CREDIT CARD APPROVAL PREDICTION

Mini Project Report

Submitted by

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Submitted in partial fulfillment of the requirements for the award of the degree of

Master of Computer Applications
Of
A P J Abdul Kalam Technological University

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)®
ANGAMALY-683577, ERNAKULAM(DIST)
FEBRUARY 2022

DECLARATION

I hereby declare that the report of this project work, submitted to the Department of Computer Applications, Federal Institute of Science and Technology (**FISAT**), Angamaly in partial fulfillment of the award of the degree of Master of Computer Application is an authentic record of our original work.

The report has not been submitted for the award of any degree of this university or any other university.

Date : 30-01-2022

Place: Angamaly

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)®

ANGAMALY, ERNAKULAM-683577

DEPARTMENT OF COMPUTER APPLICATIONS

CERTIFICATE

This is to certify that the project report titled **"CREDIT CARD APPROVAL PREDICTION"** submitted by **UNNIMAYA P U** towards partial fulfillment of the requirements for the award of the degree of Master of Computer Applications is a record of bonafide work carried out by them during the year 2022.

Project Guide **Head of the Department**

Submitted for the viva-voice held on ..... at .....

Examiner1 :

Examiner2 :

ACKNOWLEDGEMENT

Gratitude is a feeling which is more eloquent than words, more silent than silence. To complete this project work we needed the direction, assistance and cooperation of various individuals, which is received in abundance with the grace of God.

We hereby express our deep sense of gratitude to **Dr. Manoge George**, Principal of FISAT and **Dr. C Sheela**, Vice principal of FISAT, for allowing us to utilize all the facilities of the college.

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Finally we wish to express a whole heart-ed thanks to our parents, friends and well-wishers who extended their help in one way or other in preparation of our project. Besides all, We thank GOD for everything.

ABSTRACT

Nowadays, banks receive a lot of applications for issuance of credit cards. Many of them rejected for many reasons, like high-loan balances, low-income levels, or too many inquiries on an individual's credit report. Manually analyzing these applications is error-prone and a time-consuming process. Credit risk as the board in banks basically centers around deciding the probability of a customer's default or credit decay and how expensive it will end up being assuming it happens. It is important to consider major factors and predict beforehand the probability of consumers defaulting given their conditions. Which is where a machine learning model comes in handy and allows the banks and major financial institutions to predict whether the customer, they are giving the loan to, will default or not.

This project builds a machine learning model with the best accuracy possible using python. First we load and view the dataset. The dataset has a combination of both mathematical and non-mathematical elements, that it contains values from various reaches, in addition to that it contains a few missing passages. We preprocess the dataset to guarantee the AI model we pick can make great expectations. After the information is looking great, some exploratory information examination is done to assemble our instincts. Finally, we will build a machine learning model that can predict if an individual's application for a credit card will be accepted. Using various tools and techniques we then try to improve the accuracy of the model. Using Data Analysis and Machine Learning, we attempted to determine the most essential parameters for obtaining credit card acceptance in this project.

Contents

Chapter 1

INTRODUCTION

Banks receive a lot of credit card applications. Many of the applications do not get approved for a variety of reasons, like increased loan balances or poor-income levels. Manually analyzing these applications can be very time-consuming and full of human errors. Thankfully, we can automate this task with the help of machine learning.

This project builds a machine learning model with the best accuracy possible using python. First we load and view the dataset. The dataset has a combination of both mathematical and non-mathematical elements, that it contains values from various reaches, in addition to that it contains a few missing passages. We preprocess the dataset to guarantee the AI model we pick can make great expectations. After the information is looking great, some exploratory information examination is done to assemble our instincts. Finally, we will build a machine learning model that can predict if an individual's application for a credit card will be accepted.

