Batch No – 3

WAITER'S TIP

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Abstract

The hospitality industry thrives on exceptional service, and one crucial aspect of this service is the gratuity received by waitstaff. In this project, we explore the application of machine learning techniques to predict waiter tips based on various factors. By leveraging a dataset comprising information such as meal cost, party size, day of the week, and other relevant features, we aim to build a predictive model that enhances our understanding of tipping patterns. The dataset is preprocessed to handle missing values, outliers, and categorical variables, ensuring the robustness of the model. Exploratory Data Analysis (EDA) is conducted to gain insights into the relationships between different features and tipping behavior. Feature engineering is employed to extract meaningful information from the data, enhancing the predictive power of the model. This project not only demonstrates the practical application of machine learning in the hospitality industry but also offers actionable insights that can be leveraged to improve service quality and increase waiter earnings. The results contribute to a deeper understanding of tipping dynamics and pave the way for future research in the realm of customer behavior prediction in service-oriented businesses.

Introduction

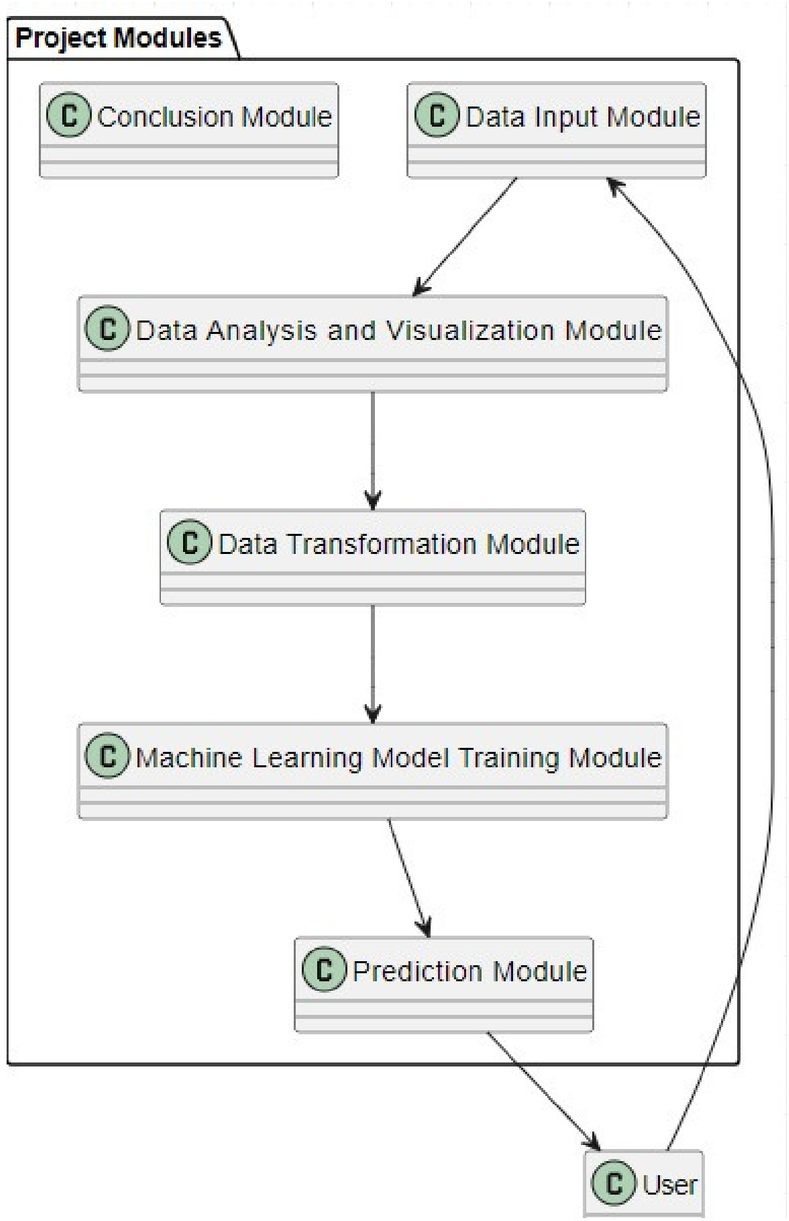
In an era where data-driven decision-making is reshaping industries, our project delves into the realm of the hospitality industry, specifically focusing on predicting waiter tips using machine learning. The gratuities received by waitstaff play a pivotal role in the service-oriented sector, and understanding the intricate dynamics behind tipping behavior is crucial for optimizing service strategies. Leveraging a rich dataset encompassing variables such as meal cost, party size, and day of the week, we embark on a journey of preprocessing, exploratory data analysis, and feature engineering to build a robust predictive model. By evaluating diverse machine learning algorithms, we aim to not only accurately predict tip amounts but also unearth the factors that significantly influence tipping behavior. The interpretability of our model becomes paramount, offering actionable insights for restaurant owners and managers to enhance service quality, improve customer satisfaction, and boost waiter earnings. This project not only showcases the practical application of machine learning in the hospitality sector but also contributes to a nuanced understanding of customer behavior prediction, laying the groundwork for future research and advancements in service-oriented businesses.

