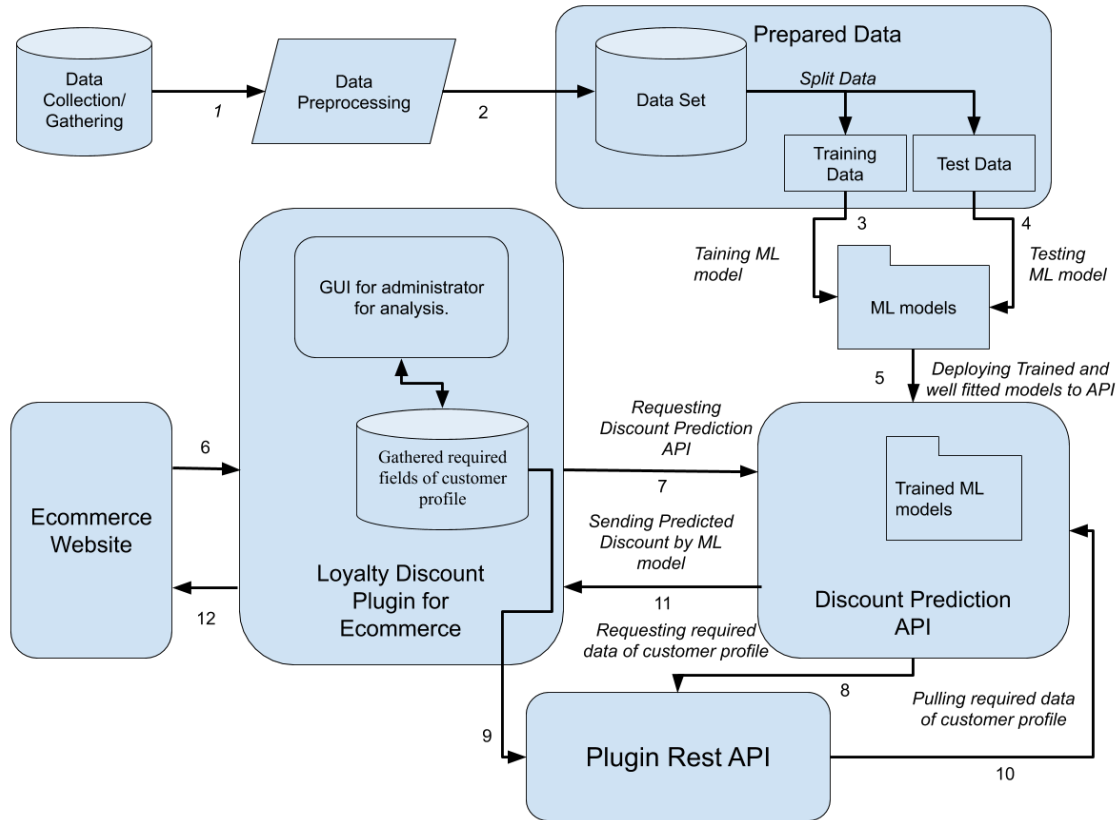## 4.1 System Architecture Overview(High-level Architecture):

Fig.3.1 System Architecture

4.1.1 Data Collection:

Data should consist of attributes that are necessary to give a discount based on the customer's loyalty. Such datasets related to ecommerce are collected in a systematic fashion.

4.1.2 Data Preprocessing:

Real-world data is often incomplete, inconsistent, and lacking in certain behavior trends and likely contains many errors. Data processing includes transforming raw data into an understandable format.

4.1.3 Prepared Data:

After data collection and data pre-processing the prepared data saved in the required format (like CSV).

4.1.4 Splitting Data:

Partition of data into training data and test data. Splitting training data in
Training data and validation data.

4.1.5 Machine Learning Model:

ML model built using the ML algorithm. The different algorithms are suitable to solve the problems used and a model trained on the training dataset using that algorithm.

The algorithm giving a good performance is chosen.

4.1.6 Ecommerce Website and Loyalty Discount Plugin:

The plugin is used to provide discount prediction features to the ecommerce website. Customers will select products for shopping then the Loyalty discount plugin requests a discount predicting API for checking any discount is applicable for that customer. If a discount is applicable then a discounted amount is shown to the customer for that product.

4.1.7 Loyalty Discount Plugin Rest API:

The Rest API is a part of a plugin that provides communication between the plugin database and discount prediction API or any other, like sending customers the required data to the discount prediction API. This Rest API has an Oauth1 i.e authentication level 1 to identify who is accessing data. To check if the user is authenticated or not.

4.1.8 Discount Prediction API:

ML model is deployed on flask based Discount Prediction API. When plugin requests for discount to discount prediction API. Then the attributes of the customer profile which are required for prediction of discount are pulled by Plugin REST API.In the form of JSON. Pulled data is preprocessed as per model trained and then data is passed to the ML model. ML model predicts the discount for that customer data. And send the result back to Plugin.

4.2 Low-Level Architecture

4.2.1 Machine Learning Model

4.2.1.1 Data Exploration:

As the few datasets regarding ecommerce which contains information of customers transaction and their purchase history are available in the marketplace. The different datasets explored among those Acquire Valued Shoppers Challenge[22] Dataset from Kaggle is chosen. As most of the wished features found in the Acquire Valued Shoppers Challenge dataset. So to train the ML model this dataset used. Before considering Acquire valued Shoppers Challenge dataset, different e-commerce datasets are analyzed[33][34][35]. The ulabox dataset[33] from kaggle not having enough features , Elo Merchant[34] dataset has no clear information regarding all the attributes in dataset and analysis of Discount Prediction medical show[35] dataset depict that if purchasing of one item is depend on other item then offer can be given.

4.2.1.2 Data Preprocessing:

The Acquire Valued Shoppers Challenge dataset is used to build the ML model. This dataset has three different folders namely history, transaction, and offers.

