ISSN 2277-2685
IJESR/June-2024/ Vol-14/Issue-2s/182—199
Mohammed Azhar *et. al.*, / International Journal of Engineering & Science Research

RECPIESENSE : INTELLIGENT FOOD RECIPE RATING PREDICTION WITH MACHINE LEARNING

Mohammed Azhar
azharepicboy786@gmail.com
Dept. of IT
ISL Engineering College
Hyderabad, Telangana, India

Mohd Affan Ali
affanafaan57@gmail.com
Dept. of IT
ISL Engineering College
Hyderabad, Telangana, India

Mohammed Abdul Vasif
mohdvasifsaudager78@gmail.com
Dept. of IT
ISL Engineering College
Hyderabad, Telangana, India

Syed Najam-ul- Hassan
syedmujeebulhassan@gmail.com
Associate Professor
ISL Engineering College
Hyderabad, Telangana, India

ABSTRACT:: In recent times, there are many studies and systems which deal with restaurant rating or individual food rating but rating a recipe using Artificial Intelligence is rare. This study aims to rate recipes based on different attributes using different Machine Learning algorithms. It compares the performance of different classifiers in rating a recipe based on different performance criterion. This can be economically beneficial to restaurants by helping them improve their recipes and getting more customers. It can also be used in a more personal level to improve household recipes and for the customers of restaurants to decide which restaurant is better for a specific dish based on how good their recipe is.

INTRODUCTION:

Food tasting and rating is becoming more and more popular everywhere which is clearly visible in different online and social media platforms. Food quality can be assessed from different points of view. In this paper we are concerned about rating a food recipe depending on different attributes. A recipe rating system based on how it is prepared and user reviews can be very helpful for the food industries. Different restaurants can rate their recipes using this and adjust their recipes for more user or customer acceptance. This can also be useful on a personal level for people interested in cooking, experimenting with different recipes and would like to see the rating of their recipes. There are many factors that play a part in a person's selection of food. Although finding reviews on a particular restaurant, its overall service, food quality is very much available but information about a particular dish or recipe is not as available. If someone is interested in a particular dish or recipe it becomes difficult for them to check how good it is. Different restaurants may also make the same dish using different recipes. So this system can help them see how their dish is rated compared to others.

The world of food has undergone a significant transformation, especially in how we perceive and assess its quality. With the rise of online platforms and social media, food tasting and rating have become ubiquitous. This

trend has highlighted the need for a more comprehensive approach to evaluating food, particularly in the context of recipes. In this paper, we focus on developing a food recipe rating system that considers various attributes to gauge the quality and appeal of a recipe.

A recipe rating system holds immense potential, especially for the food industry. It provides a structured way for restaurants and culinary experts to assess their recipes based on preparation methods and user feedback. By leveraging such a system, restaurants can tailor their recipes to better align with customer preferences, thereby enhancing overall user satisfaction.

Furthermore, on a personal level, this system serves as a valuable tool for cooking enthusiasts and experimenters. It allows individuals to not only explore a wide range of recipes but also to gauge their quality through ratings. This is particularly beneficial in a landscape where information about specific dishes or recipes is often limited, making it challenging for individuals to make informed choices.

One of the key challenges addressed by this system is the variability in recipes for the same dish across different restaurants. By providing a platform for comparing and rating these variations, individuals can make more informed decisions about which version of a dish they prefer. This not only fosters healthy competition among restaurants but also empowers consumers with valuable insights into their culinary choices.

In essence, our food recipe rating system aims to bridge the gap between culinary creativity, user preferences, and informed decision-making. By harnessing the power of data-driven insights and user feedback, we strive to create a more enriching and satisfying culinary experience for both professionals and enthusiasts alike.

potholes such as speed humps and cones this one is more efficient than all others since it reduces traffic jams caused by frequent road blockages.

LITERATURE SURVEY:

Opinion mining for thai restaurant reviews using neural networks and mrmr featureselection.

AUTHORS: Niphat Claypo and Saichon Jaiyen

Currently, Thai restaurants are popular around the world. There are tons of reviews related to foods and services in social networking websites. These tons of customer reviews make it difficult to analyze the opinions of customer toward foods and services. To help the businesses, the model of opinion mining is proposed for classifying the reviews and to analyze the attitude of customers for improving their products and services. In this research, the artificial neural network is applied to classify the positive and negative reviews. In addition, the mRMR feature selection is used to select the features of data in order to reduce the number of features in the data set. Consequently, the computational times of learning algorithms for neural networks are reduced. The experimental results show that the neural network is an effective model for classifying the Thai restaurant reviews.

2) Predicting the helpfulness of online restaurant reviews using different machine learning algorithms

AUTHORS:Yi Luo and Xiaowei Xu.

Helpful online reviews could be utilized to create sustainable marketing strategies in the restaurant industry, which contributes to national sustainable economic development. This study, the main aspects (including food/taste, experience, location, and value) from 294,034 reviews on Yelp.com were extracted empirically using the Latent Dirichlet Allocation (LDA) and positive and negative sentiment were assigned to each extracted aspect. Positive sentiments were associated with food/taste, while negative sentiments were associated with

value. This study further proves a robust classification algorithm based on Support Vector Machine (SVM) with a Fuzzy Domain Ontology (FDO) algorithm outperforms other traditional classification algorithms such as Naïve Bayes (MB) and SVM ontology in predicting the helpfulness of online reviews. This study enriches the literature on managerial aspects of sustainability by analyzing a large amount of plain text data that customers generated. The results of this study could be used as sustainable marketing strategy for review website developers to design sophisticated, intelligence review systems by enabling customers to sort and filter helpful reviews based on their preferences. The extracted aspects and their assigned sentiment could also help restaurateurs better understand how to meet diverse customers' needs and maintain sustainable competitive advantages.

3 Application of deep learning in food: A review. Comprehensive Reviews in Food Science and Food Safety

AUTHORS : Lei Zhou, Chu Zhang, Fei Liu, Zhengjun Qiu, and YongHe

Deep learning has been proved to be an advanced technology for big data analysis with a large number of successful cases in image processing, speech recognition, object detection, and so on. Recently, it has also been introduced in food science and engineering. To our knowledge, this review is the first in the food domain. In this paper, we provided a brief introduction of deep learning and detailedly described the structure of some popular architectures of deep neural networks and the approaches for training a model. We surveyed dozens of articles that used deep learning as the data analysis tool to solve the problems and challenges in food domain, including food recognition, calories estimation, quality detection of fruits, vegetables, meat and aquatic products, food supply chain, and food contamination. The specific problems, the datasets, the preprocessing methods, the networks and frameworks used, the performance achieved, and the comparison with other popular solutions of each research were investigated. We also analyzed the potential of deep learning to be used as an advanced data mining tool in food sensory and consume researches. The result of our survey indicates that deep learning outperforms other methods such as manual feature extractors, conventional machine learning algorithms, and deep learning as a promising tool in food quality and safety inspection. The encouraging results in classification and regression problems achieved by deep learning will attract more research efforts to apply deep learning into the field of food in the future.

4 Rating individual food items in restau-rant reviews.

AUTHORS: Burusothman Ahiladas, Paraneetharan Saravanaperumal,Sanjith Balachandran, Thamayanthy Sripalan, and SurangikaRanathunga.

Restaurant recommendation systems are capable of recommending restaurants based on various aspects such as location, facilities and price range. There exists some research that implements restaurant recommendation systems, as well as some famous online recommendation systems such as Yelp. However, automatically rating individual food items of a restaurant based on online customer reviews is an area that has not received much attention. This paper presents Ruchi, a system capable of rating individual food items in restaurants. Ruchi makes use of Named Entity Recognition (NER) techniques to identify food names in restaurant reviews. Typed dependency technique is used to identify opinions associated with different food names in a single sentence, thus it was possible to carry out entity-level sentiment analysis to rate individual food items instead of sentence-level sentiment analysis as done by previous research..