Chapter 2

PROOF OF CONCEPT

2.1 Existing System

Credit score cards are a common risk control method in the financial industry. It uses personal information and data submitted by credit card applicants to predict the probability of future defaults and credit card borrowings. The bank is able to decide whether to issue a credit card to the applicant. Credit scores can objectively quantify the magnitude of risk.At present it is a manual process.we can automate this task with the help of machine learning.

2.2 Proposed System

The proposed CREDIT CARD APPROVAL PREDICTION predicts whether an application of credit card should be approved or rejected. We will build a machine learning model that can predict if an individual's application for a credit card will be accepted. Using various tools and techniques we then try to improve the accuracy of the model.Using Data Analysis and Machine Learning, we attempted to determine the most essential parameters for obtaining credit card acceptance in this project.

Chapter 3

SCRUM MEETINGS

On 17-11-2021

On this day we started our project discussion that was accepted on 15th December 2021. Our project topic is ”CREDIT CARD APPROVAL PREDICTION”.

On 20-12-2021

On this day we discussed about the basic requirements needed for the project. Then I decided to do the project in python using Visual Studio.

On 22-09-2021

This day we started learning Machine Learning algorithms. Also searched some videos and research papers related to the project for getting more information.

On 10-01-2022

First Review

On 17-01-2022

Started ML model development

On 19-01-2022

Model Evaluation

On 31-01-2022

Started developing of UI

On 23-02-2022

Final Presentation

On 25-02-2022

Started documentation

Chapter 4

IMPLEMENTATION

CREDIT CARD APPROVAL PREDICTION - In this project, we will be build an automatic credit card approval predictor using machine learning techniques, just like the real banks do.We use Visual Studio to develop the data science code and Flask server as framework to connect the model code and the User Interface. The back-end is Python and server is Streamlit.

4.1 Algorithm

Linear Regression

Linear regression method is used for predicting the value of the dependent variable by using the values of the independent variable.The linear regression model is suitable for predicting the value of a continuous quantity. Logistic regression transforms its output using the logistic sigmoid function to return a probability value between 0 and 1. outcome must be a categorical or discrete value.

Decision Tree

Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome.

4.2 System Architecture

The diagram that describes the operation of the system (figure 4.1)

4.3 Work flow of the system

Work flow of system that describe the flow and the process of the system (figure 4.2)