Literature Survey

S.No	Authors name and year of publication	Title name and journal name	Abstract or objectives	Techniques used	Limitations
1.	Sunil Bhutada, Chandana Kavuri , Sanjana Marru, Anusha Tanniru, 2022	Predicting waiters prompt service by analyzing restaurants rating and other factors using machine learning	This project aims to predict waiters prompt service and analyze how other factors like Restaurant's ranking, Ambience, customers finance	Random Forest Regressor	Data quality issues, overfitting and generalization
2.	Alex Mirugwe, 2020	Restaurant Tipping Linear Regression Mod	The goal of the exercise is to build a linear model for predicting the average amount of tip is expected to earn from the restaurant given the predictor variables	Linear regression model	Assumption of linearity and independence
3.	Dadang Priyanto, Muhammad Zarlis, Anthony Anggrawan, 2021	Determination of Giving 'Tips' Using Fuzzy Logic To Determine Restaurant Customer Service Satisfaction	As in this study, it was used to calculate the ideal amount of 'tips' for restaurant waiters based on the service provided by restaurant waiters.	Fuzzy Logic	Lack of standardization
4.	Jeremy E. Whaley Martin A. O'Neill Auburn University, 2020	To tip or not to tip? An exploratory study of the motivations driving consumer tipping behavior	This paper intends to shed light upon consumers' motivations to tip. The initial part of the study began with a modest literature review of the topic	Factor analysis	Quantitative scale limitations

Proposed System

The proposed system for this project involves the development and implementation of a machine learning model designed to predict waiter's tips in a restaurant setting. Leveraging a diverse set of input features, including total bill, service duration, and customer demographics, the model aims to discern intricate patterns and relationships within the data. Through training on historical tipping data, the model will learn to identify key factors influencing tipping behavior. Once trained, it can be deployed to make real-time predictions, providing valuable insights for restaurant owners and waitstaff. The anticipated outcome is a predictive tool that not only enhances our understanding of tipping dynamics but also empowers businesses to optimize service strategies, improve customer satisfaction, and ultimately maximize tipping outcomes.



Block Diagram

1. User Interface:

User Represents the end-user interacting with the system.

2. Project Modules:

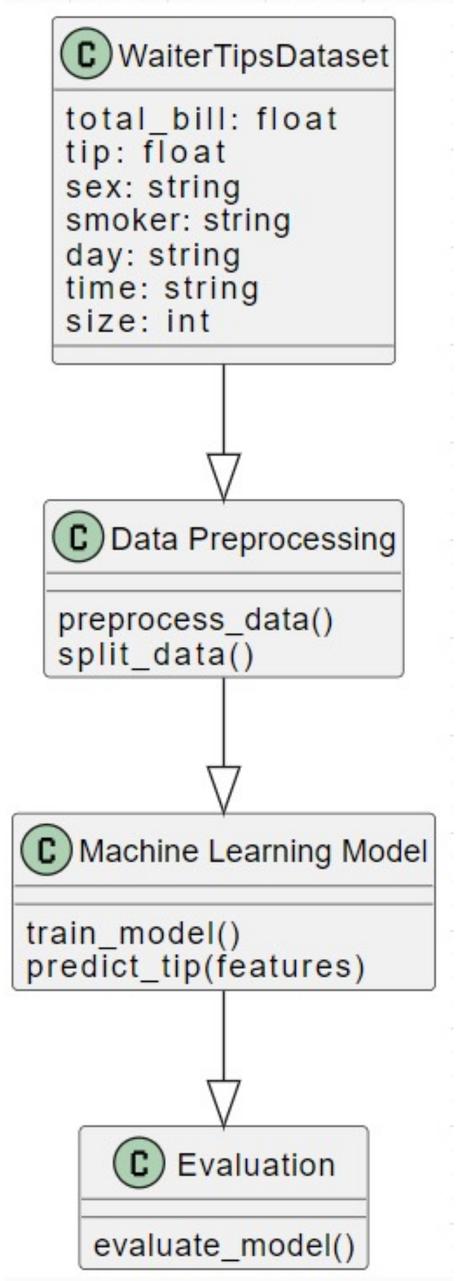
(i) Data Input Module: Ingests structured data, including features like total_bill, tip, gender, smoking status, day, time, and party size.