By merging the data of offers.csv and history.csv the required dataset is obtained. After merging a dataset containing the customer id, offer value given to each customer for a particular product, company, brand, and category of each product. As it is analyzed that the feature of the dataset i.e category of a product affects more on offer value than the company and brand of the product. The dataset obtained after above preprocessing is as shown below:

	A	B	C	D	E	F	G
1	id	Recency	Frequency	Monetary	CBrand	CCategory	CCompany
2	86252	10	6	14.55	B13474	CA3203	CO106414464
3	12682470	117	1	2.5	B13474	CA3203	CO106414464
4	13251776	33	10	45.63	B7668	CA1726	CO104460040
5	13540129	121	3	13.96	B7668	CA1726	CO104460040
6	13807224	4	16	53.84	B15889	CA5616	CO104610040
7	14088807	30	5	13.65	B7668	CA1726	CO104460040
8	16203579	236	1	2.79	B13474	CA3203	CO106414464
9	16238376	34	5	13.64	B13474	CA3203	CO106414464
10	16691816	37	6	68.93	B875	CA3509	CO103320030
11	16797008	397	1	3.49	B13474	CA3203	CO106414464

To add the label to the dataset Recency, Frequency, and Monetary value are converted in the form of 0 and 1. Labels are in the form of H, L, M, and N which stands for high, low, medium, and no discount respectively. For this conversion, the threshold value of recency, frequency, and monetary value is taken into consideration. Here "1" stands for the constraint that is cleared by the customer and "0" stands for the constraint that is not cleared by the customer. Based on this the labels are given high, low, medium, and no discount. Now dataset looks like as below:

	A	B	C	D	E	F	G	H	I	J	K
id	Recency	Frequency	Monetary	CBrand	CCategory	CCompany	RB	FB	MB	lable
86252	10	6	14.55	B13474	CA3203	CO106414464	1	1	1	H
12682470	117	1	2.5	B13474	CA3203	CO106414464	0	1	0	L
13251776	33	10	45.63	B7668	CA1726	CO104460040	0	1	1	M
13540129	121	3	13.96	B7668	CA1726	CO104460040	0	1	1	M
13807224	4	16	53.84	B15889	CA5616	CO104610040	1	1	0	M
14088807	30	5	13.65	B7668	CA1726	CO104460040	0	1	1	M

The features passed to build the ML model are Recency, Frequency, Monetary Value, Category of product, and label. The data will look like this:

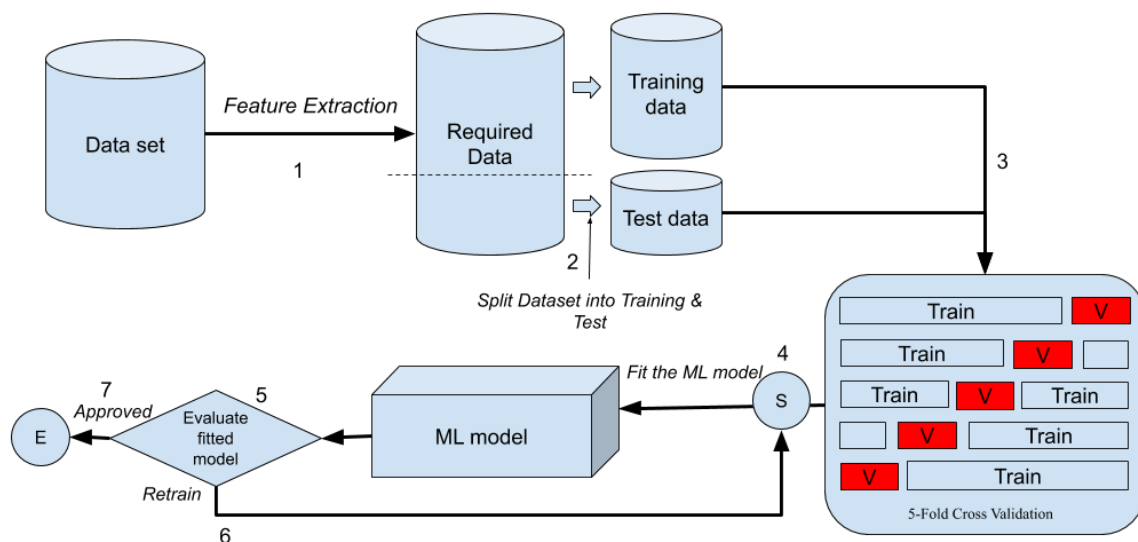|	Recency	Frequency	Monetary	CCategory_int	Target
0	10.0	6	14.55	100	0
1	117.0	1	2.50	100	1
2	33.0	10	45.63	101	2
3	121.0	3	13.96	101	2
4	4.0	16	53.84	102	2

4.2.1.3 Model Building:

Fig.3.2 ML model Overview

Starting with model building, the Weka[23] tool is used for analysis of data and different algorithms are applied over the data and checked for the accuracy of each. For applying different algorithms

data in different forms is considered and algorithms are applied over it and checked for accuracy. The different forms considered are as follow:

Model 1:

Data:

Recency	Frequency	Monetary	CCategory	Lable
10	6	14.55	CA3203	low
117	1	2.5	CA3203	low
33	10	45.63	CA1726	medium
121	3	13.96	CA1726	medium
4	16	53.84	CA5616	low
30	5	13.65	CA1726	medium
236	1	2.79	CA3203	low

On this data decision tree and neural network algorithm applied which gives 100% accuracy.

Model2:

Data:

Recency	Frequency	Monetary	Lable
10	6	14.55	low
117	1	2.5	low
33	10	45.63	medium
121	3	13.96	medium
4	16	53.84	low
30	5	13.65	medium

Here category of product is not considered, only RFM factor is considered. On this data decision tree algorithm given 72% accuracy and neural network model has given 65% accuracy.

Model 3:

Data:

RB	FB	MB	Lable
1	1	1	low
0	1	0	low
0	1	1	medium
0	1	1	medium
1	1	0	low
0	1	1	medium

The RFM factor is converted in the form of 0 and 1 and decision tree and neural network is applied on this data which has given accuracy 70.63% and 70.67% respectively.

Model 4:

Data:

Recency	Frequency	Monetary	CCategory	lable
10	6	14.55	CA3203	H
117	1	2.5	CA3203	L
33	10	45.63	CA1726	M
121	3	13.96	CA1726	M
4	16	53.84	CA5616	M
30	5	13.65	CA1726	M
236	1	2.79	CA3203	L

On this data decision tree has given 99.96% accuracy and neural network given 83.82% accuracy.

Model 5:

Data:

Recency	Frequency	Monetary	CCategory	lable
10	6	14.55	CA3203	H
117	1	2.5	CA3203	L
33	10	45.63	CA1726	M
121	3	13.96	CA1726	M
4	16	53.84	CA5616	M
30	5	13.65	CA1726	M

Same data as per model 4 is used; only the recency ,frequency and monetary value are converted to nominal on which decision tree algorithm has given 62.51% accuracy. The neural network can not be applied on this data cause nominal value converted to feature by neural network algorithm.