5) Deep learning for amazon food review sentiment analysis

AUTHORS: **Jiayu Wu and Tianshu Ji.**

In this project, we study the applications of Recursive Neural Network on sentiment analysis tasks. To process the raw text data from Amazon Fine Food Reviews, we propose and implement a technique to parse binary trees using Stanford NLP Parser. In addition, we also propose a novel technique to label tree nodes in order to achieve the level of supervision that RNN requires, in the context of the lack of labeling in the original dataset. Finally, we propose a new model RNNMS (Recursive Neural Network for Multiple Sentences), and have better results than our baseline in terms of every metrics we consider.

IMPLEMENTATION OR METHODOLOGY

MODULES:

- User
- Admin
- Data Preprocessing
- Machine Learning Results

MODULES DESCRIPTION:

User:

The User can register the first. While registering he required a valid user email and mobile for further communications. Once the user register then admin can activate the user. Once admin activated the user then user can login into our system. User can upload the dataset based on our dataset column matched. For algorithm execution data must be in float format. Here we took Food Recipe Rating dataset. User can also add the new data for existing dataset based on our Django application. User can click the Classification in the web page so that the data calculated Accuracy, Precision, Recall and F1-Score based on the algorithms.

Admin:

Admin can login with his login details. Admin can activate the registered users. Once he activate then only the user can login into our system. Admin can view the overall data in the browser. Admin can click the Results in the web page so calculated Accuracy, Precision, Recall and F1-Score based on the algorithms is displayed. All algorithms execution complete then admin can see the overall accuracy in web page.

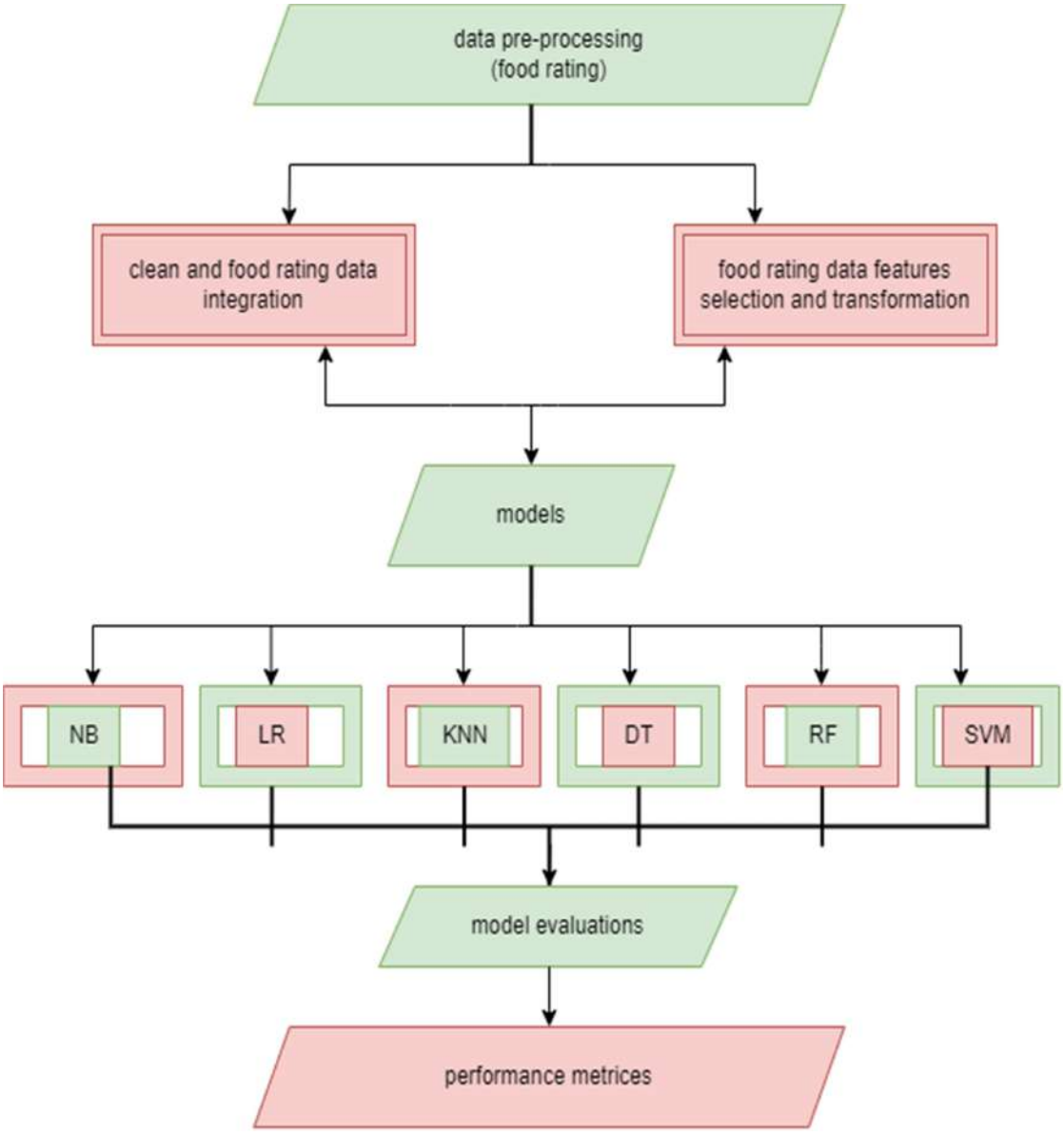
Data Pre-processing:

A python code was applied to remove the unnecessary attributes. After that the exact number of reviews and servings were found by scraping. Total Number of sentences in the instruction column was counted to find the number of instructions per recipe and that number was placed in the instruction's column. After that, we got 5 attributes that are the number of reviews, % Make Again, number of ingredients, number of servings, and number of instructions. The% make again denotes the number of people who would make the dish again after having followed the recipe. After testing the result with each at-tribute and finding their correlation we discarded2 of the attributes and had a final dataset with 3 attributes (Servings, Ingredients, Instructions).

Machine learning Results:

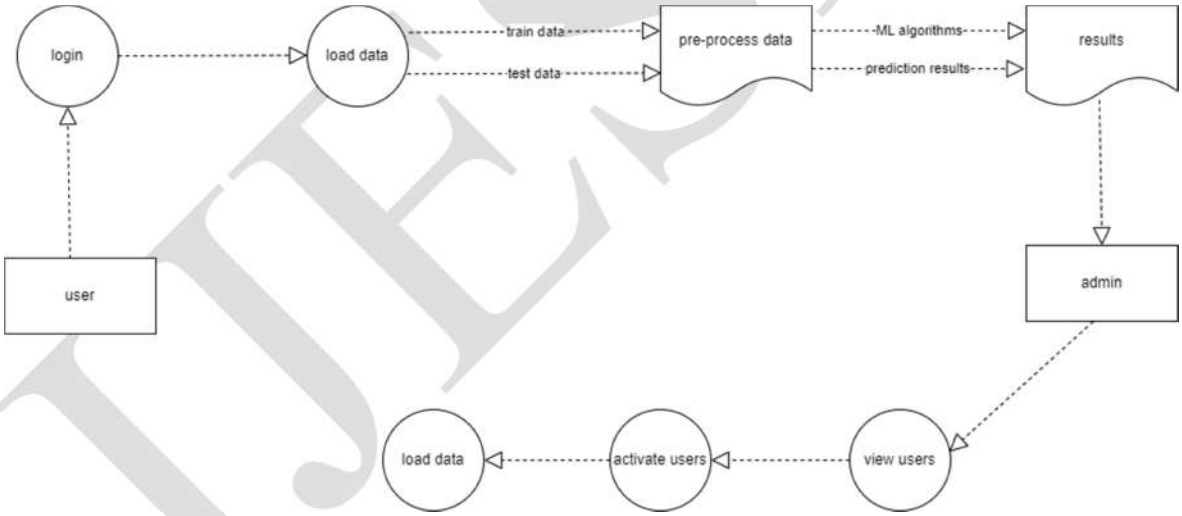
Based on the split criterion, the cleansed data is split into 60% training and 40% test, then the dataset is subjected to six machine learning classifiers such as Decision Tree(DT), Naive Bayes(NB), linear regression, k nearest neighbour(KNN), random forest(RF), support vector machine(SVM). The accuracy of the classifiers was calculated and displayed in my results. The classifier which bags up the highest accuracy could be determined as the best classifier.

