Data Collection and Preprocessing Phase

Date	June 2024
Team ID	Team-739764
Project Title	Auto Insurance Fraud Detection Using Machine Learning
Maximum Marks	6 Marks

Preparation Template

The images will be preprocessed by resizing, normalizing, augmenting, de noising, adjusting contrast, detecting edges, converting color space, cropping, batch normalizing, and whitening data. These steps will enhance data quality, promote model generalization, and improve convergence during neural network training, ensuring robust and efficient performance across various computer vision tasks.

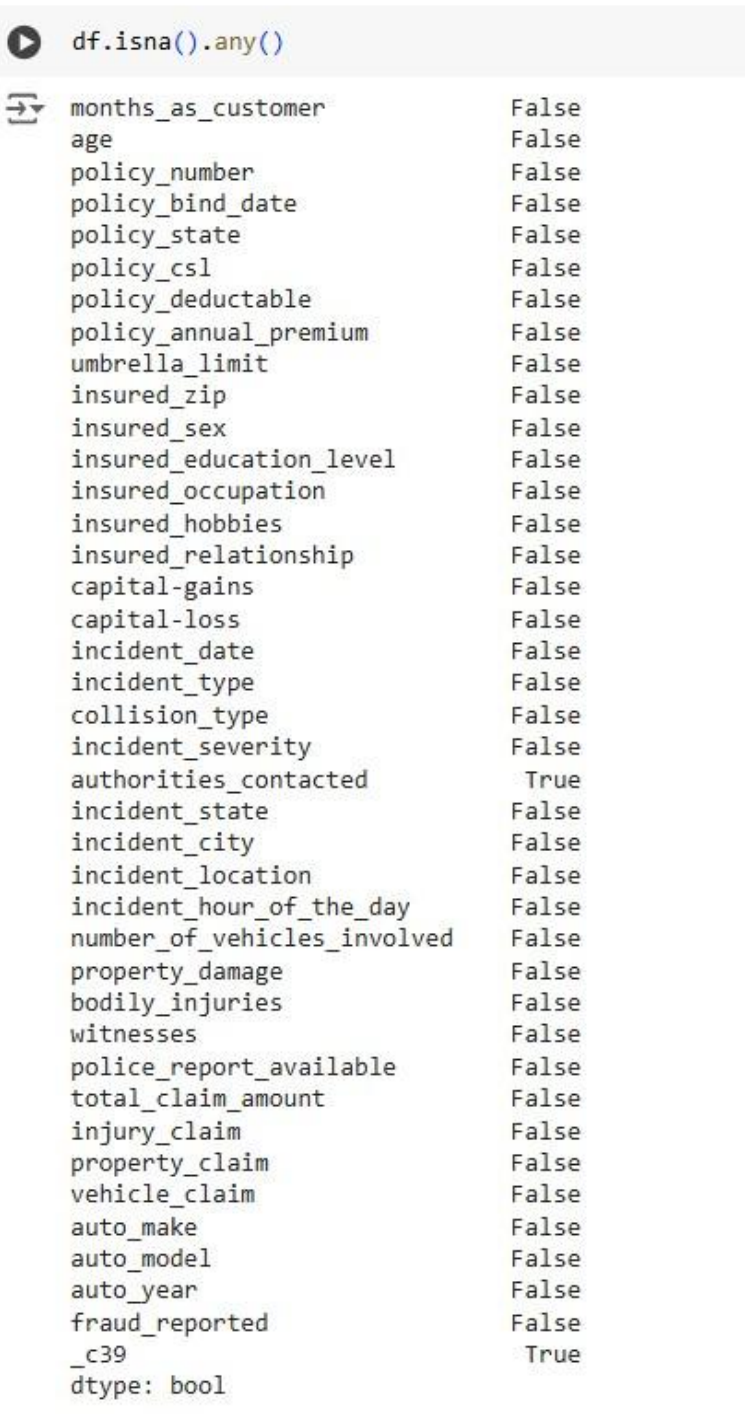
Section	**Description**
Data Overview	There are many popular open sources for collecting the data. E.g.: kaggle.com, UCI repository, etc. In this project we have used .csv data.
Data Preparation	These are the general steps of pre-processing the data before using it for machine learning
Handling missing values	We use Handling missing values For checking the null values
Handling categorical data	As we can see our dataset has categorical data we must convert the categorical data to integer encoding or binary encoding
Handling Outliers in Data	With the help of boxplot, outliers are visualized. And here we are going to find upper bound and lower bound of numerical features with some mathematical formula.

Data Preparation

Collect the dataset	Please refer to the link given below to download the dataset. Link: https://www.kaggle.com/datasets/buntyshah/auto-insurance-claims-data