(ii)Data Analysis and Visualization Module: Performs statistical analysis and generates visualizations to understand relationships between variables.

(iii)Data Transformation Module: Converts categorical features into numerical values suitable for machine learning.

(iv)Machine Learning Model Training Module: Utilizes the transformed data to train a Linear Regression model to predict tips.

(v)Prediction Module: Accepts new input features and employs the trained model to predict tip amounts.



System Architecture

1. Data Transformation Process:

The Data Transformation Module converts categorical features, such as gender and smoking status, into numerical values, ensuring compatibility with machine learning models, and facilitating meaningful analysis and predictions.

2. Prediction Process:

The Prediction Module utilizes a trained Linear Regression model to predict tip amounts based on input features, offering insights into expected tips for different scenarios in the restaurant setting.

System Requirements

Hardware Requirements:

-CPU : Processor i5 or more

-RAM : 8GB

-Operating System

Software Requirements:

-Jupyter Notebook

-Anaconda Navig

-Python 3.8

Non Functional Requirements

Reliability:

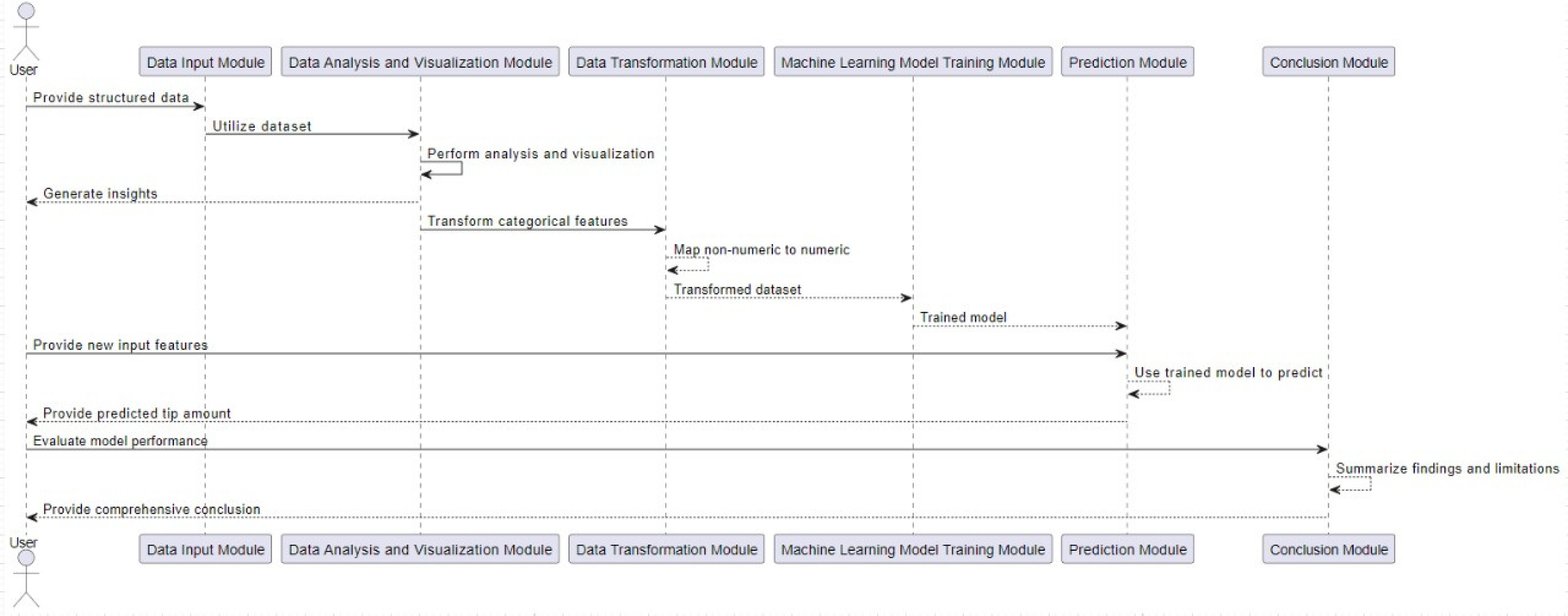
The software should be able to detect the URL type accurately,irrespectivec of no of attempts.

It should be able to give the faster response as output.

Scalability:

The software should be able to differentiate the class of all the URLs ands should be user friendly for yielding better results.

Module Design:



Thank You