* **INTRODUCTION:**

**1.1 OVERVIEW:**

In India, the number of people applying for loans gets increased for various reasons in recent years. The bank employees are not able to analyze or predict whether the customer can pay back the amount or not (good customer or bad customer) for the given interest rate. our aim is to find the nature of the client applying for a personal loan.

The result of the analysis shows that short term loans are preferred by the majority of the clients and the clients majorly apply loans for debt consolidation. The results are shown in graphs that help the bankers to understand the client’s behavior.

Loan companies grant a loan after an intensive process of verification and validation. However, they still don't know for sure if the applicant will be able to repay the loan with no difficulties.

**1.2 PURPOSE:**

In this project, we'll build a predictive model to help determine if an applicant will be able to repay the lending company or not. We will prepare the data using a Jupyter Notebook and use various models to predict the target variable.

* **LITERATURE** **SURVEY**:

**2.1** **EXISTING** **PROBLEM** & **PROPOSED SOLUTION:**

We will be using Python for this course along with the below-listed libraries. Specifications

Python

pandas

seaborn

sklearn

import pandas as pd

import numpy as np

import seaborn as sns

import matplotlib.pyplot as plt

%matplotlib inline

import warnings

warnings.filterwarnings("ignore")

For this problem, we have three CSV files: train, test and sample submission.

Train file will be used for training the model, i.e. our model will learn from this file. It contains all the independent variables and the target variable.

Test file contains all the independent variables, but not the target variable. We will apply the model to predict the target variable for the test data.

Sample submission file contains the format in which we have to submit out predictions.

* THEORITICAL ANALYSIS:
* **BLOCK DIAGRAM:**



**3.2 HARDWARE/SOFTWARE DESIGNING:**

* Used HTML,CSS,Jupyter,JavaScript for web designing.
* Used FLASK for integrated model and webpage in Spyder environment

**4.EXPERIMENTAL INVESTIGATION:**

During the project execution we experimentally found that the Application User Interface(AUI) has predefined python codes and formats to run the app.IBM cloud had inbuilt machine learning convolution neutral network and many important algorithms which the task easier and faster.

5. FLOWCHART:



**6. Result:**





7.ADVANTAGES AND DISADVANTAGES:

**7.1** **ADVANTAGES**:

- Loan Prediction is very helpful for employee of banks as well as for the applicant.

-The Loan Prediction System can can automatically calculate the weight of each features taking part in loan processing and on new test data same features are processed with respect to their associated weight .

**7.2 DISADVANTAGES**:

The disadvantage of this model is that it emphasize different weights to each factor but in real life sometime loan can be approved on the basis of single strong factor only, which is not possible through this system. Loan Prediction is very helpful for employee of banks as well as for the applicant also.

**8.** APPLICATIONS:

The objectives of data understanding are:

Understand the attributes of the data.

Summarize the data by identifying key characteristics, such as data volume and total number of variables in the data.

Understand the problems with the data, such as missing values, inaccuracies, and outliers.

Visualize the data to validate the key characteristics of the data or unearth problems with the summary statistics.

It is useful for prediction of loans.

Applicants with high incomes should have more chances of loan approval.

Applicants who have repaid their previous debts should have higher chances of loan approval.

Loan approval should also depend on the loan amount. If the loan amount is less, the chances of loan approval should be high.

Lesser the amount to be paid monthly to repay the loan, the higher the chances of loan approval.

**9.**CONCLUSION:

we learned how to create models to predict the target variable, that is whether the applicant will be able to repay the loan or not.

This is a classification problem where we have to predict whether a loan will be approved or not. In a classification problem, we have to predict discrete values based on a given set of independent variables.

Loan prediction is a very common real-life problem that each retail bank faces at least once in its lifetime. If done correctly, it can save many hours of work.

**10.FUTURE** **SCOPE**:

In future, this model can be used to compare various machine learning algorithm generated prediction models and the model which will give higher accuracy will be chosen as the prediction model. After this work, we are able to conclude that Decision tree version is extraordinary efficient and gives a higher end result.