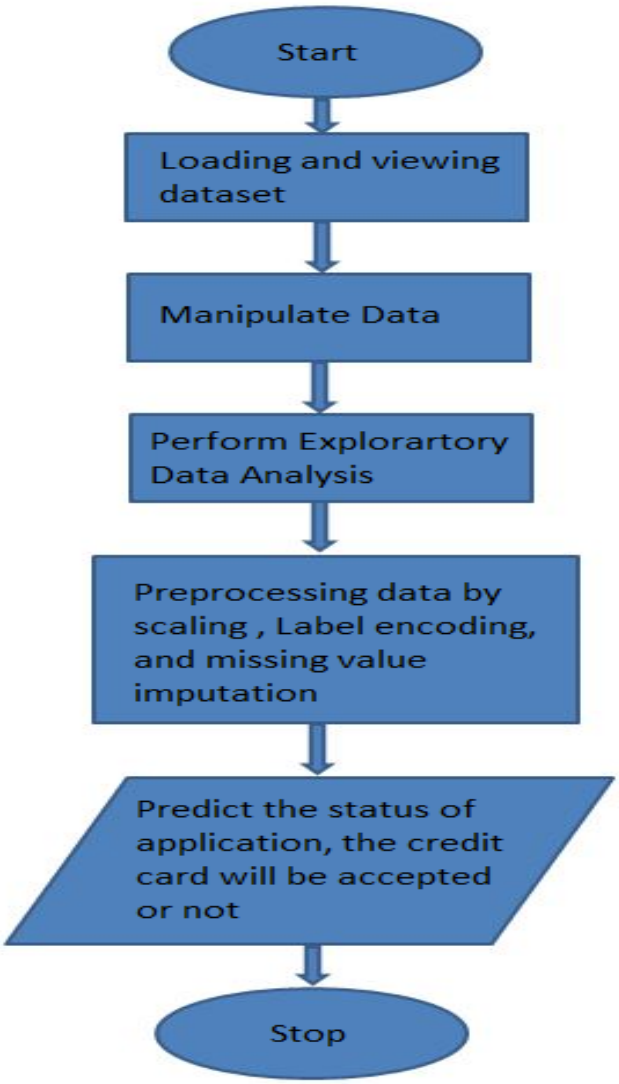

Figure 4.1: Structure or Architecture of the system

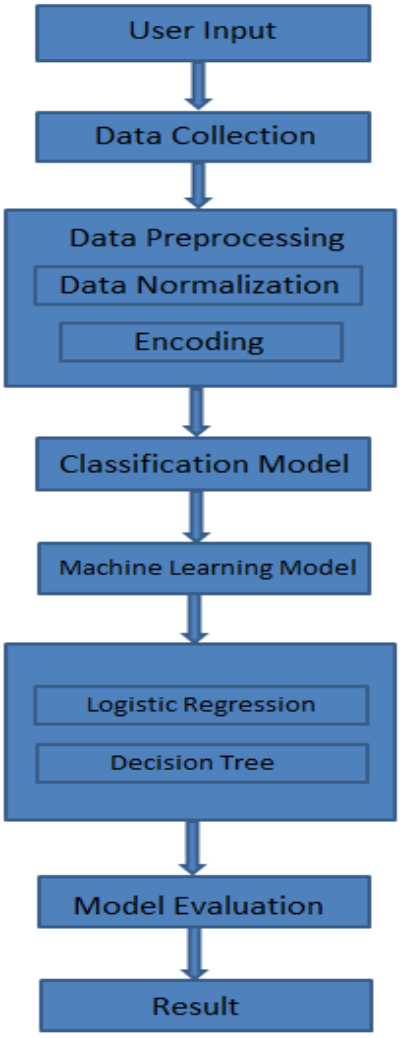

Figure 4.2: workflow of the system

4.4 Dataset

The "cc_approvals" is the dataset. It include 690 data tuple and 16 features such as CIBIL history, self employed etc.

4.5 Modules

4.5.1 Data set Collection

The various tasks are :

4.5.2 Data prepossessing

Next step to explore and analysis the data set. Firstly read the data set. Then analyse the data set using the describe method and check if any null values are present our data set using "isnull()" function

4.5.3 Data Transformation

Before run the models, we have to convert all categorical values (text values) to numerical values. In our data set, we can see that we have multiple fields such as "Gender","Married","Dependents","Education_status","Employment_status","Propertyarea" which is categorical. So we have to convert this field into numerical. It do using the label encoder function .

4.5.4 Splitting data

The dataset was split for training and testing, We are using 80% of the data for training and 20% of the data for testing.X and y splitting was done to predict the credit card approval. The train_test_split package library was used to do the splitting

4.5.5 Modelling Training

After splitting the dataset we are applying the data model. Here I used Linear-Regression model and the Desicion Tree model to predict whether the credit card application is approved or not.

4.5.6 Model Evaluation and Testing

The confusion_matrix, classification_report, Matplotlib library, comparing various other models such as kNearestNeighbor, SVM, Naive bayes are used see the accuracy of the model.

Chapter 5

RESULT ANALYSIS

We build the predictor with some machine learning model to predict if a person's application for a credit card would get approved or not given some information about that person.

Chapter 6

CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

The machine learning model we built gave an 81% accuracy for predicting whether the credit card will be approved or not, considering the various factors mentioned in the application of the credit card holder. And we can conclude that the factor that had a major impact on the decision making of whether to approve a credit card application was CIBIL_History.