SYSTEM ARCHITECTURE:



DATA FLOW DIAGRAM:

1. The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
2. The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
3. DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
4. DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.



UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object-Oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems.

The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects-oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

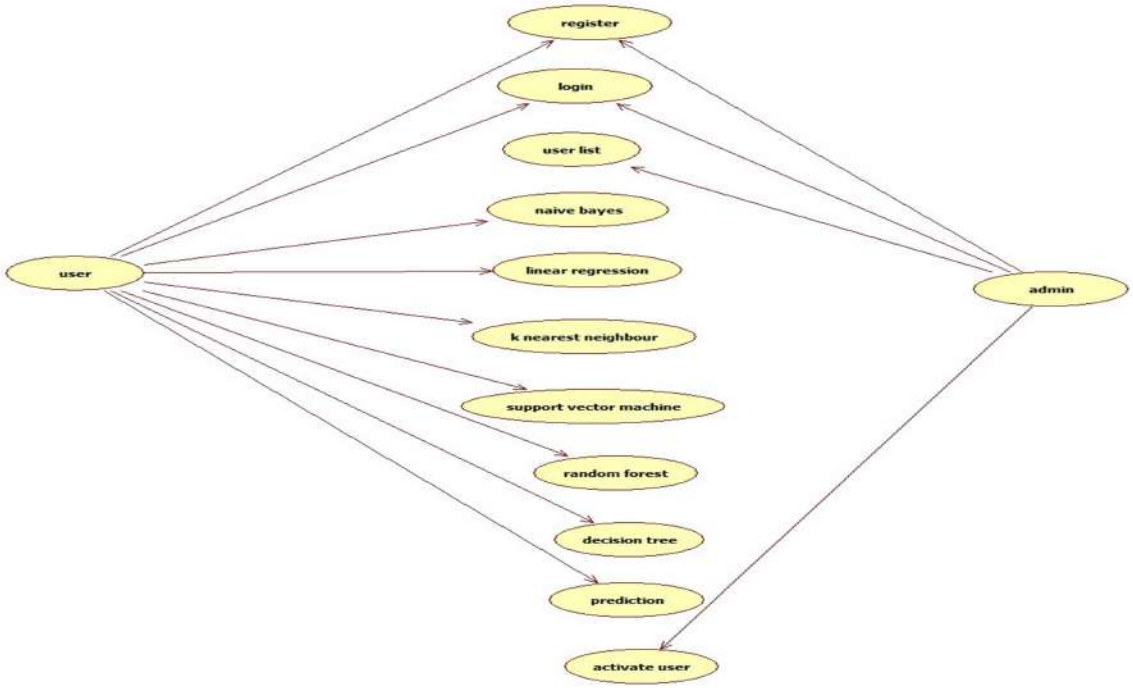
GOALS:

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.
4. Provide a formal basis for understanding the modeling language.
5. Encourage the growth of OO tools market.
6. Support higher level development concepts such as collaborations, frameworks, patterns and components.
7. Integrate best practices.

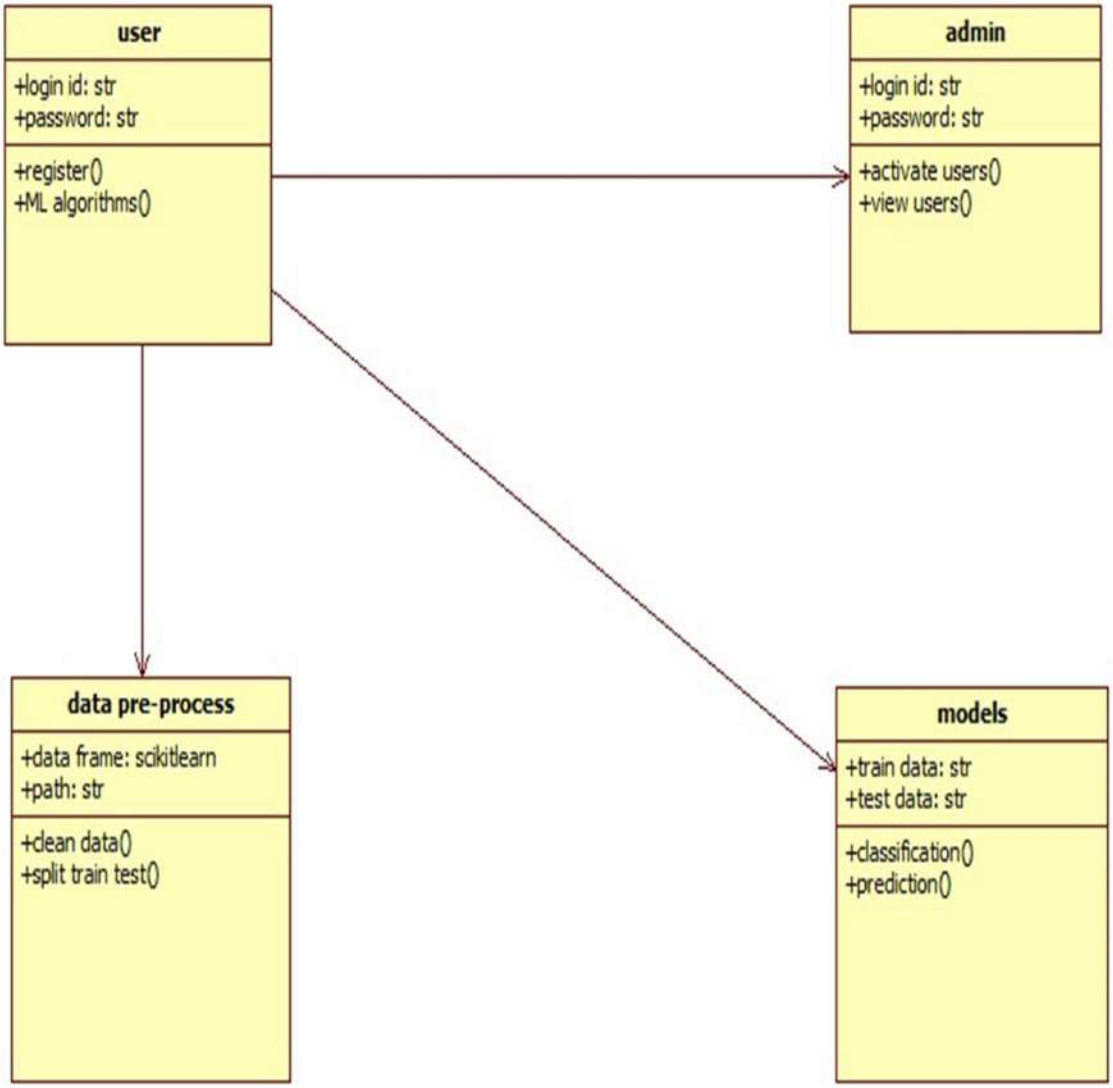
USE CASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.