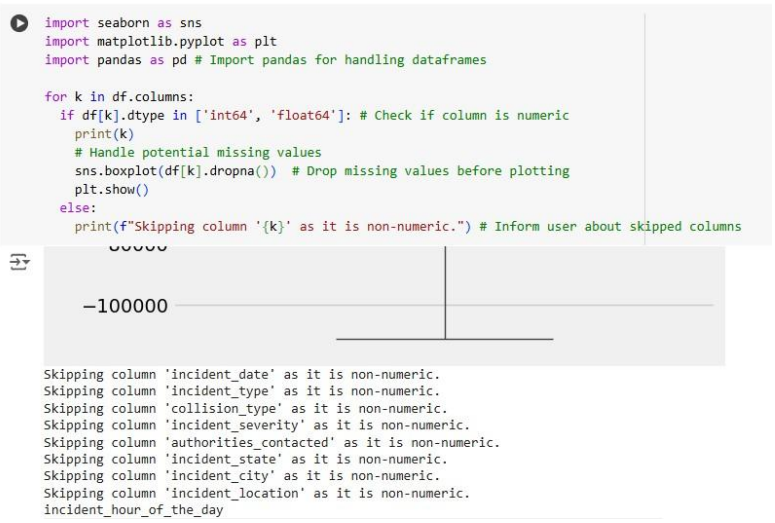
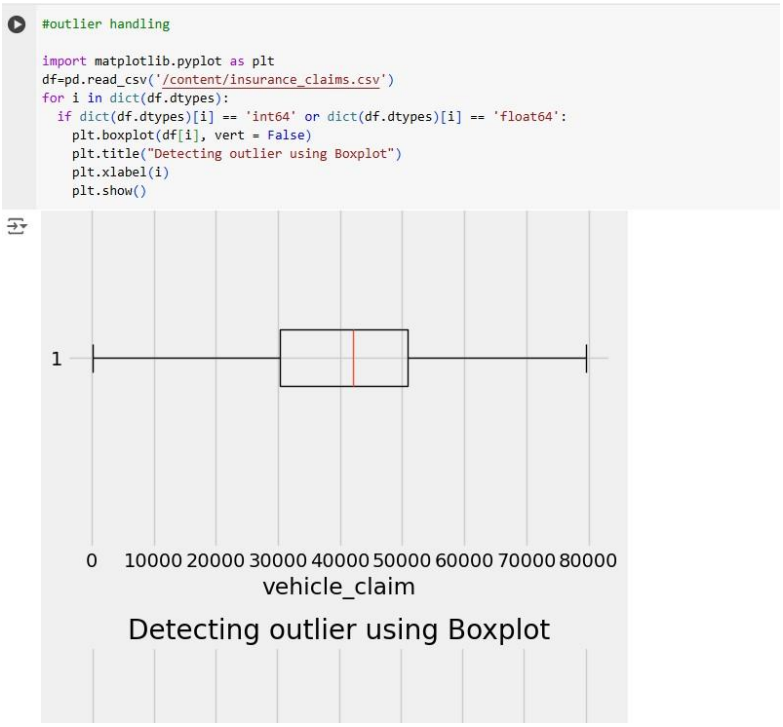
Importing the libraries	`import numpy as np`
	`import pandas as pd`
	`import matplotlib.pyplot as plt`
	`import seaborn as sns`
	`from sklearn.model_selection import train_test_split`
	`from sklearn.ensemble import RandomForestClassifier,GradientBoostingClassifier`
	`from sklearn.tree import DecisionTreeClassifier`
	`from sklearn.neighbors import KNeighborsClassifier`
	`from sklearn.metrics import f1_score`
	`from sklearn.metrics import classification_report,confusion_matrix`
	`import warnings`
	`import pickle`
	`from scipy import stats`
	`warnings.filterwarnings('ignore')`

Loading Data	We use the code `df=pd.read_csv("/content/Train.csv")` For reading the dataset

Handling missing values	

```
df.isna().any()
```

```
months_as_customer             False
age                            False
policy_number                  False
policy_bind_date               False
policy_state                   False
policy_csl                     False
policy_deductable              False
policy_annual_premium          False
umbrella_limit                 False
insured_zip                    False
insured_sex                    False
insured_education_level        False
insured_occupation             False
insured_hobbies                False
insured_relationship           False
capital-gains                  False
capital-loss                   False
incident_date                  False
incident_type                  False
collision_type                 False
incident_severity              False
authorities_contacted           True
incident_state                 False
incident_city                  False
incident_location              False
incident_hour_of_the_day       False
number_of_vehicles_involved    False
property_damage                False
bodily_injuries                False
witnesses                      False
police_report_available        False
total_claim_amount             False
injury_claim                   False
property_claim                 False
vehicle_claim                  False
auto_make                      False
auto_model                     False
auto_year                      False
fraud_reported                 False
_c39                            True
dtype: bool
```

Handling Categorical values	
Handling Outliers	

```
import seaborn as sns
import matplotlib.pyplot as plt
import pandas as pd # Import pandas for handling dataframes

for k in df.columns:
  if df[k].dtype in ['int64', 'float64']: # Check if column is numeric
    print(k)
    # Handle potential missing values
    sns.boxplot(df[k].dropna())  # Drop missing values before plotting
    plt.show()
  else:
    print(f"Skipping column '{k}' as it is non-numeric.") # Inform user about skipped columns
```



```
Skipping column 'incident_date' as it is non-numeric.
Skipping column 'incident_type' as it is non-numeric.
Skipping column 'collision_type' as it is non-numeric.
Skipping column 'incident_severity' as it is non-numeric.
Skipping column 'authorities_contacted' as it is non-numeric.
Skipping column 'incident_state' as it is non-numeric.
Skipping column 'incident_city' as it is non-numeric.
Skipping column 'incident_location' as it is non-numeric.
incident_hour_of_the_day
```

```
#outlier handling

import matplotlib.pyplot as plt
df=pd.read_csv('/content/insurance_claims.csv')
for i in dict(df.dtypes):
  if dict(df.dtypes)[i] == 'int64' or dict(df.dtypes)[i] == 'float64':
    plt.boxplot(df[i], vert = False)
    plt.title("Detecting outlier using Boxplot")
    plt.xlabel(i)
    plt.show()
```