6.2 Future Scope

Modern credit analyses employ many additional variables like the criminal records of applicants, their health information, net balance between monthly income and expenses. A dataset with these variables could be acquired. It's also possible to add complementary variables to the dataset. This will make the credit simulations more , similar to what is done by the banks before a credit is approved.

Chapter 7

SOURCE CODE

```
from sklearn.metrics import accuracy_score
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report

LR=LogisticRegression()
LR.fit(train_X,train_y)
pred=LR.predict(test_X)
print("Model Accuracy:- ",accuracy_score(test_y,pred))
print(confusion_matrix(test_y,pred))
print(classification_report(test_y,pred))
```

Figure 7.1: LogisticRegression Model code

```
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import confusion_matrix, accuracy_score

lst=[]
for i in range (1,20):

    classifier = DecisionTreeClassifier(criterion="gini", random_state = 0, max_depth=i)
    classifier.fit(X_train, y_train)
    y_pred = classifier.predict(X_test)

    accuracy = accuracy_score(y_test, y_pred)
    lst.append(accuracy)
    print(accuracy)

max_value=max(lst)
max_value_index=lst.index(max_value)
print ("max value :",max_value)
print ("index of max value :",max_value_index)
```

Figure 7.2: Decision Tree Model code

```
from sklearn.tree import DecisionTreeClassifier
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
from sklearn.linear_model import LogisticRegression
from sklearn.ensemble import RandomForestClassifier
```

```
models=[]
models.append(("Logistic Regression",LogisticRegression()))
models.append(("Decision Tree",DecisionTreeClassifier()))
models.append(("Linear Discriminant Analysis",LinearDiscriminantAnalysis()))
models.append(("Random Forest",RandomForestClassifier()))
models.append(("Support Vector Classifier",SVC()))
models.append(("K- Neirest Neighbour",KNeighborsClassifier()))
models.append(("Naive Bayes",GaussianNB()))
```

```
scoring='accuracy'
```

Figure 7.3: Comparing various models

```
def evaluate_model(dt_classifier):
    print("Train Accuracy :", accuracy_score(y_train, dt_classifier.predict(X_train)))
    print("Train Confusion Matrix:")
    print(confusion_matrix(y_train, dt_classifier.predict(X_train)))
    print("-"*50)
    print("Test Accuracy :", accuracy_score(y_test, dt_classifier.predict(X_test)))
    print("Test Confusion Matrix:")
    print(confusion_matrix(y_test, dt_classifier.predict(X_test)))

evaluate_model(dt_best)
```

Figure 7.4: Evaluating model Code

```
result =classifier.predict(  sc.transform( [[   28.749890366, 0, 0, 89082, 217.32115468  ]] )   )
if  result[0] == 0:
    print( "Credit card application will be approved")
else:
    print( "Credit card application will be declined")
```

```
Credit card application will be approved
```

```
result =classifier.predict(  sc.transform( [[  91.612600, 6.0,2.0, 167164.0, 111.588603  ]] )   )
if  result[0] == 0:
    print( "Credit card application will be approved")
else:
    print( "Credit card application will be declined")
```

```
Credit card application will be declined
```

Figure 7.5: Prediction Code

```python
import streamlit as st
from PIL import Image
import pickle

model = pickle.load(open('./Model/ML_Model.pkl', 'rb'))

def run():
    img1 = Image.open('Credit.png')
    img1 = img1.resize((156,145))
    st.image(img1,use_column_width=False)
    st.title("Credit Card Approval Prediction using Machine Learning")

    ## Account No
    account_no = st.text_input('Account number')

    ## Full Name
    fn = st.text_input('Full Name')

    ## For gender
    gen_display = ('Female','Male')
    gen_options = list(range(len(gen_display)))
    gen = st.selectbox("Gender",gen_options, format_func=lambda x: gen_display[x])

    ## For Marital Status
    mar_display = ('No','Yes')
    mar_options = list(range(len(mar_display)))
    mar = st.selectbox("Marital Status", mar_options, format_func=lambda x: mar_display[x])

    ## No of dependets
    dep_display = ('No','One','Two','More than Two')
    dep_options = list(range(len(dep_display)))
    dep = st.selectbox("Dependents",  dep_options, format_func=lambda x: dep_display[x])

    ## For edu
    edu_display = ('Not Graduate','Graduate')
    edu_options = list(range(len(edu_display)))
```