Model 6:

Data:

CCategory	RB	FB	MB		lable
CA3203	1	1	1	H	
CA3203	0	1	0	L	
CA1726	0	1	1	M	
CA1726	0	1	1	M	
CA5616	1	1	0	M	
CA1726	0	1	1	M	
CA3203	0	1	0	L	

Here the category of product, recency,frequency and monetary value in the form of 0 and 1 is considered . On this data the decision tree algorithm has given 99.97% accuracy whereas neural network algorithm has given 99.99% accuracy.

The required data is obtained by the feature extraction process. To build the model the dataset is split into training data and testing data. As there are a total of 87471 records in the dataset that 80% are used as training data and 20% as testing data.

- Stratified sampling and Cross-Validation:
  The categorical data type of all features changed to a numerical data type. To use all the data for training and testing the K-fold cross-validation is used. In which data is shuffled randomly and split into K groups. The value of K taken here is 10. Before K fold Validation Stratified sampling is applied to achieve greater precision and more accuracy. The code for stratified sampling and k fold validation is as shown below:

```
#stratified sampling
sss = StratifiedShuffleSplit(n_splits=5, test_size=0.2, random_state=0)
sss.get_n_splits(X, y)
for train_idx, test_idx in sss.split(X, y):
    X_train,X_test=X.iloc[train_idx],X.iloc[test_idx]
    y_train,y_test=y.iloc[train_idx],y.iloc[test_idx]
```

```
#kfold
kf = KFold(n_splits=10)
kf.get_n_splits(X_train)
```

- Fitting the ML model:

  The dataset is completely ready to apply machine learning algorithms to it. The Decision tree is a supervised algorithm and mostly used in classification. As it is a classification problem so the decision tree algorithm is taken into consideration. It is implemented using a scikit learn library. As the dataset has no erroneous values so the decision tree algorithm learns all the data correctly.

```
dt = DecisionTreeClassifier()
score=[]

for train_index, valid_index in kf.split(X_train):
    print("TRAIN:", train_index, "VALIDATION:", valid_index,"\n\n")
    Xv_train, X_valid = X_train.iloc[train_index], X_train.iloc[valid_index]
    yv_train, y_valid = y_train.iloc[train_index], y_train.iloc[valid_index]
    dt.fit(Xv_train, yv_train)
    yv_predict=dt.predict(X_valid)
    score.append(dt.score(X_valid, y_valid))
    print("Accuracy",score[-1])

finalscore=dt.score(X_test,y_test)
print("final:",finalscore)
```

The other algorithm used was neural network. The Keras library was used for the implementation of neural networks. The results obtained from this model were appropriate so the neural network algorithm was taken into consideration. The five convolutional layers are added to the neural network.

```
#defining neural network model structure

model = Sequential()
model.add(Dense(32, activation=ACTIVATION_HOOK, input_shape=(4,)))
model.add(Dense(64, activation=ACTIVATION_HOOK))
model.add(Dense(64, activation=ACTIVATION_HOOK))
model.add(Dense(128, activation=ACTIVATION_HOOK))
model.add(Dense(128, activation=ACTIVATION_HOOK))
model.add(Dense(256, activation=ACTIVATION_HOOK))
model.add(Dense(CLASS_SIZE,activation='softmax'))
model.summary()
```

```
#compiling model
model.compile(optimizer='adadelta',loss='sparse_categorical_crossentropy',metrics=['accuracy'])
```

4.2.1.4 Accuracy

The features passed to the Machine learning model are Recency, Frequency, Monetary Value, and Category of product. It gives a prediction of which type of discount should offer to customers that

are High, Medium, Low, or no discount. The accuracy achieved by the neural network model is 84.83%.

4.2.1.5 Saving ML model

As once done with one-time training of the ML model and getting proper accuracy from it then it requires saving the ML model to use it. The code used to save the model is as below:

```
import pickle
filename='model.sav'
pickle.dump(dt, open(filename, 'wb'))
```
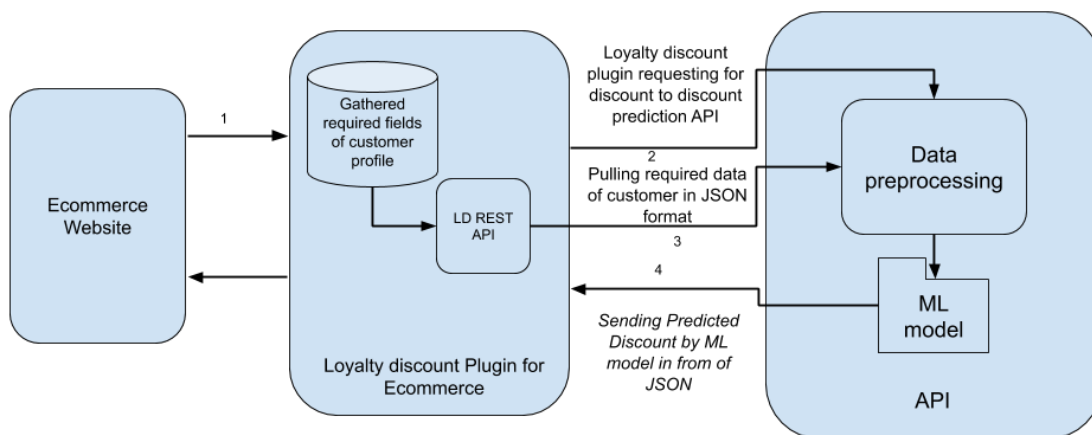
4.2.2 Discount Prediction ML model API(flask API)

Fig 3.3 Discount Prediction ML model API Low Level Architecture

This is a flask based on API[12] for Ecommerce. Flask is used because it is easy to set up and to deploy ML models on API for providing this feature to ecommerce.

On the flask server before starting it loads the ML model by using pickle[18]. Whenever a Loyalty discount plugin requests for a discount then flask receives an input in the form of JSON[21] which contains customer details and product details.

After receiving a request, flask API requests loyalty discount plugin for customer data (past transactions, etc.). The loyalty discount plugin sends data in the JSON form that is preprocessed and brings in the format as the ML model requires. After that data is provided to the ML model for prediction.

ML models process the data and predict the result. After that flask check that the given discount is under a certain limit. If some condition is crossed by the customer then limits are reset.

