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# Machine Learning Application for Black Friday Sales Prediction Framework

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***Abstract:*** ***Understanding the purchase behavior of various customers (dependent variable) against different products using their demographic information (IS features where most of the features are self -explanatory. This dataset consist of null values, redundant and unstructured data.***
***Machine learning is the most common applications in the domain retail industry. This concept helps to develop a predictor that has a distinct commercial value to the shop owners as it will help with their inventory management, financial planning, advertising and marketing.***
***This entire process of developing a model includes preprocessing, modelling, training testing and evaluating. Hence, frameworks will be developed to automate few of this process and its complexity will be reduced. The algorithm we proposed was Random Forest regressor that performed an average accuracy of 83.6% and with minimum RMSE (Root Mean Squared Error) value of 2829 on tire Black Friday sales dataset.***
***Keywords: Demographic, Redundant, Inventory, Regressor, RMSE***

## I. INTRODUCTION

"Black Friday" is the name given to the shopping day after thanksgiving. This day was actually considered as "Black Friday" on the grounds that the number of customers made auto collisions and some of the time even violence [1], [2].
Police begat the saying to depict the disorder encompassing the congestion of pedestrian and auto traffic in downtown shopping regions. In retail industry, the number of sales play an important part that decide the loss a profit for the company. Predicting the sales accurately gives the efficient industry management.
Black Friday is like a carnival sale in the USA. In this day huge sale occurs in a very less price for the products which are much demanded. To incur the sales, a prediction model is made to hover on the type of product which is sold in maximum numbers. A customer's behavior is to be analyzed in order to predict the amount of purchase to be done by him/her on a particular day. In this paper, we will predict the sales of a company on "Black Friday" [3].
To predict the sales of different products based on their independent variables, we need to analyze the relationship between different variables and well organize the darn. So that a model can perform calculations and predicts sales accurately.

## II. MOTIVATION

Predicting customer behavior is one of the most popular applications of Machine Learning in various fields like Finance, Sales, Marketing. Building such predictive models, we can predict the impact of the decisions taken on the growth of our organization.

## III. OBJECTIVES

*1)* Analyzing the data of all the customers and finding relationship of independent variables with respect to the target variable
*2)* Predicting the expected sales by testing and training

## IV. SYSTEM ARCHITECTURE

### *A. System Architecture*

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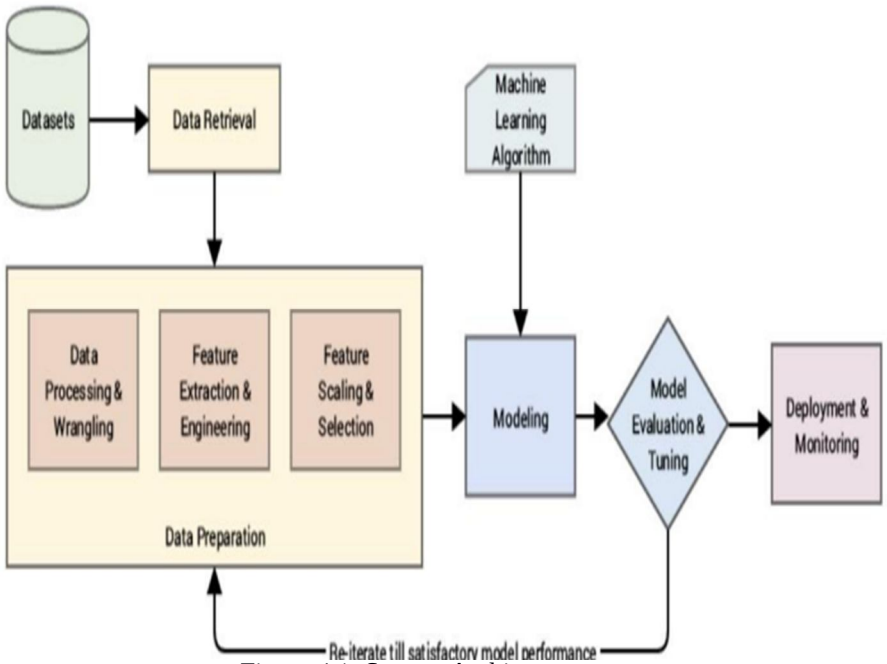