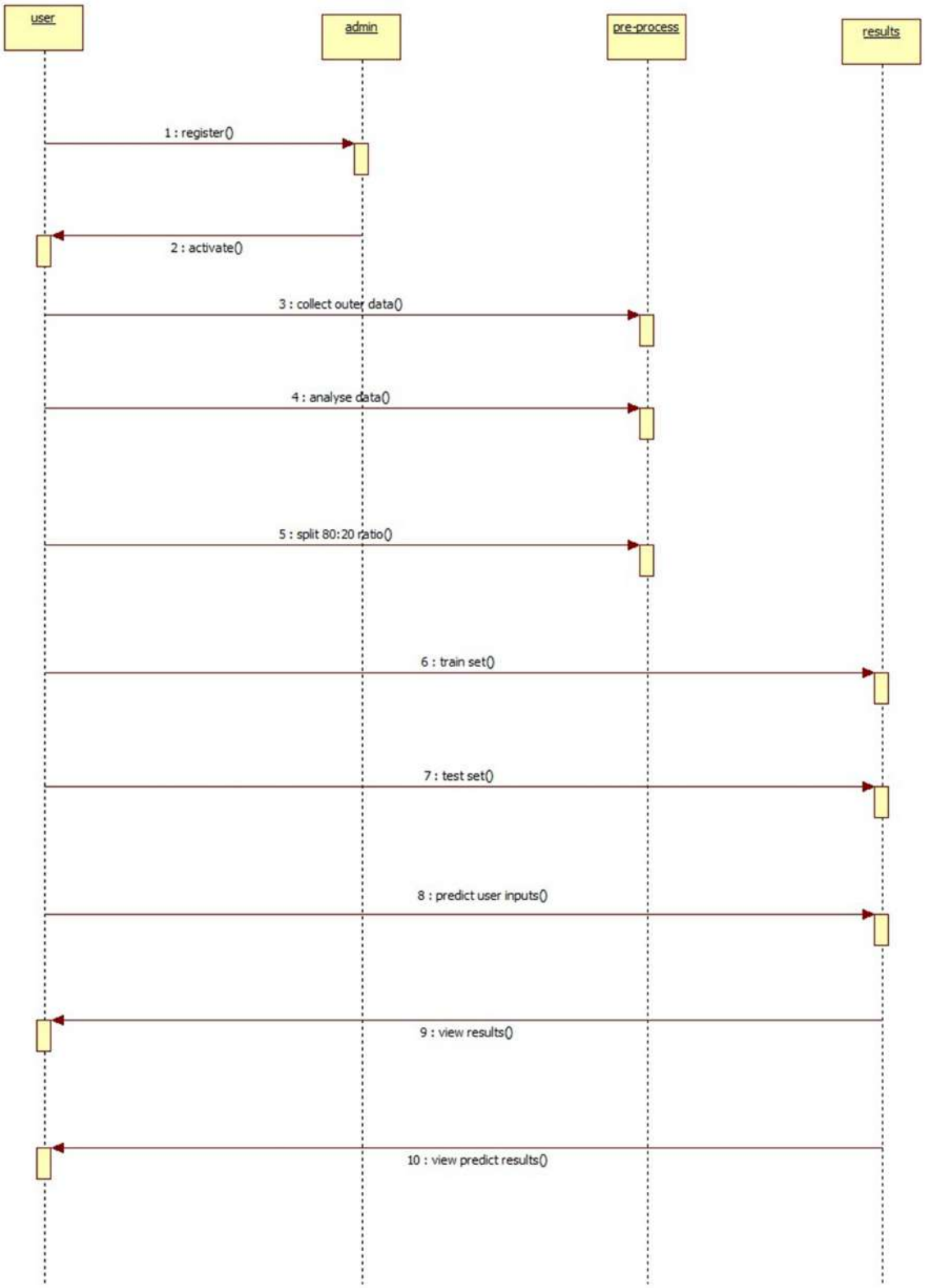
CLASS DIAGRAM:

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.



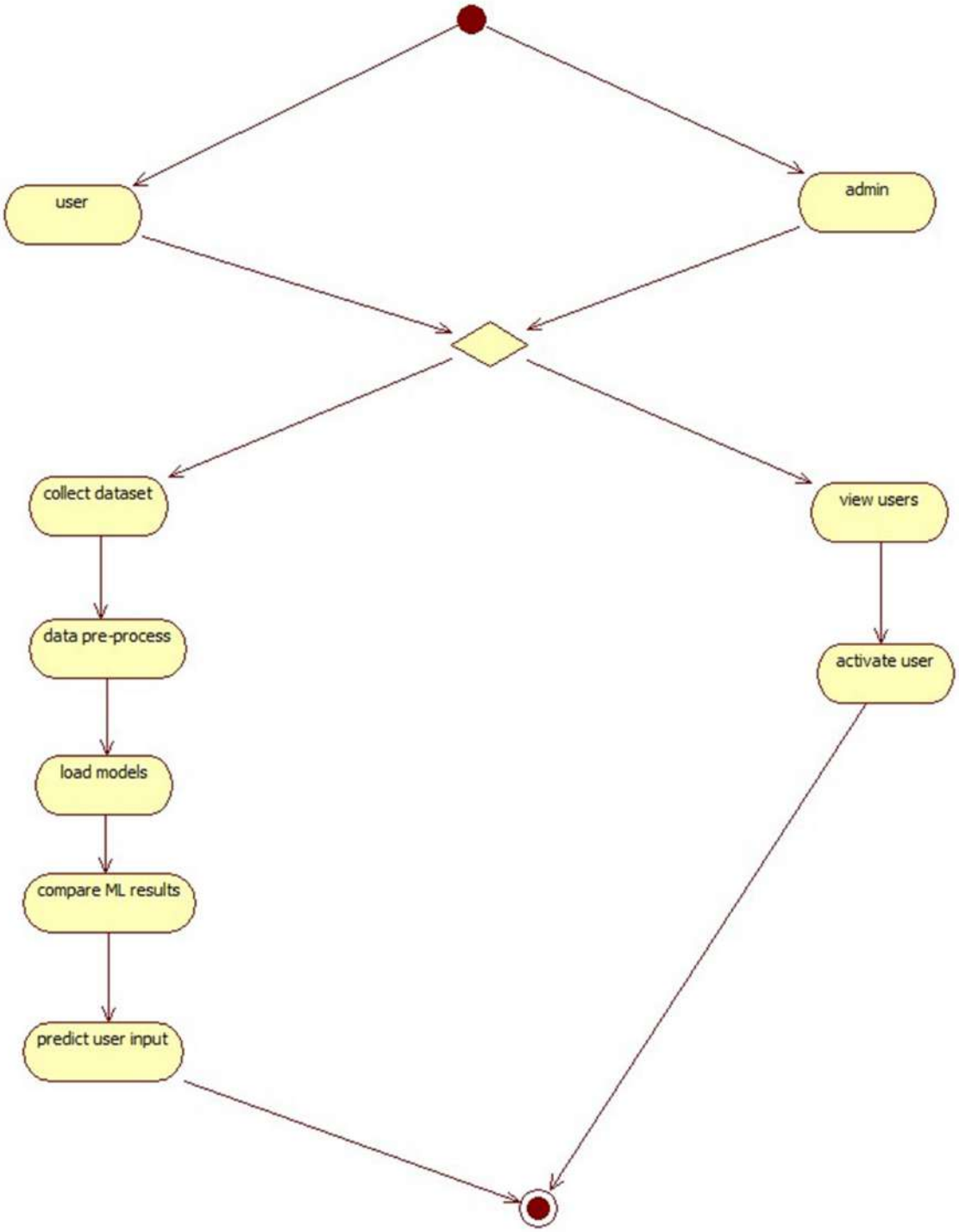
SEQUENCE DIAGRAM:

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.


user
admin
pre-process
results
1 : register()
2 : activate()
3 : collect outer data()
4 : analyse data()
5 : split 80:20 ratio()
6 : train set()
7 : test set()
8 : predict user inputs()
9 : view results()
10 : view predict results()

ACTIVITY DIAGRAM:

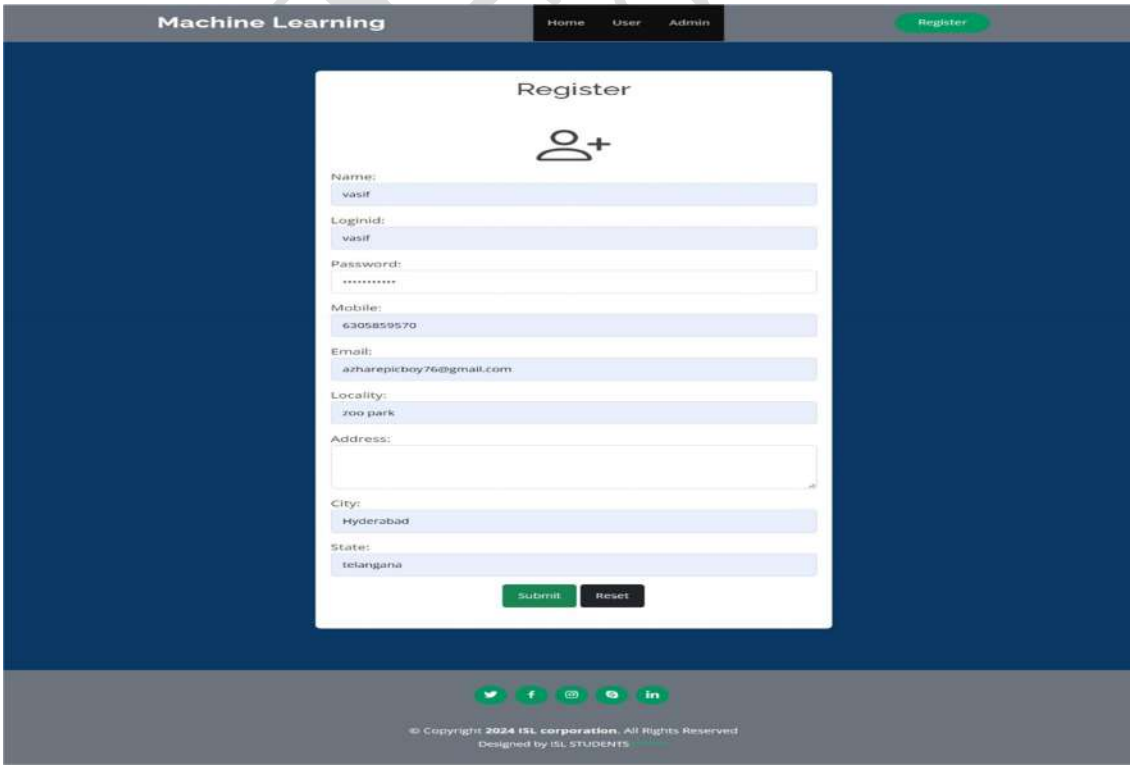
Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.