The predicted result after processing it is converted into JSON and sent back to the plugin.

4.2.3 Plugin Development

Plugins are packages that contain code that extends functionality or adds new features to WordPress websites. WooCommerce is a secure, flexible ecommerce plugin for WordPress. Woocommerce is an ecommerce store on WordPress. This project is mainly focused on customer loyalty which relies on the factors, transaction history of customers, RFM factors, etc.
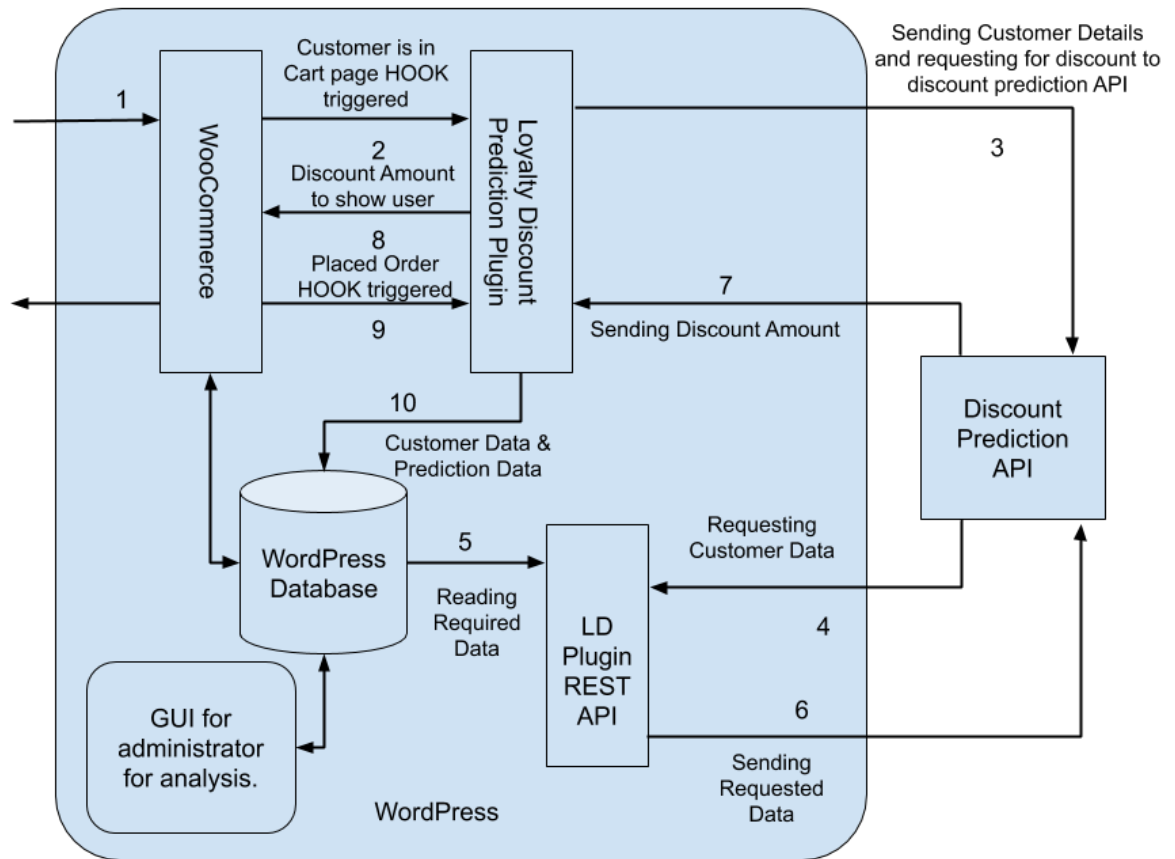

Fig 3.4 WordPress Custom Plugin Development

1. Customers land on a website and look for products for shopping.
2. When a customer adds a product to the cart and goes to the cart page, wooCommerce 'woocommerce_before_calculate_totals' hook is triggered which calls a function with high priority 'add_custom_price' which gets current user details.

```
add_action( 'woocommerce_before_calculate_totals', 'add_custom_price', 10, 1);

function add_custom_price( $cart_object ) {
    $user=wp_get_current_user();
    $cust_id = $user->ID;
```

3. Then a loyalty discount plugin calls a discount prediction API one by one subsequently for each product added into the cart by passing a JSON string containing details about the customer and the cart added product(cust_id,pid).

```
foreach ( $cart_object->get_cart() as $cart_item ) {
    $pid = $cart_item['data']->get_id();
    $result=api_call($cust_id,$pid);
    $discount=$result['response'];
```

4. Upon receiving a request from a plugin, the discount prediction API requests details of the customer to plugin Rest API.

5. The plugin Rest API fetches the details of the customer from the customer plugin table which is in the WordPress database and sends it to the plugin REST API.

6. Plugin REST API sends requested data to the discount prediction API.

7. Discount prediction API process data and send the predicted results to the plugin.

8. The plugin calculates and sends a discounted amount to WooCommerce which will be the final price of that product for that customer.

9. Once a customer places an order, 'woocommerce_checkout_order_processed' hook triggers and calls a function 'placed_order_update_database' .

10. 'Placed_order_update_database' updates the loyalty discount table within the WordPress database by adding details of customers and discount given recently.

```php
add_action('woocommerce_checkout_order_processed','placed_order_update_database', 10, 1);
function placed_order_update_database($order_id){
  global $wpdb;
```

Dependencies and Requirements

5.1 Libraries used:

5.1.1 flask 1.1.2:

Flask is a lightweight WGSI(Web Server Gateway Interface) web application framework. It began as a simple wrapper around werkzeug and jinja and has become one of the most popular Python web application frameworks

License: BSD-3-Clause

5.1.2 cloudpickle 1.3.0:

Cloudpickle 0.8.1 is used for serializing and de-serializing

License: BSD 3-Clause

5.1.3 numpy 1.18.1:

A fundamental package for array computing in python

License: OSI Approved (BSD)

5.1.4 pandas 0.25.3:

Pandas is an open source, easy to use data structures and data analysis tools for Python language

License: BSD Licence

5.1.5 matplotlib 3.2.1:

Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python.

License: PSF

5.1.6 scikit-learn 0.22.1:

Scikit-learn is a free software machine learning library for python programming.