Figure 4.1: System Architecture

*B. Data Flow Diagrams*

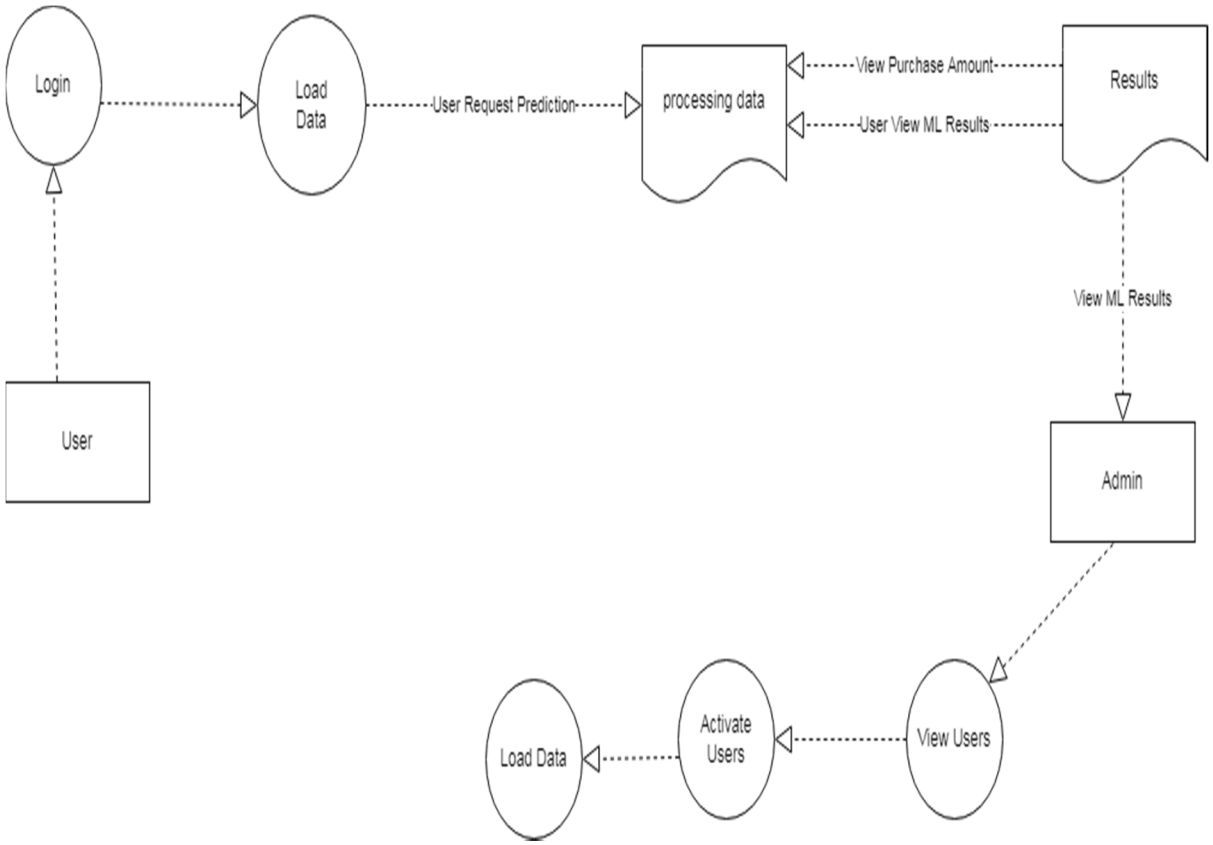



Figure 4.2: Data Flow Diagram

## V. UML DIAGRAMS

The UML diagrams consist of the class diagram, use case diagram, activity diagram, sequence diagram.