Figure 7.6: Credit.Streamlit Code

```
## For edu
edu_display = ('Not Graduate','Graduate')
edu_options = list(range(len(edu_display)))
edu = st.selectbox("Education",edu_options, format_func=lambda x: edu_display[x])

## For emp status
emp_display = ('Job','Business')
emp_options = list(range(len(emp_display)))
emp = st.selectbox("Employment Status",emp_options, format_func=lambda x: emp_display[x])

## For Property status
prop_display = ('Rural','Semi-Urban','Urban')
prop_options = list(range(len(prop_display)))
prop = st.selectbox("Property Area",prop_options, format_func=lambda x: prop_display[x])

## For Credit Score
cred_display = ('Between 300 to 500','Above 500')
cred_options = list(range(len(cred_display)))
cred = st.selectbox("CIBIL Score",cred_options, format_func=lambda x: cred_display[x])

## Applicant Monthly Income
mon_income = st.number_input("Applicant's Monthly Income($)",value=0)

## Co-Applicant Monthly Income
co_mon_income = st.number_input("Co-Applicant's Monthly Income($)",value=0)

## Loan AMount
loan_amt = st.number_input("Previous Loan Amount",value=0)

## loan duration
dur_display = ['2 Month','6 Month','8 Month','1 Year','16 Month']
dur_options = range(len(dur_display))
dur = st.selectbox("Previous Loan Duration",dur_options, format_func=lambda x: dur_display[x])

if st.button("Submit"):
    duration = 0
    if dur == 0:
```

Figure 7.7: Credit.Streamlit Code

```
    if st.button("Submit"):
        duration = 0
        if dur == 0:
            duration = 60
        if dur == 1:
            duration = 180
        if dur == 2:
            duration = 240
        if dur == 3:
            duration = 360
        if dur == 4:
            duration = 480
            #this loop is the condition for approval of whether the application is approved or not_______
        features = [[gen, mar, dep, edu, emp, mon_income, co_mon_income, loan_amt, duration, cred, prop]]
        print(features)
        prediction = model.predict(features)
        lc = [str(i) for i in prediction]
        ans = int("".join(lc))
        if ans == 0:
            st.error(
                "Hello: " + fn +" || "
                "Account number: "+account_no +' || '
                'According to our Calculations, you are not eligible to approve Credit Card from Bank'
            )
        else:
            st.success(
                "Hello: " + fn +" || "
                "Account number: "+account_no +' || '
                'Congratulations!!  You are eligible to approve Credit Card from Bank'
            )

run()
```