License: BSD 3-Clause

5.1.7 keras 2.3.1:

Keras is an API designed for human beings, not machines. Keras follows best practices for reducing cognitive load: it offers consistent & simple APIs, it minimizes the number of user actions required for common use cases, and it provides clear & actionable error messages. It also has extensive documentation and developer guides.

License: MIT

5.1.8 requests 2.22.0:

Python HTTP for Humans.

License: Apache 2.0

5.1.9 TensorFlow 1.13.0:

TensorFlow is an open-source machine learning framework for everyone.

License: Apache 2.0

5.2 Tools:
- **IDE:**
  - PyCharm Community Edition for Flask API.
  - Spider for the ML model
  - Visual Studio Code and Atom for plugin
- **Analysis:**
  - Weka for model testing and data analysis.
- **Testing:**
  - Insomnia for testing Flask API and Plugin Rest API.

5.3 System Environment:
- **Processor:**
  - 2.5 gigahertz (GHz) or faster processor.
- **RAM:**
  - 8 GB or more
- **Hard drive space:**
  - 48 GB for 64-bit OS or Higher
- **Operating Systems:**
  - Linux 18.04 or Higher
  - Windows 10
- **GPU:**
  - NVIDIA GTX 1050(4 GB) Compute Capability 3.5 or higher.
- **Language:**
  - Python 3.6.
- **Tool:**
  - Anaconda 3-5.2.0-Linux.
  - Anaconda3-5.2.0-Windows-x86_64.
  - Xampp v3.2.4
- **Internet Connection:**
  - Internet connectivity is necessary to download some Libraries. Internet connection required during the training of the ML model.

Instructions for Deployment

Step 1: Download and install Python 3.6[24].

Step 2: Download and install WordPress[25] on Web Server with WooCommerce Plugin[26].

Step 3: Clone project repo to a file.

Data Visualization	24-02-2020 02:17 PM	File folder
loyalty-discount	07-06-2020 07:34 PM	File folder
ML model Bulding	07-06-2020 04:26 PM	File folder
MLModel	22-05-2020 07:14 PM	File folder
test data	01-06-2020 12:59 PM	File folder
__init__.py	07-06-2020 04:43 PM	Python File	3 KB
ML Model Data.zip	07-06-2020 04:30 PM	WinRAR ZIP archive	927 KB
README.md	25-12-2019 12:10 AM	MD File	1 KB
requirements.txt	07-06-2020 10:29 PM	Text Document	1 KB

Step 4: Create a new python virtual environment and activate. And install packages which are in requirement.txt.

```
C:\Windows\System32\cmd.exe

>dir
08-06-2020  04:01 PM    <DIR>          .
08-06-2020  04:01 PM    <DIR>          ..
24-02-2020  02:17 PM    <DIR>          Data Visualization
07-06-2020  07:34 PM    <DIR>          loyalty-discount
07-06-2020  04:26 PM    <DIR>          ML model Bulding
07-06-2020  04:30 PM           948,427 ML Model Data.zip
22-05-2020  07:14 PM    <DIR>          MLModel
25-12-2019  12:10 AM               670 README.md
07-06-2020  10:29 PM               156 requirements.txt
01-06-2020  12:59 PM    <DIR>          test data
07-06-2020  04:43 PM             2,966 __init__.py
               4 File(s)        952,219 bytes
               7 Dir(s)  340,243,607,552 bytes free

>python -m venv venv\

>dir
08-06-2020  04:12 PM    <DIR>          .
08-06-2020  04:12 PM    <DIR>          ..
24-02-2020  02:17 PM    <DIR>          Data Visualization
07-06-2020  07:34 PM    <DIR>          loyalty-discount
07-06-2020  04:26 PM    <DIR>          ML model Bulding
07-06-2020  04:30 PM           948,427 ML Model Data.zip
22-05-2020  07:14 PM    <DIR>          MLModel
25-12-2019  12:10 AM               670 README.md
07-06-2020  10:29 PM               156 requirements.txt
01-06-2020  12:59 PM    <DIR>          test data
08-06-2020  04:12 PM    <DIR>          venv
07-06-2020  04:43 PM             2,966 __init__.py
               4 File(s)        952,219 bytes
               8 Dir(s)  340,215,877,632 bytes free
```

```
C:\Windows\System32\cmd.exe

>venv\Scripts\activate.bat

(venv) >
```

```
C:\Windows\System32\cmd.exe
(venv) >pip install -r requirements.txt
Collecting keras==2.3.1 (from -r requirements.txt (line 1))
  Using cached https://files.pythonhosted.org/packages/ad/fd/6bfe879
b/Keras-2.3.1-py2.py3-none-any.whl
Collecting matplotlib==3.1.3 (from -r requirements.txt (line 2))
  Downloading https://files.pythonhosted.org/packages/1a/a1/52899c06
/matplotlib-3.1.3-cp36-cp36m-win_amd64.whl (9.1MB)
    100% |████████████████████████████████| 9.1MB 2.0MB/s
```

Step 5: Start Flask API by just running __init__.py file and after some time stop.

```
(venv) >python __init__.py
Using TensorFlow backend.
 * Serving Flask app "__init__" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

Step 6: Copy the loyalty-discount folder to the WordPress Plugin folder.

```
C:\Windows\System32\cmd.exe
wordpress\wp-content\plugin>dir
08-06-2020  05:31 PM    <DIR>          .
08-06-2020  05:31 PM    <DIR>          ..
26-03-2020  11:46 PM    <DIR>          debug-plugin-activation-errors
05-06-2014  09:29 PM                28 index.php
29-05-2020  06:01 PM    <DIR>          woocommerce
               1 File(s)             28 bytes
               4 Dir(s)  339,582,296,064 bytes free
```