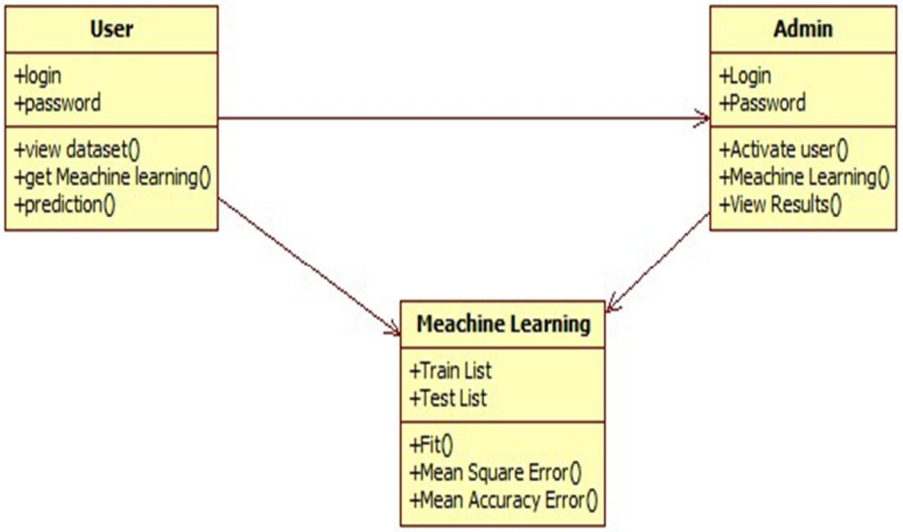



Figure 5.1 Class Diagram

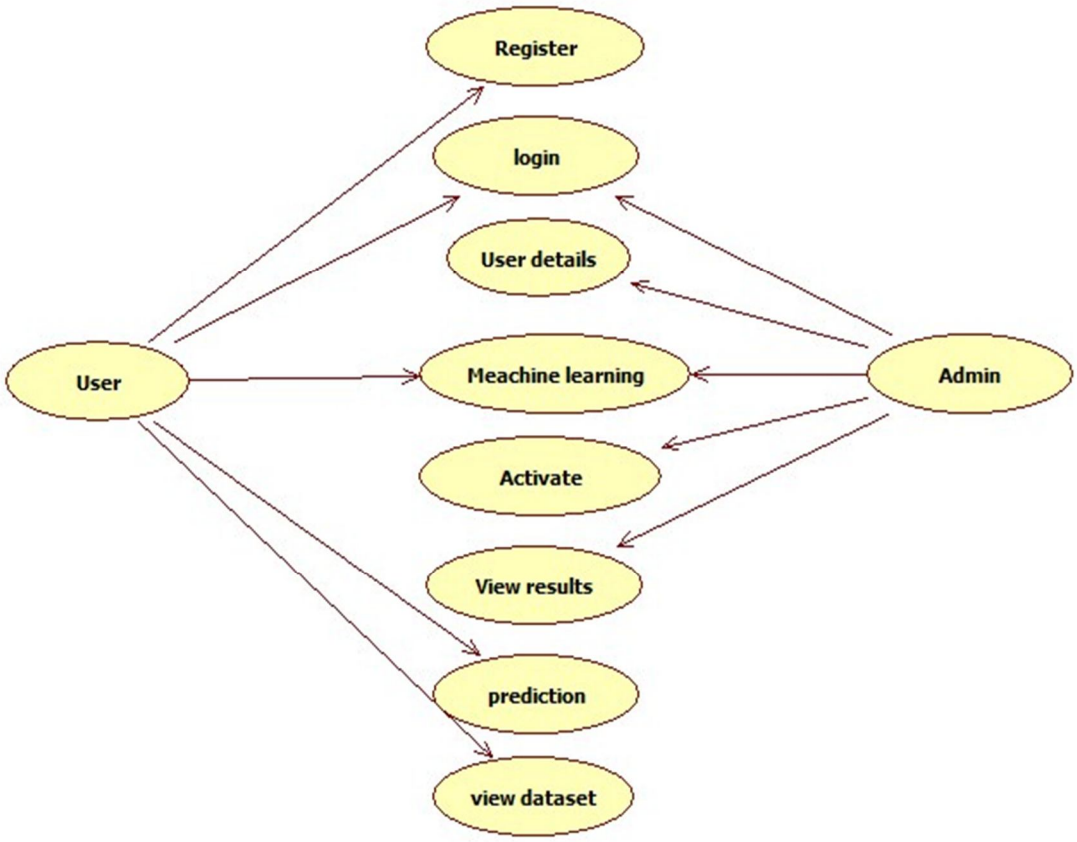



Figure 5.2 Use Case Digram

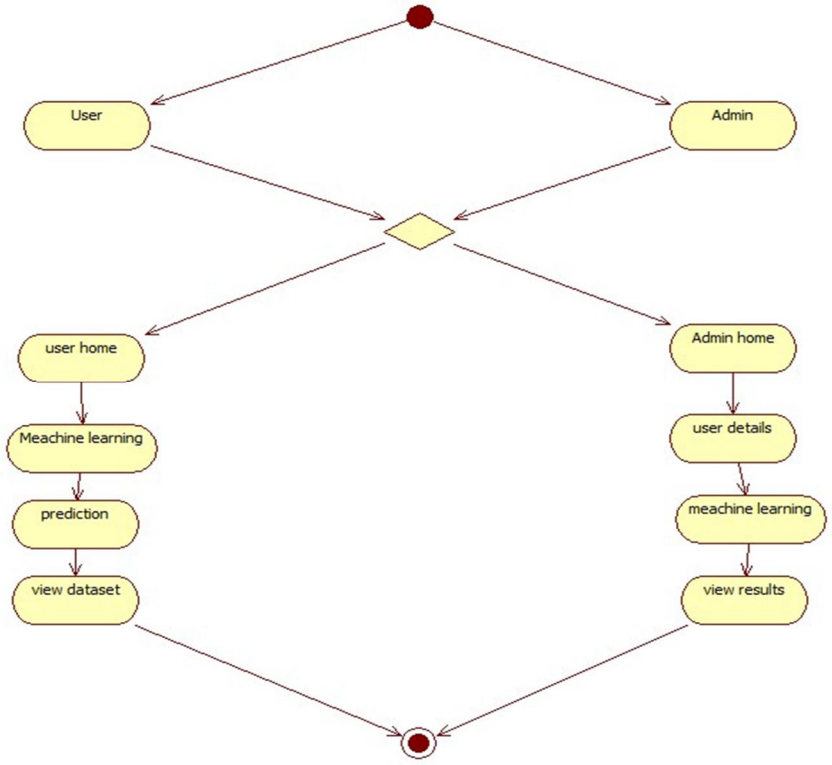



Figure 5.3 Activity Diagram

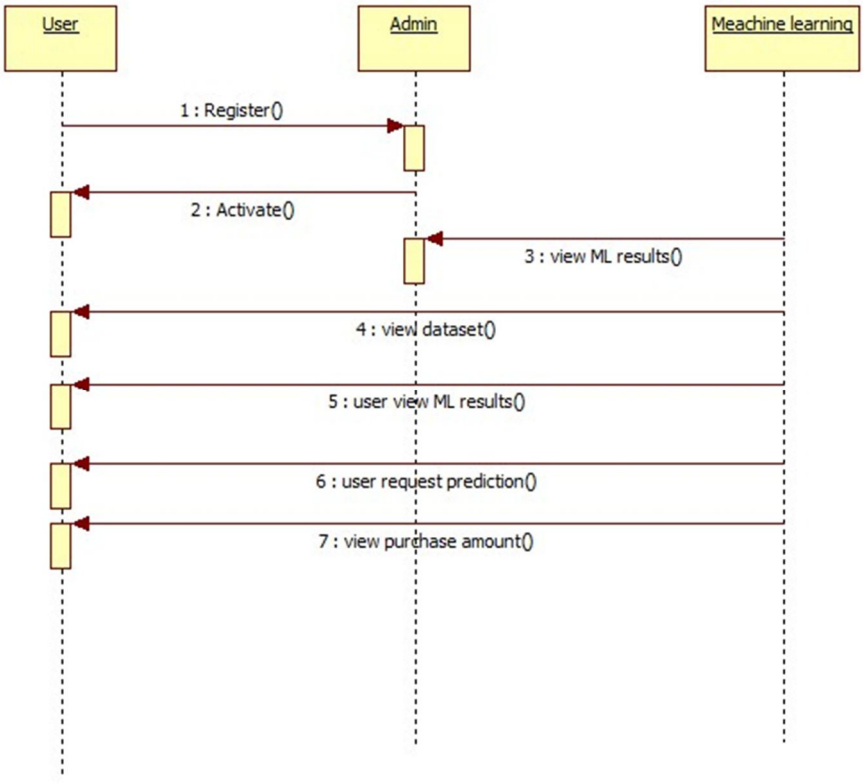



Figure 5.4 Sequence Digram

## VI. HARDWARE AND SOFTWARE REQUIREMENTS

*A. Software Requirements Specification*

*1)* Operating system : Windows 10.
*2)* Coding Language : Python
*3)* Tool : PyCharm, Visual Studio Code
*4)* Database : SQLite

*B. Hardware Requirements Specification*

*1)* System : Intel i5 6 core.
*2)* Hard Disk : 500 GB SSD.
*3)* Monitor : 15'' LED
*4)* Input Devices : Keyboard, Mouse
*5)* Ram : 32 GB.

## VII. APPLICATIONS

*1)* Application for sales prediction
*2)* Website to show the timeline when the product rates differ the most
*3)* E-Commerce sites

## VIII. CONCLUSION

Machine Learning (ML) can be used for the various tasks. This research work presents the use of ML algorithm for the prediction of the amount that a customer is likely to spend on next "Black Friday" sale. It has been performed that the exploratory data analysis is used to find interesting trends from the dataset. This research work suggests that when the user tries to predict the product that the customer is more likely to purchase, according to the customer's gender, age and occupation. Experiments states that our method can produce more accurate prediction when compared to the techniques like decision trees, ridge regression etc. A comparison of various methods are summarized. Also, we have concluded that our model with lowest RMSE perform better than exiting models.