Figure 7.8: Credit.Streamlit Code

Chapter 8

SCREEN SHOTS

Figure 8.1: USER INTERFACE

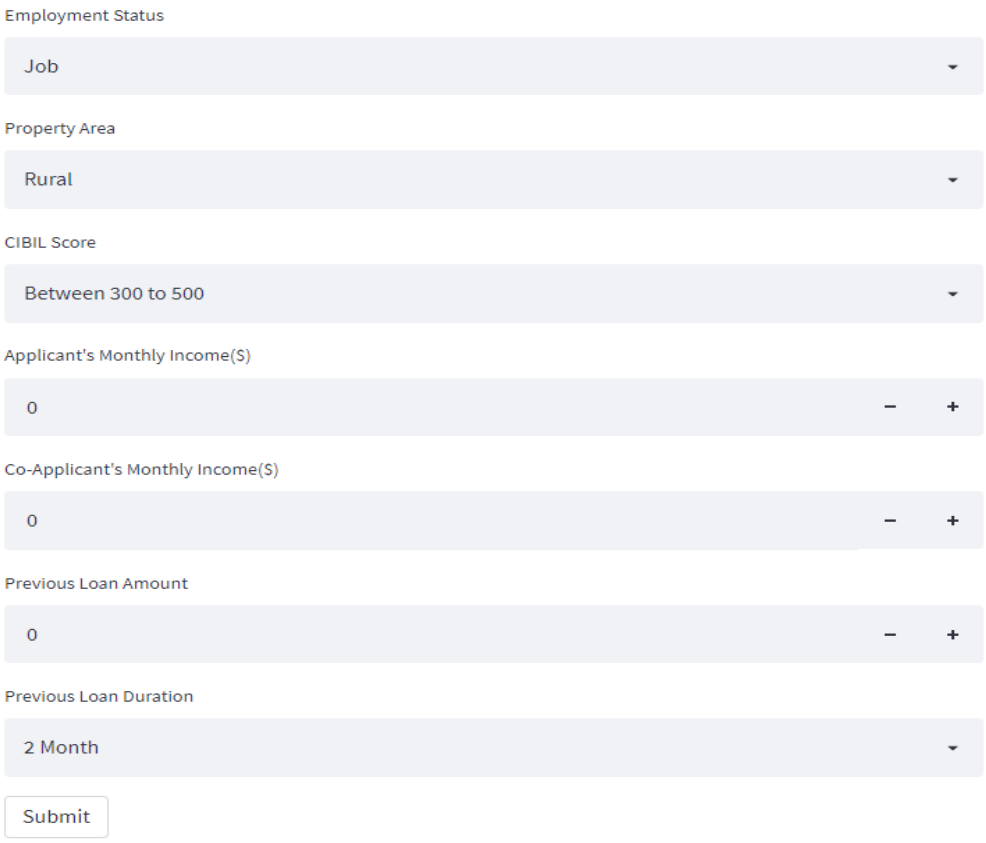

Figure 8.2: USER INTERFACE