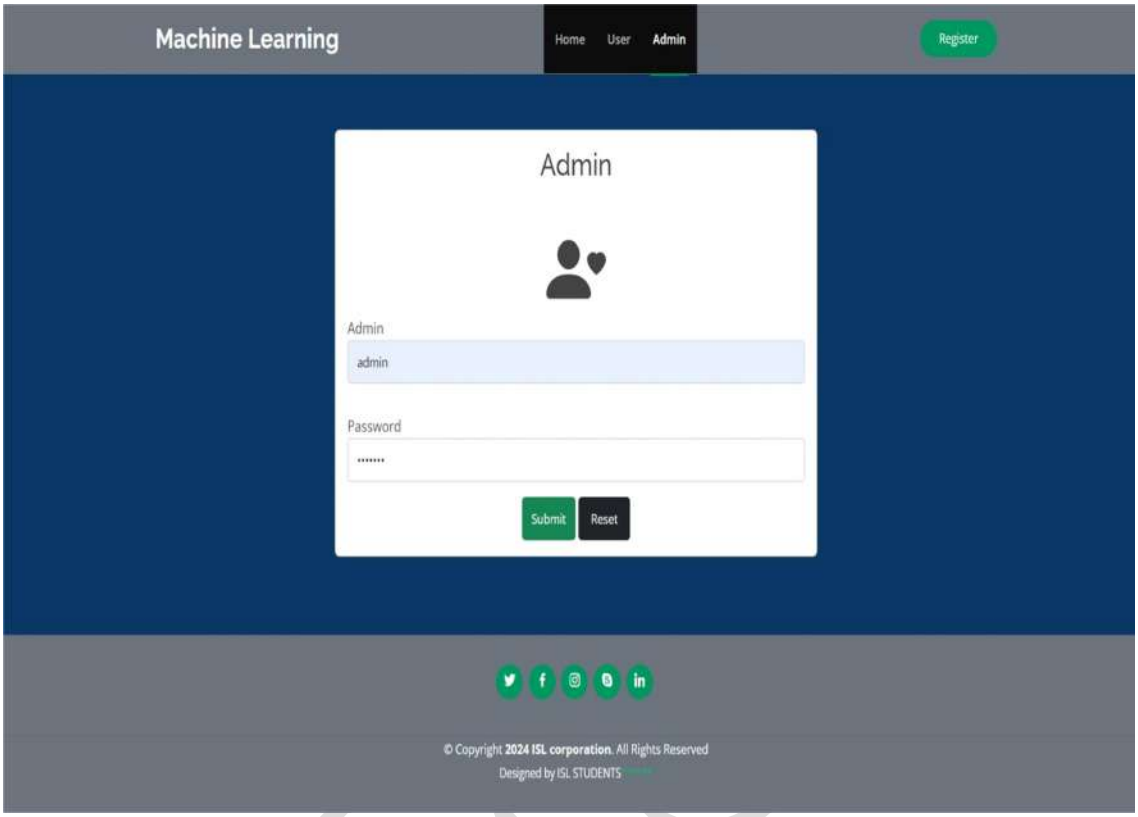
FEATURES OF THE SYSTEM

Home page

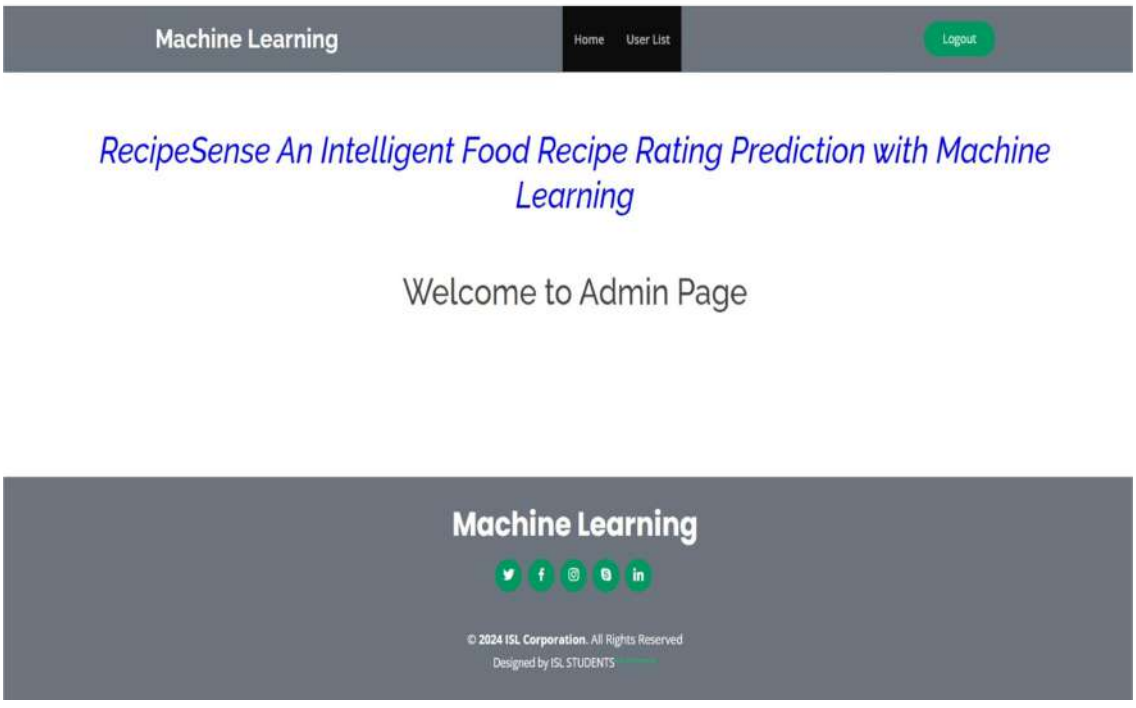
Register Form



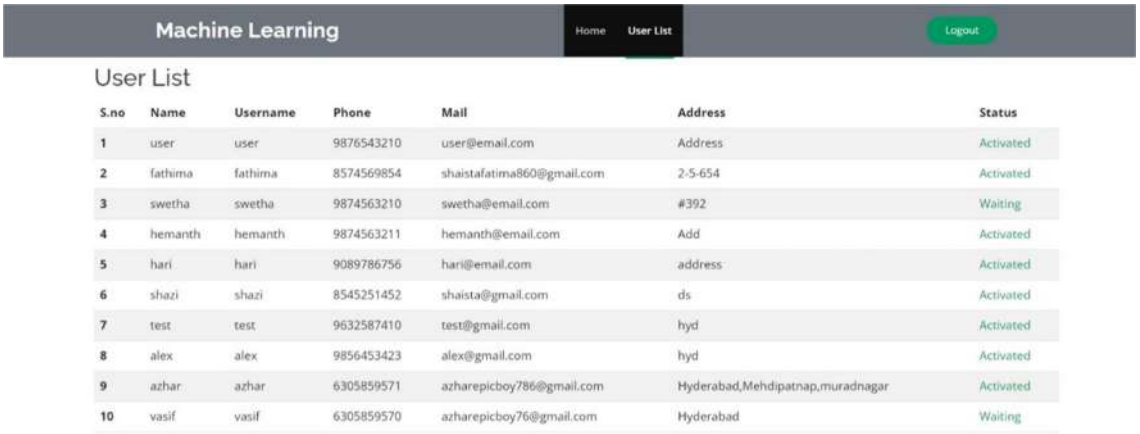
Admin Login Page



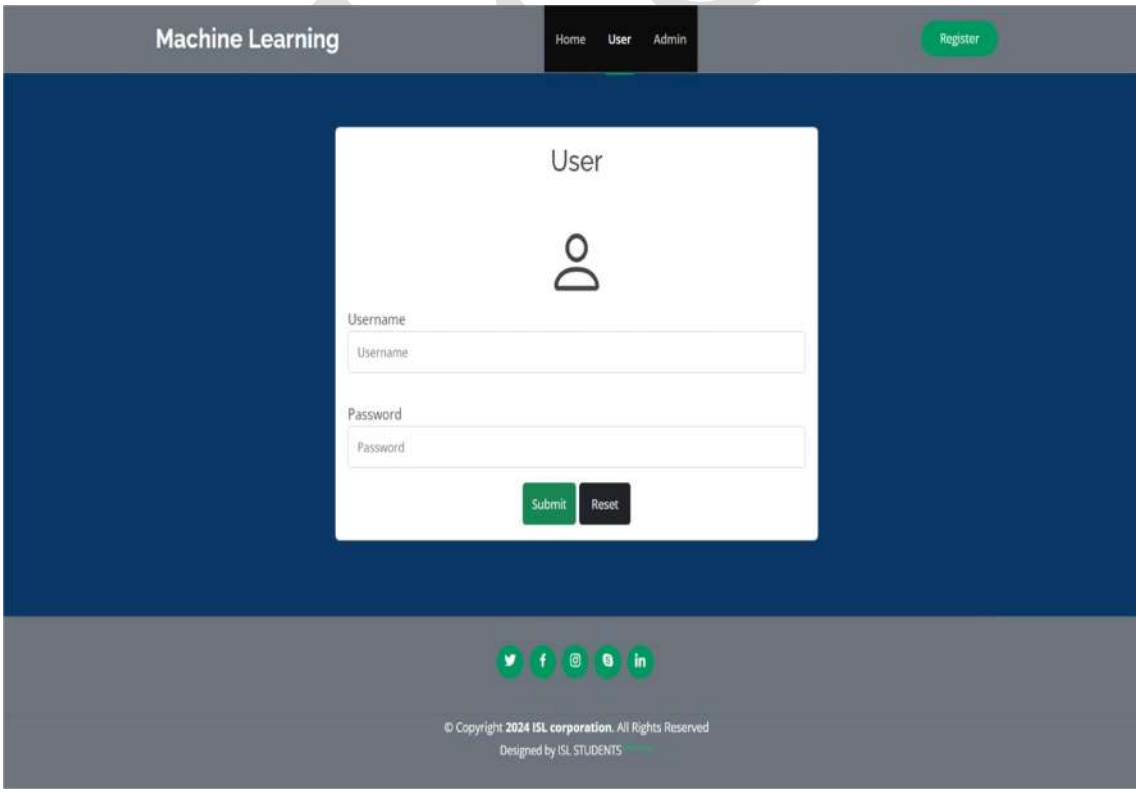
Admin Home Page



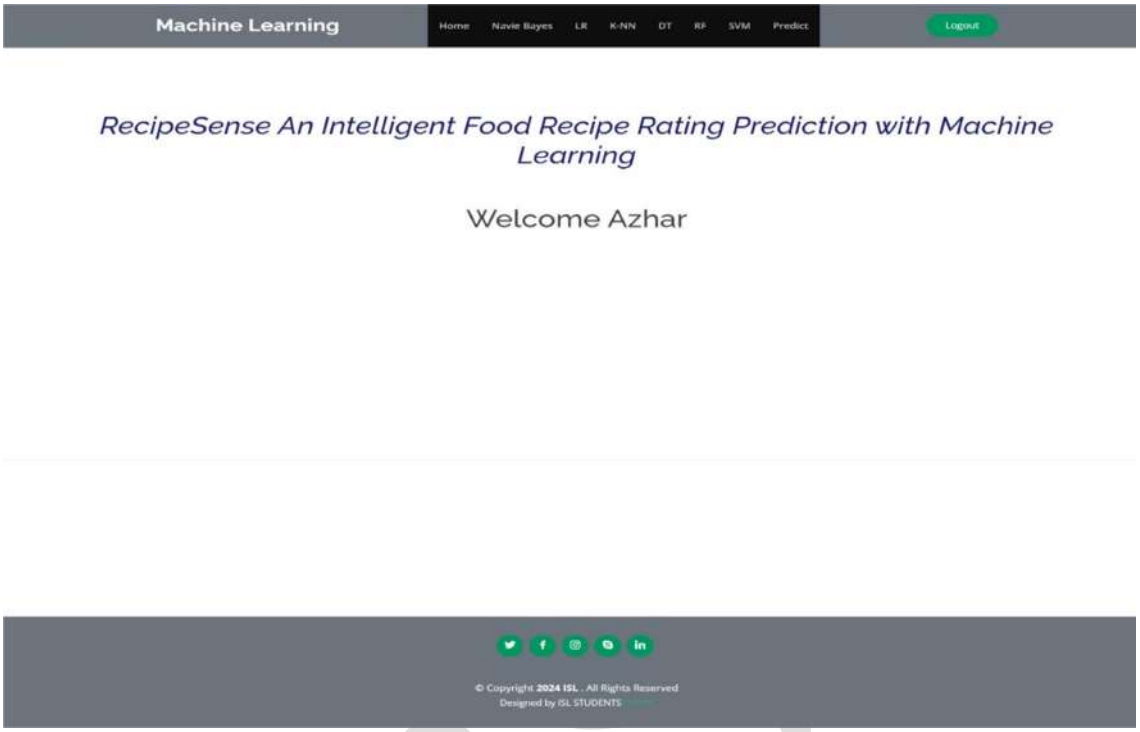
Activate User



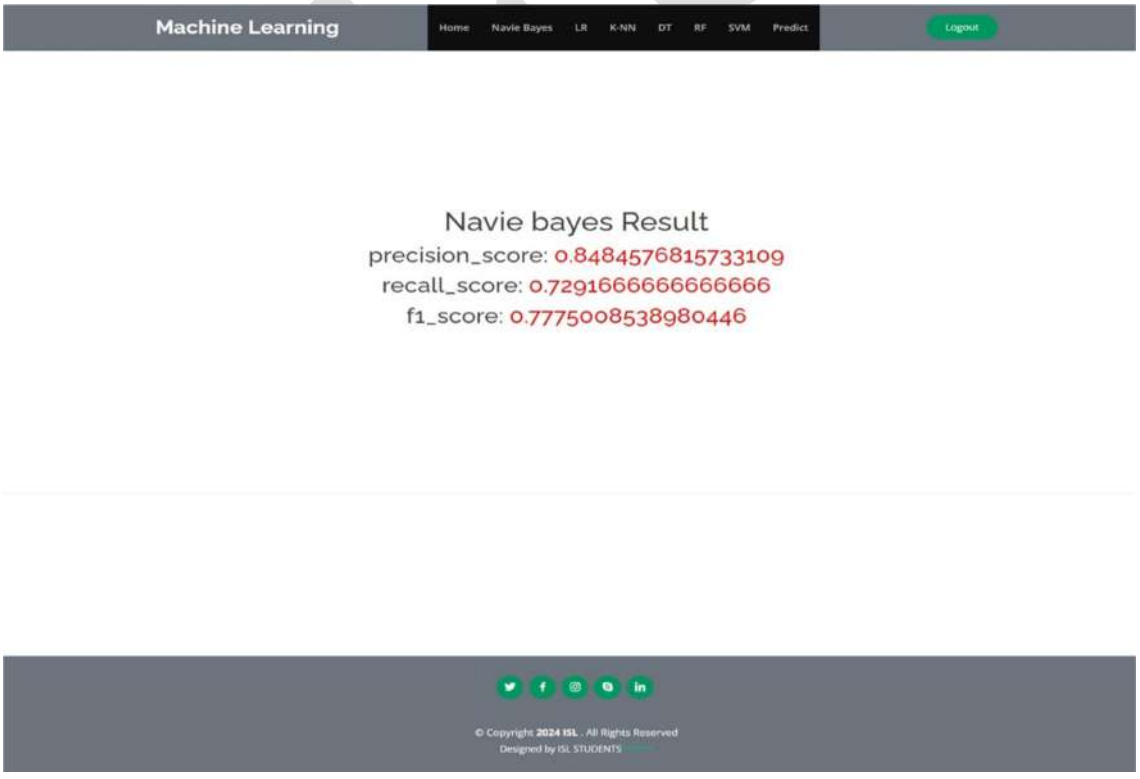