```
C:\Windows\System32\cmd.exe
wordpress\wp-content\plugin>dir
08-06-2020  05:32 PM    <DIR>          .
08-06-2020  05:32 PM    <DIR>          ..
26-03-2020  11:46 PM    <DIR>          debug-plugin-activation-errors
05-06-2014  09:29 PM                28 index.php
08-06-2020  05:32 PM    <DIR>          loyalty-discount
29-05-2020  06:01 PM    <DIR>          woocommerce
               1 File(s)             28 bytes
               5 Dir(s)  339,582,210,048 bytes free
```

Step 7: Start WordPress and Activate Installed Plugin with WooCommerce Plugin. Start WooCommerce plugin and Loyalty Discount Plugin.
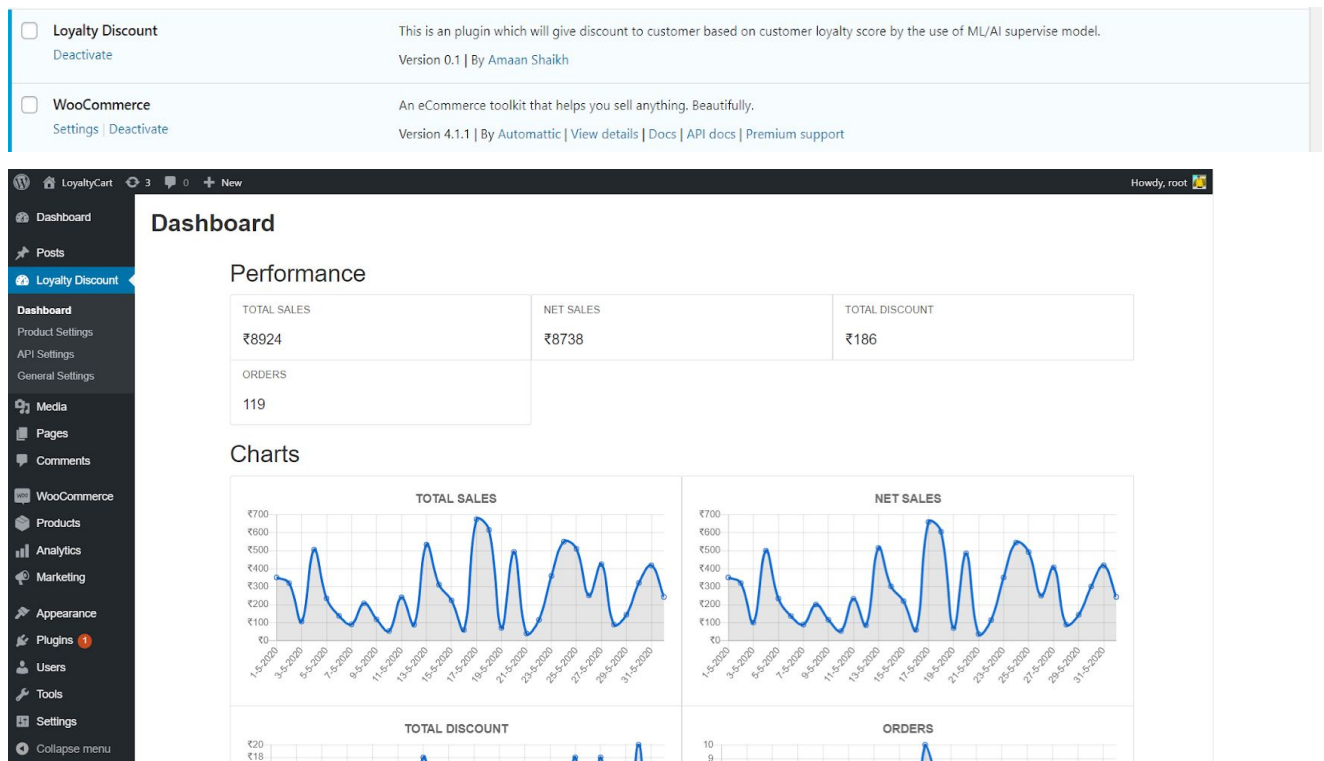
Step 8: Goto API Setting tab. And click on Create Button. Fill the form and click on the Generate button.

Step 9: Copy the Security Key and past in __init__.py user variable. Run the flask again.

Summary

After exploring kaggle and other resources some datasets were found related to ecommerce. The datasets suitable to solve this problem were analyzed after that it came to know that Acquire Valued Shoppers Challenge dataset from Kaggle satisfying the features required to solve this problem as compared to other datasets hence the Acquire Valued Shoppers Challenge dataset taken into consideration.

The Weka tool is used for preprocessing of data and checking results by applying different machine learning algorithms on it. From this study, It is found that the decision tree algorithm and neural network algorithm give better performance on that data. So a machine learning model built using decision tree algorithm as well as neural network algorithm. The features used to build the ML model are Recency, Frequency Monetary Value(RFM factor) and Category of product. The ML model predicts which type of discount should be offered to customers based on their loyalty i.e High , Medium, Low or No discount.

The Python Flask is used as an API connectivity between ML model and Web interface(ecommerce site).When customers purchase any product and add them to cart then the RFM factor of the customer and product category of the purchased product is passed to the ML model with the help of flask. Once the result is predicted, it is preprocessed and passed back to the web interface.

To implement this project ecommerce website (front end of project) is built on wordpress.The woocommerce plugins in WordPress are used to build ecommerce website. To give the feature of discount prediction, an own custom plugin is developed and added to wordpress which gives a discount prediction feature for customers based on their ecommerce profile.

Future Scope

As future work on identifying new features and related datasets to improve the performance of the ML model and increase the complexity of the ML model.

In the current project work admin of the store has to remember a product id but in the future, we will add a name identifying system for products.

Displaying graphs of discount predicted to a particular category(low, medium, high, no) when an admin selects a product in the dashboard only.

Improve GUI by using materialistic design patterns in the plugin. Now, this plugin works only for the WooCommerce site but as a future work plugin will work for other websites too.

References

[1]https://retailtouchpoints.com/features/executive-viewpoints/5-trends-to-anticipate-in-dynamic-pricing; 5 Trends to Dynamic Pricing;

[2]https://marketplace.uber.com/pricing/surge-pricing; Surge pricing by Uber;

[3]http://faculty.london.edu/jgallien/CaroGallien_ClearancePricingOptimizationForFastFashion.pdf; Zara systematic dynamic markdown pricing;

[4]https://en.wikipedia.org/wiki/RFM_(market_research); Research about Recency, Frequency, Monetary Value

[5]https://www.w3schools.in/wordpress-tutorial/intro/; Wordpress Introduction

[6]https://wordpress.org/plugins/woocommerce/; Woocommerce and its plugins

[7]https://developer.mozilla.org/en-US/docs/Learn/Getting_started_with_the_web/HTML_basics; HTML Basics

[8]https://skillcrush.com/blog/css/; CSS

[9]https://api.jquery.com/ ; Introduction to JQuery

[10]https://www.chartjs.org/docs/latest/; ChartJS

[11]https://getbootstrap.com/docs/4.5/getting-started/introduction/; Introduction To BootStrap

[12]https://flask.palletsprojects.com/en/1.1.x/tutorial/; Python Flask

[13]https://www.python.org/; Python Documentation

[14]https://pandas.pydata.org/pandas-docs/stable/getting_started/tutorials.html;Pandas Tutorials

[15]https://numpy.org/doc/ Numpy Documentation

[16]https://www.tensorflow.org/guide/keras Tensorflow, Keras

[17]https://scikit-learn.org/stable/modules/tree.html Scikit-Learn

[18]https://docs.python.org/3/library/pickle.html Pickle in Python

[19]https://www.w3schools.com/php/php_intro.asp Introduction to PHP

[20]https://wordpress.org/support/article/phpmyadmin/ Wordpress PhpMyAdmin

[21]https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/JSON JSON Documention

[22]https://www.kaggle.com/c/acquire-valued-shoppers-challenge/data; Acquire valued shoppers challenge dataset

[23]https://www.cs.waikato.ac.nz/ml/weka/; Weka tool

[24]https://www.python.org/ftp/python/3.6.8/python-3.6.8-amd64.exe; Python3.6 Download link.

[25]https://wordpress.org/latest.zip; WordPress Download link.

[26]https://downloads.wordpress.org/plugin/woocommerce.4.2.0.zip;WooCommerce Download link.

[27]https://www.youtube.com/playlist?list=PLT9miexWCpPUQkQwL-COHmo0Jd0qxLjTn; Playlist of WordPress Custom plugin development.

[28]https://businessbloomer.com/woocommerce-display-total-discount-savings-cart/; Adding Text in the WooCommerce cart webpage.

[29]https://docs.woocommerce.com/document/create-a-plugin/;WooCommerce Custom plugin doc.

[30]https://codex.wordpress.org/Writing_a_Plugin; getting started with plugin development guide.

[31]https://stackoverflow.com/questions/42530626/getting-order-data-after-successful-checkout-hook; Used to retrieve current cart product details.

[32]https://highrise.digital/blog/wordpress-hooks-action-filters/;Understand the Hook, actions and filters by the given link video demo.

[33]https://www.kaggle.com/ulabox/ulabox-orders-with-categories-partials-2017;Ulabox orders with categories' partials 2017

[34]https://www.kaggle.com/c/discount-prediction/data; Discount Prediction predict Medical wholesales Discount to their customers