## IX. ACKNOWLEDGMENT

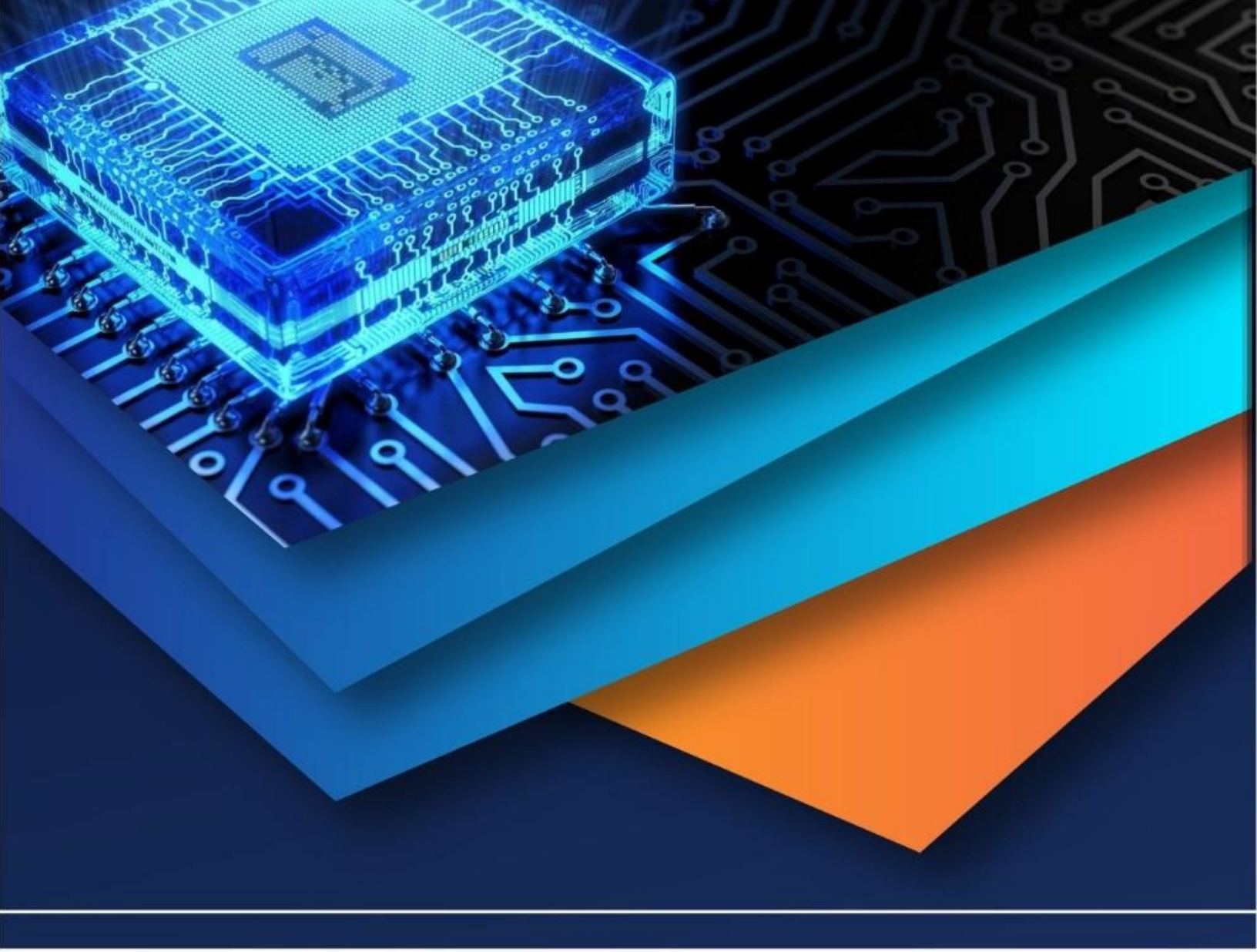
It gives us great pleasure in presenting the preliminary project report on 'Machine Learning Application For Black Friday Sales Prediction Framework'. I would like to take this opportunity to thank our internal guide Prof. S.B. Nimbekar and head of Department, Dr. R. V. Babar for giving us all the help and guidance we needed. We are really grateful to them for there kind support. There valuable suggestions were very helpful.

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