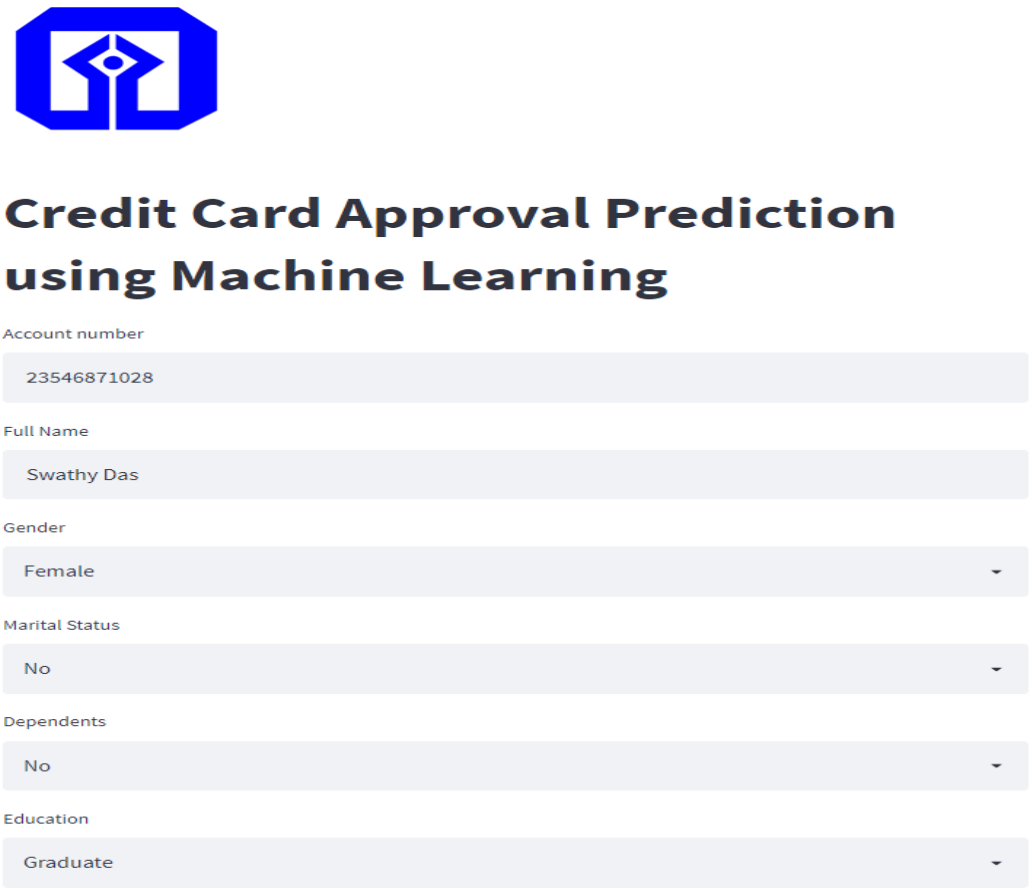

Figure 8.3: USER INTERFACE

Figure 8.4: USER INTERFACE

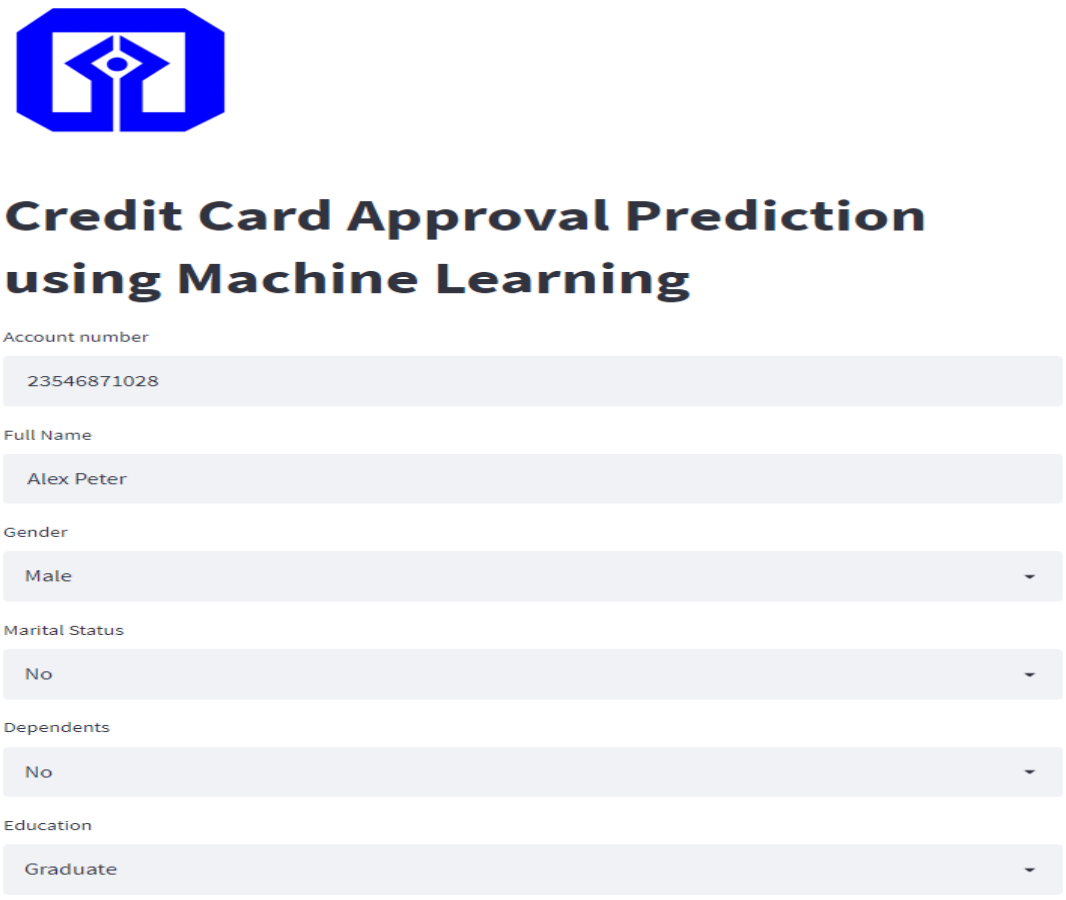