11.BIBLIOGRAPHY:

<https://towardsdatascience.com/ml-basics-loan-prediction-d695ba7f31f6>

<https://towardsdatascience.com/predict-loan-eligibility-using-machine-learning-models-7a14ef904057>

<https://www.youtube.com/watch?v=UbCWoMf80PY>

APPENDIX:

* SOURCE CODE
* PYTHON CODE

import numpy as np

import pandas as pd

from flask import Flask, request, render\_template

import pickle

import os

import requests

# NOTE: you must manually set API\_KEY below using information retrieved from your IBM Cloud account.

API\_KEY = "Jkaa1SmegW7iyLQ5HoAumvAal-Z3jnradP9j1b4iTNbV"

token\_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={"apikey": API\_KEY, "grant\_type": 'urn:ibm:params:oauth:grant-type:apikey'})

mltoken = token\_response.json()["access\_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}

app = Flask(\_\_name\_\_)

model = pickle.load(open('loan.pkl', 'rb'))

@app.route('/')

def home():

return render\_template('LoanStatus.html')

@app.route('/predict', methods=['POST'])

def predict():

input\_features = [float(x) for x in request.form.values()]

features\_value = [np.array(input\_features)]

features\_name = ['Current Loan Amount', 'Term', 'Credit Score', 'Annual Income',

'Years in current job', 'Home Ownership', 'Years of Credit History',

'Number of Credit Problems', 'Bankruptcies', 'Tax Liens',

'Credit Problems', 'Credit Age']

payload\_scoring = {"input\_data": [{"fields": [features\_name], "values": [input\_features]}]}

response\_scoring = requests.post('https://us-south.ml.cloud.ibm.com/ml/v4/deployments/d06ceba3-f576-43a7-8e23-a1d7935dab80/predictions?version=2021-06-04', json=payload\_scoring, headers={'Authorization': 'Bearer ' + mltoken})

print("Scoring response")

print(response\_scoring.json())

print(predictions)

pred = predictions['prediction'][0]['values'][0][0]

if(pred==0):

output = "he will not get exited"

print("he will not get exited")

else:

output="he gets exited"

print("he gets exited")

return render\_template('index.html',prediction\_text= output)

return render\_template('ChargedOff.html')

if \_\_name\_\_ == '\_\_main\_\_':

app.run(debug=False)

……………………………………………………………………………………………..

Html clode…………………………………….

(CHARGED code)

<html lang="en" dir="ltr">

<head>

<meta charset="utf-8">

<title>ChargedOff</title>

<link rel="shortcut icon" href="{{ url\_for('static', filename='diabetes-favicon.ico') }}">

<link rel="stylesheet" type="text/css" href="{{ url\_for('static', filename='styles.css') }}">

<script src="https://kit.fontawesome.com/5f3f547070.js" crossorigin="anonymous"></script>

<link href="https://fonts.googleapis.com/css2?family=Pacifico&display=swap" rel="stylesheet">

</head>

<body>

<style>

body{

background-image:url('https://cdn.hipwallpaper.com/i/50/14/xg6UXl.jpg');

background-position: center;

font-family:sans-serif;

background-size:cover;

}

</style>

</br></br></br></br></br></br>

<!-- Website Title -->

<div style="padding-left:200px">

<div class="container">

<h2 class='container-heading'><span class="heading\_font"><font size="8">Predicting Loan Status</font></span></h2>

<div class='description'>

<p><font size="6">A Machine Learning Web App using Flask.</font></p>

</div>

</div>

<!-- Result -->

<div class="results">

<p><font size="6">Prediction : <b><u>{{prediction\_text}}</u></b><b><u>ChargedOff</b></u></p>

………………………………………………………………………(full paid code)………..