[35]https://www.kaggle.com/c/elo-merchant-category-recommendation/data; Elo Merchant Category Recommendation Help understand customer loyalty

[36]https://wordpress.org/plugins/aco-woo-dynamic-pricing/;Dynamic Pricing With Discount Rules for WooCommerce.

[37]https://wordpress.org/plugins/woo-discount-rules/; Discount Rules for WooCommerce.

[38]https://wordpress.org/plugins/dynamic-price-and-discounts-for-woocommerce/;Dynamic Price and Discounts for Woocommerce.

Plagiarism check

Source:https://www.duplichecker.com/

Abstract:

Scan Properties

Number of Words : 217
Results Found : 0

To or From — Binary Translator
To or From — PDF Converter

0% Plagiarism   100% Unique   0% Related-Meaning

E-commerce has changed the way of business all over the world.

The range of ecommerce is getting broad and becoming convenient as well as scalable.

Over the last few decades, several major e-commerce organizations have emerged such as Amazon, Flipkart that sell the majority varieties of merchandise and also competitions like big basket are

playing a major role in this highly competitive business.

All of these businesses offer product catalog from which customers can choose and purchase, multiple payment options and ability to scale up with the platform.

The one key part most ecommerce websites do not provide Offering discounts to customers based on their loyalty; this feature helps the retailers to increase their benefits and give

This feature in ecommerce will help to increase the margin of shoppers and increase the count of their customers by giving the best deals to them.

This can be achieved by calculating the loyalty of customers and based on loyalty score giving personalized discounts to each customer.

Introduction:

Scan Properties

Number of Words : 573
Results Found : 0

To or From — Binary Translator
To or From — PDF Converter

0% Plagiarism   100% Unique   0% Related-Meaning

In the offline market, the retailer analyzes each and every customer profile.

If a customer is loyal and revisits the shop for more goods and he asks for a discount, the retailer gives a special discount to the customer based on

The discount given to each customer is different.

This strategy is used in the offline market to increase revenue, to increase the number of customers.

Discount prediction for ecommerce websites is the concept of offering goods at different prices which varies according to the customer's profile.

Until now all ecommerce websites undertaken some strategies for pricing of products like Adjust your price according to the competition, Adjust price at a specific time of day, Adjust

price according to web traffic, Adjust price based on conversion rate[1], but they lack over to make pricing of the product based on customer's loyalty.

And it also has the challenge to calculate customer loyalty as it depends on various factors.

Front End:

Scan Properties

Number of Words : 377
Results Found : 2

To or From
Binary Translator

To or From
PDF Converter

10% Plagiarism
90% Unique
0% Related-Meaning

Make it Unique   Start New Search

it is a tool that organizes the whole process of creating, storing, and showcasing web-content in an optimal way.

Wordpress powers both the back end and front end for web applications.

Wordpress has features including a plugin architecture and a template system.

WordPress is completely an open-source tool and is still being updated very frequently.

WooCommerce[6] is a flexible, open-source eCommerce solution built on WordPress.

WooCommerce is a plugin that integrates easily with WordPress and adds ecommerce functionality to WordPress websites.Whether you're launching a business, taking an existing brick and mortar store online, or

designing sites for clients, you can get started quickly and build exactly the store you want.

It has hundreds of extensions so it offers some incredible functions out of the box.

Similarity 13%

WordPress | Introduction - GeeksforGeeks | What is WordPress?

wordpress is a free and open source content management system(cms) framework.wordpress is completely an open source tool and is still being updated very frequently.you may find the repository here. like any other open source software, wordpress relies on its community.

https://www.geeksforgeeks.org/introduction-wordpress/

Similarity 9%

WooCommerce – WordPress plugin | WordPress.org

whether you're launching a business, taking an existing brick and mortar store online, or designing sites for clients you can get started quickly and build exactly the store you want. activate the free woocommerce plugin on a new or existing wordpress site, follow the optional guided tour, and set up...

https://wordpress.org/plugins/woocommerce/

Back End:

Scan Properties

Number of Words : 644
Results Found : 1

To or From
Binary Translator

To or From
PDF Converter

3% Plagiarism
97% Unique
0% Related-Meaning

Make it Unique   Start New Search

Flask[12] is a popular lightweight python web application framework and baseband on the WSGI toolkit.

Flask provides a simple template to build web applications.

Flask can be used to save time building web applications after being imported into python.

It has no database, abstraction layer, or form validation or any other components but flask supports extensions.

Flask is used to build the REST API of the project with Oauth1.

Oauth1 is Authentication level 1 used for authentication purposes.

Python[13] is a powerful, easy to learn programming language which contains high-level data structures.

It can also be used to create web applications.

It runs on different platforms friendly, has a simple syntax, and allows developers to write a program with fewer lines.

Pandas[14] is a popular fast, flexible, and easy to use data analysis and manipulation toolkit built on the Python programming language.

Pandas permitting you to carry out your complete information analysis workflow in Python without having to switch to a more

---

Similarity 4%

Top 8 programming laguages to learn in 2k18

php code may be embedded with html code or can be used in the combination with various web templates systems, web contentphp code is usually processed by a php interpreter. php also defines a large array functions in the core language and many are also available in various extensions.