User login Page



User homepage

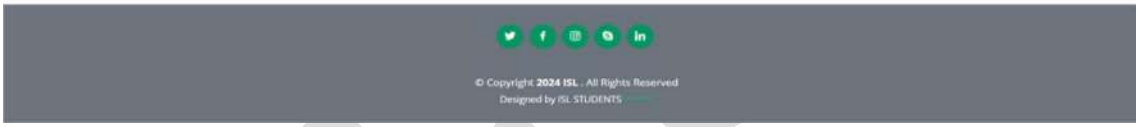


Naive bayes results:



Linear regression results:

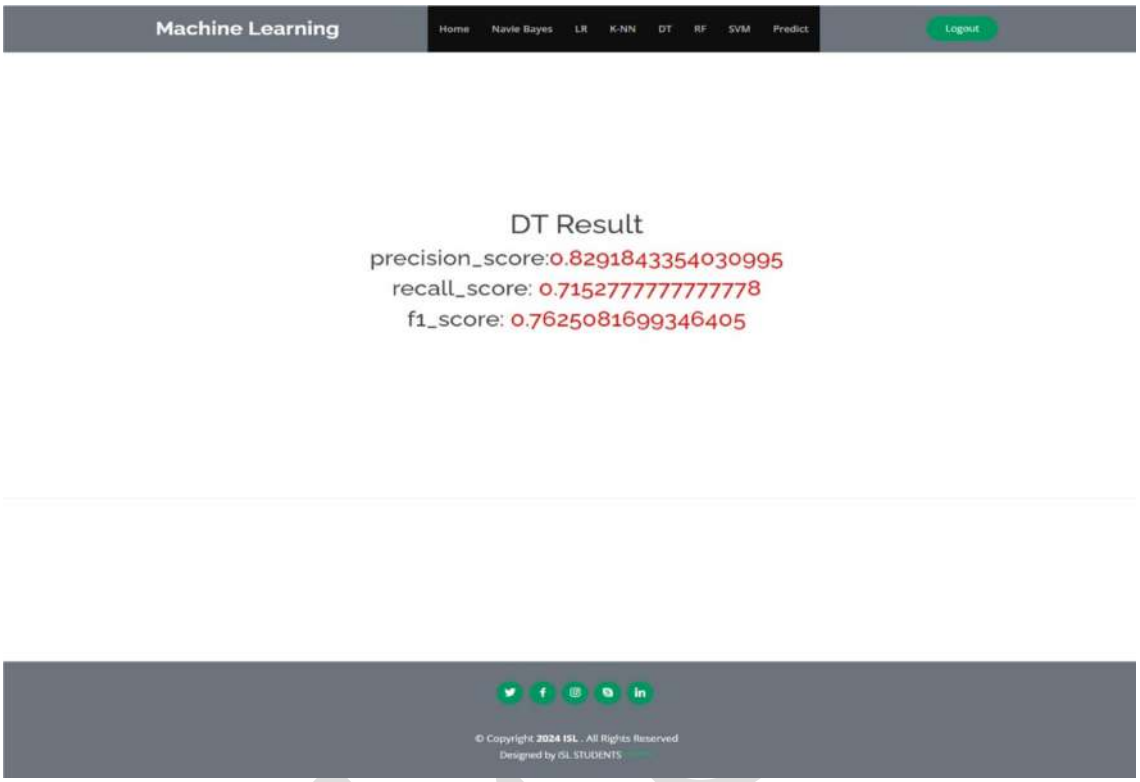
LR Result
precision_score: 0.9885770717494933
recall_score: 0.7534722222222222
f1_score: 0.8530729625292386



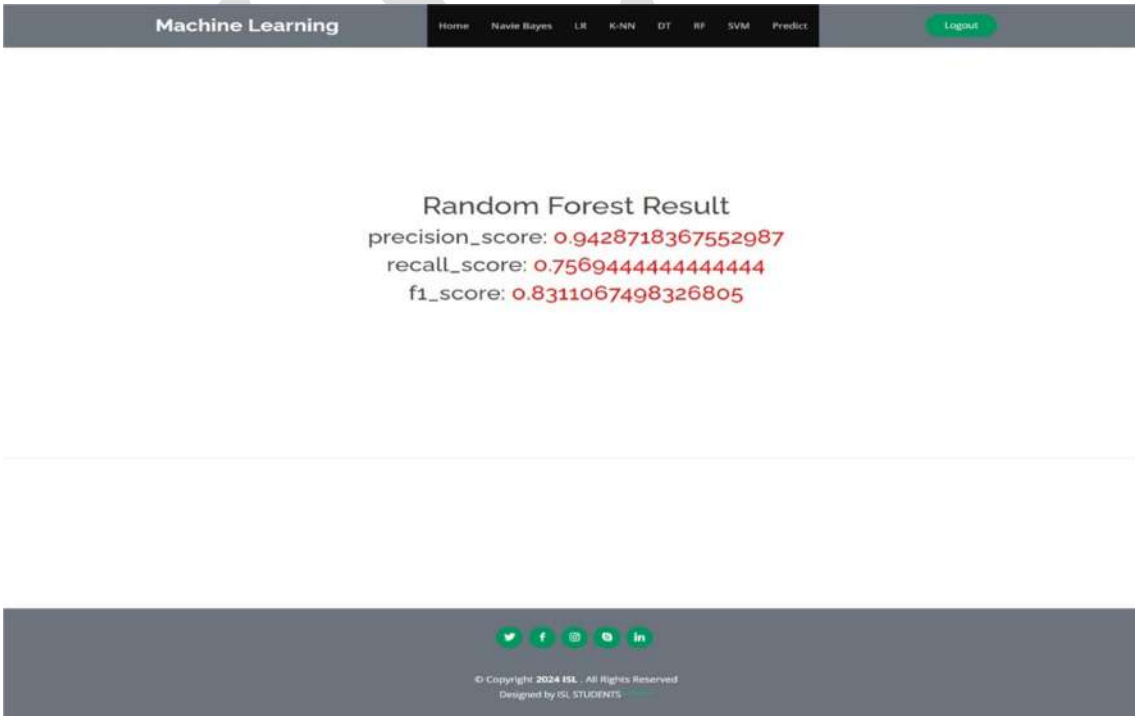
KNN results:

KNN Result
precision_score:0.8484576815733109
recall_score: 0.7291666666666666
f1_score: 0.7775008538980446

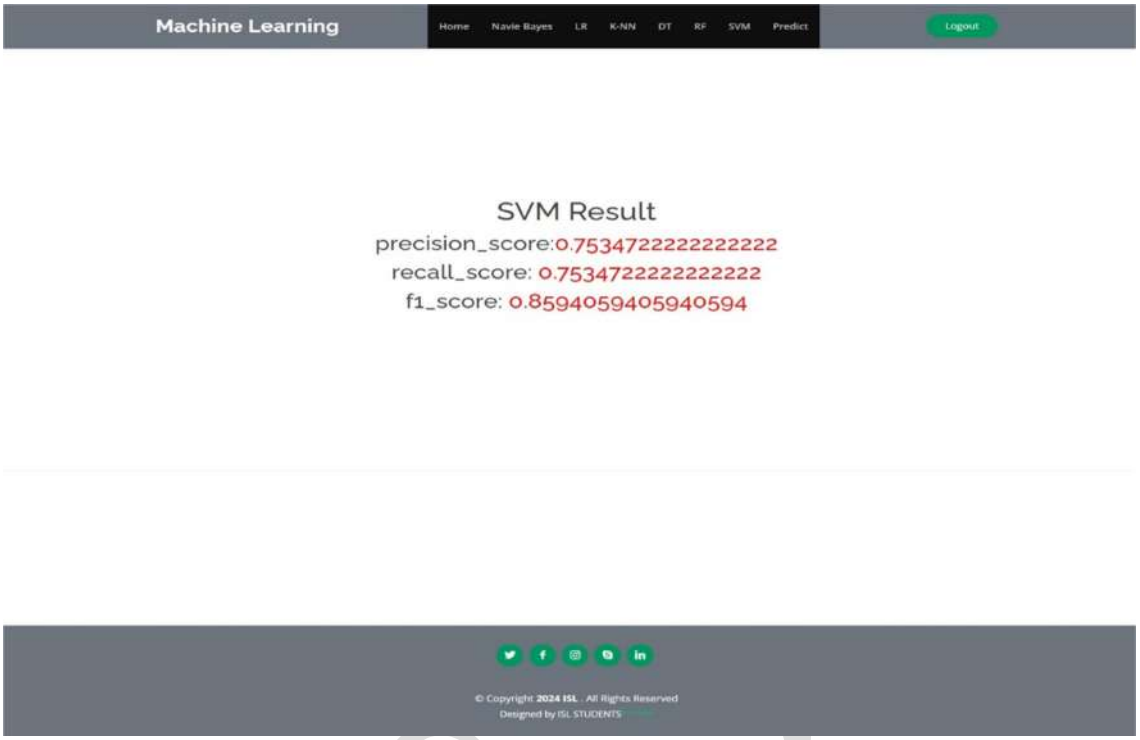
Decision tree results:



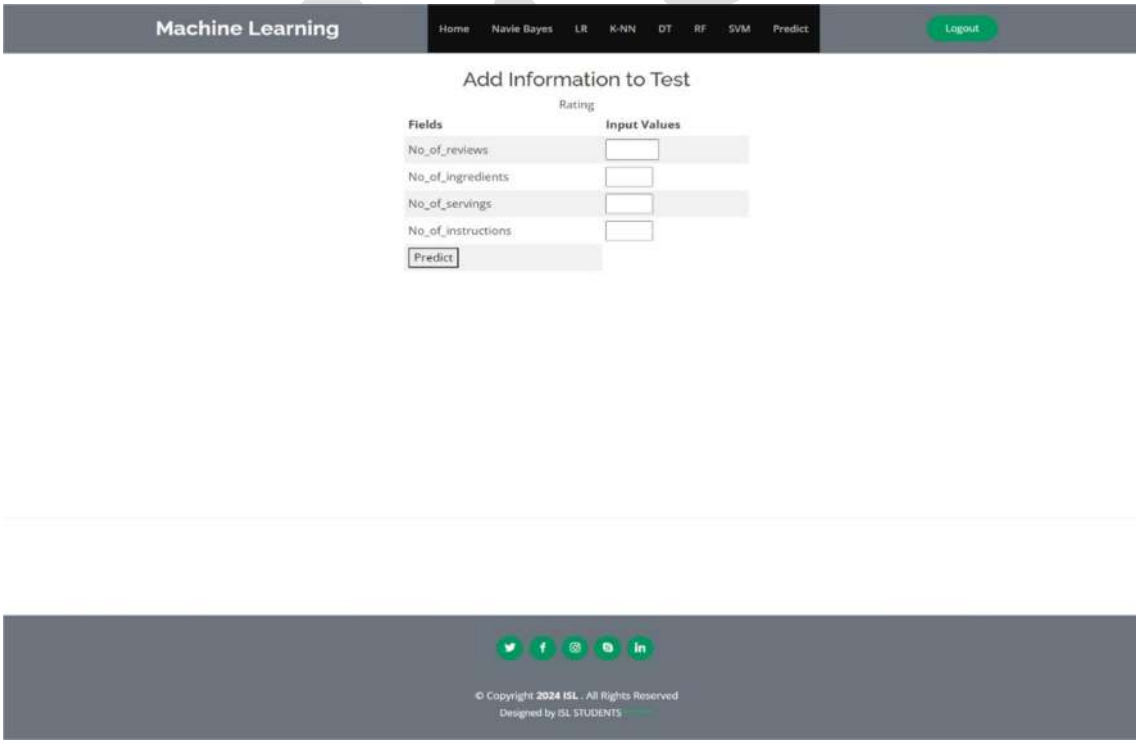
Random forest results:



SVM results:



Prediction results:



CONCLUSION

In this study we have tried to apply different machine learning algorithms to see and compare how well they do in rating a recipe. However, this study isn't only about rating recipes. This Is also an experimental study to see if we can actually rate recipes using machine learning. We had 28,954 instances from there we tested on 20%of them. Since the lowest testing accuracy achieved is 81% after experimenting with different classifiers we are optimistic about that. Based on what has been covered in this research study we can still make some improvements. More Attributes can be added and analyzed as we have a limited number of attributes. Also with more attributes and data we can try to find out how healthy a recipe is. After collecting more instances we can test how neural networks perform in rating recipes as there have been many studies recently using neural networks on food science.

REFERENCES:

[1] Niphat Claypo and Saichon Jaiyen. Opinion mining for thai restaurant reviews using neural networks and mrmr featureselection.In2014 International Computer Science and Engineering Conference (ICSEC), pages 394–397. IEEE,2014

[2] Yi Luo and Xiaowei Xu. Predicting the helpfulness of online restaurant reviews using different machine learning algorithms: A case study of yelp. Sustainability, 11(19):5254.

[3] Lei Zhou, Chu Zhang, Fei Liu, Zhengjun Qiu, and YongHe. Application of deep learning in food: A review. Comprehensive Reviews in Food Science and Food Safety,18(6):1793–1811, 2019.

[4]Burusothman Ahiladas, Paraneetharan Saravanaperumal,Sanjith Balachandran, Thamayanthy Sripalan, and SurangikaRanathunga. Ruchi: Rating individual food items in restau-rant reviews.InProceedings of the 12th InternationalConference on Natural Language Processing, pages 209–214, 2015

[5] Jiayu Wu and Tianshu Ji. Deep learning for amazon food review sentiment analysis.

[6] Qiwei Gan, Bo H Ferns, Yang Yu, and Lei Jin. A text mining and multidimensional sentiment analysis of online restaurant reviews.Journal of Quality Assurance in Hospitality & Tourism, 18(4):465–492, 2017

[7] Lindsey Wright. Classifying textual fast food restaurant reviews quantitatively using text mining and supervised machine learning algorithms. 2018 [8] Thomas G Dietterich et al.Ensemble learning. The Handbook of brain theory and neural networks, 2:110–125,2002