Figure 8.5: USER INTERFACE

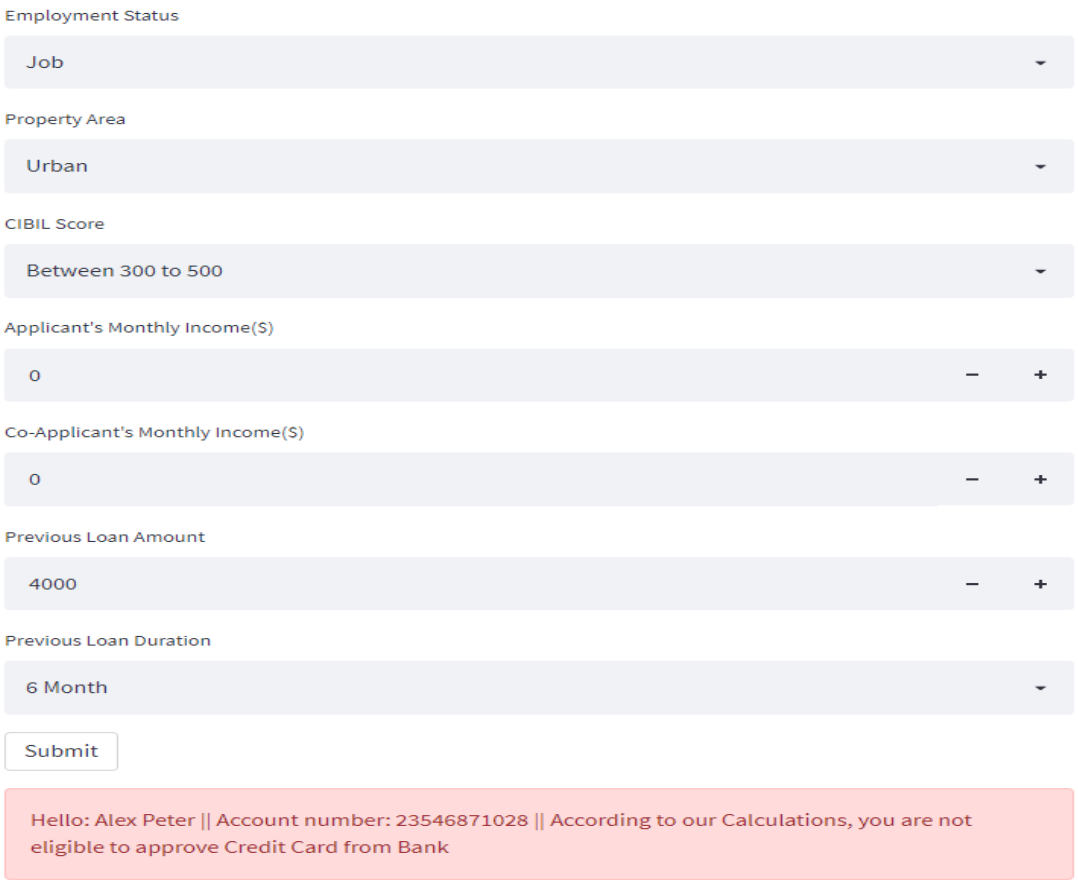

Figure 8.6: USER INTERFACE

Chapter 9

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