https://swapbrain.blogspot.com/2018/04/top-8-programming-laguages-to-learn-in.html

Existing Systems:

Scan Properties

Number of Words : 222
Results Found : 0

To or From

Binary Translator

To or From

PDF Converter

0% — Plagiarism   100% — Unique   0% — Related-Meaning

In the current condition, the Ecommerce site is in a high pick.

But in the eCommerce system, there is a catch which is an eCommerce site gives the same discount to every customer.

No system gives a discount based on the loyalty of a customer.

After exploring some plugins found, one of the plugins is called "Dynamic Pricing With Discount Rules for WooCommerce"[36] which helps to apply bulk discounts to WooCommerce products, gives a discount

based on rules which the admin set for an ecommerce site.

For example, Discounts based on the number of items on Cart and, etc.

Another plugin is called "Discount Rules for WooCommerce"[37] which helps to create any type of bulk discounts, etc.

Another plugin is called "Dynamic Price and Discounts for Woocommerce"[38] which enables the option to add discounts on a particular category or the option to add a discount based

All plugins mentioned above give a discount on the base of rules, like the total price of a cart, etc.

Methodology:

System Architecture Overview(High-level Architecture):

Scan Properties

Number of Words : 348
Results Found : 1

To or From

Binary Translator

To or From

PDF Converter

6% — Plagiarism   94% — Unique   0% — Related-Meaning

Make it Unique   Start New Search

Data should consist of attributes that are necessary to give a discount based on the customer's loyalty.

Such datasets related to ecommerce are collected in a systematic fashion.

Real-world data is often incomplete, inconsistent, and lacking in certain behavior trends and likely contains many errors.

Data processing includes transforming raw data into an understandable format.

After data collection and data pre-processing the prepared data saved in the required format (like CSV).

Partition of data into training data and test data.

The different algorithms are suitable to solve the problems used and a model trained on the training dataset using that algorithm.

The algorithm giving a good performance is chosen.

The plugin is used to provide discount prediction features to the ecommerce website.

Customers will select products for shopping then the Loyalty discount plugin requests a discount predicting API for checking any discount is

Similarity 6%

Check if the user is authenticated - Recalll

the authorize attribute will check that the user is authenticated by default and then you can optionally add in the roles. oh, I realize that was unclear (apparently, mind-reading isn't your strong sideIf(yii::app()->user->isguest) you can use this condition to check if the user is authenticated or not.

https://recalll.co/app/?q=Check%20if%20the%20user%20is%20authenticated

Low-Level Architecture:

Scan Properties

Number of Words : 739
Results Found : 0

To or From   To or From
Binary Translator   PDF Converter

0% Plagiarism   100% Unique   0% Related-Meaning

As the few datasets regarding ecommerce which contains information of customers transaction and their purchase history are available in the marketplace.

The different datasets explored among those Acquire Valued Shoppers Challenge[22] Dataset from Kaggle is chosen.

As most of the wished features found in the Acquire Valued Shoppers Challenge dataset.

So to train the ML model this dataset used.

Before considering Acquire valued Shoppers Challenge dataset, different e-commerce datasets are analyzed[33][34][35].

The ulabox dataset[33] from kaggle not having enough features , Elo Merchant[34] dataset has no clear information regarding all the attributes in dataset and analysis of Discount Prediction medical

show[35] dataset depict that if purchasing of one item is depend on other item then offer can be given.

The Acquire Valued Shoppers Challenge dataset is used to build the ML model.

This dataset has three different folders namely history, transaction,

Scan Properties

Number of Words : 260
Results Found : 0

To or From   To or From
Binary Translator   PDF Converter

0% Plagiarism   100% Unique   0% Related-Meaning

Plugins are packages that contain code that extends functionality or adds new features to WordPress websites.

WooCommerce is a secure, flexible ecommerce plugin for WordPress.

This project is mainly focused on customer loyalty which relies on the factors, transaction history of customers, RFM factors, etc.

Customers land on a website and look for products for shopping.

When a customer adds a product to the cart and goes to cart page, wooCommerce 'woocommerce_before_calculate_totals' hook is triggered which calls a function with high priority 'add_custom_price' which gets current

Then a loyalty discount plugin calls a discount prediction API one by one subsequently for each product added into the cart by passing a JSON string containing details about the

Upon receiving a request from a plugin, the discount prediction API requests details of the customer to plugin Rest API.

The plugin Rest API fetches the details of the customer from the customer plugin table which is in the WordPress database and sends it to the plugin REST API.

Summary:

Scan Properties

Number of Words : 278
Results Found : 0

To or From

[Binary Translator]

To or From

[PDF Converter]

0%   100%   0%
Plagiarism   Unique   Related-Meaning

After exploring kaggle and other resources some datasets were found related to ecommerce.

The datasets suitable to solve this problem were analyzed after that it came to know that Acquire Valued Shoppers Challenge dataset from Kaggle satisfying the features required to solve

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So a machine learning model built using decision tree algorithm as well as neural network algorithm.

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The ML model predicts which type of discount should be offered to customers based on their loyalty i.e High , Medium, Low or No discount.

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Github link:

https://github.com/amaan2398/Discounting-rate-Prediction-Model-based-on-Customer-s-Profile-for-Ecommerce-website