<html lang="en" dir="ltr">

<head>

<meta charset="utf-8">

<title>FullyPaid</title>

<link rel="shortcut icon" href="{{ url\_for('static', filename='diabetes-favicon.ico') }}">

<link rel="stylesheet" type="text/css" href="{{ url\_for('static', filename='styles.css') }}">

<script src="https://kit.fontawesome.com/5f3f547070.js" crossorigin="anonymous"></script>

<link href="https://fonts.googleapis.com/css2?family=Pacifico&display=swap" rel="stylesheet">

</head>

<body>

<style>

body{

background-image:url('https://cdn.hipwallpaper.com/i/50/14/xg6UXl.jpg');

background-position: center;

font-family:sans-serif;

background-size:cover;

}

</style>

</br></br></br></br></br></br>

<!-- Website Title -->

<div style="padding-left:200px">

<div class="container">

<h2 class='container-heading'><span class="heading\_font"><font size="8">Predicting Loan Status</font></span></h2>

<div class='description'>

<p><font size="6">A Machine Learning Web App using Flask.</font></p>

</div>

</div>

<!-- Result -->

<div class="results">

<p><font size="6">Prediction : <b><u>{{prediction\_text}}</u></b><b><u>Fully Paid</b></u></font></p>

…………(loanstatus code)……….

<!DOCTYPE html>

<html lang="en" dir="ltr">

<head>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<link href="https://fonts.googleapis.com/css2?family=Poppins:ital,wght@0,300;0,400;0,500;0,600;0,700;1,300&display=swap" rel="stylesheet">

<link href="{{ url\_for('static', filename='css/style.css') }}" rel="stylesheet" >

<!--link href="E:/rsip-2020/Internship project/EDA Loan Status Prediction/Flask/Static/css/style.css" rel="stylesheet" >-->

<title>loan prediction</title>

</head>

<body>

<div class="container">

<div class="form-img">

<style>

body{

background-image:url('https://cdn.hipwallpaper.com/i/50/14/xg6UXl.jpg');

background-position: center;

font-family:sans-serif;

background-size:cover;

}

</style>

<div class="img-content">

<h1><b>LOAN STATUS PREDICTION</b></h1>

</div>

</div>

<div class="lform">

<form class="form-ip" action="./predict" method="post">

<div class="form-row">

<div class="form-group">

<b>Enter Your Current Loan Amount</b> <select id="Current Loan Amount" name="Current Loan Amount">

<option value="">select an option </option>

<option value="2">Small Loan</option>

<option value="1">Medium Loan</option>

<option value="0">Big Loan</option>

</select><br><br>

<b>Enter The Term Type</b> <select id="Term" name=" ">

<option value="">Select the Term</option>

<option value="1">Long Term</option>

<option value="0">Short Term</option>

</select><br><br>

<b>Enter Your Credit Score</b><select id="Credit Score" name="Credit Score">

<option value="">select an option</option>

<option value="0">Average</option>

<option value="1">Good</option>

<option value="2">Very Good</option>

</select><br><br>

<b>Enter Your Annual Income</b> <input type="text" name="Annual Income" placeholder="Annual Income" required="required"><br><br>

<b>Enter Your Years At Work</b> <input class="form-input" type="text" name="Years at work" placeholder="Years At Work" required="required"><br><br>

<b>Enter Your Home Ownership Type<select id="Home Ownership" name="Home Ownership">

<option value="">select an option</option>

<option value="0">HaveMortgage</option>

<option value="2">Own Home</option>

<option value="3">Rent</option>

<option value="1">Home Mortgage</option>

</select><br><br>

<b>Enter Your Credit History </b><input class="form-input" type="text" name="Years of Credit History" placeholder="Credit History"><br><br>

<b>Enter Your Number of Credit Issues</b><input class="form-input" type="text" name="Number of Credit Problems" placeholder="Credit Issues"><br><br>

<b>Enter If Any Bankruptcies <select id="Bankruptcies" name="Bankruptcies">

<option value="">select your Bankruptcies</option>

<option value="0">Many Bankruptcies</option>

<option value="1">No bankruptcies</option>

<option value="2">Few Bankruptcies</option>

</select><br><br>

<b>Enter Your TaxLiens <select id="Tax Liens" name="Tax Liens">

<option value="">Select your Tax Liens</option>

<option value="0">Many Tax Liens</option>

<option value="1">No Tax Lien</option>

<option value="2">ome Tax Liens</option>

</select><br><br>

<b>Enter Your Credit Problems <select id="Credit Problems" name="Credit Problems">

<option value="">Select Credit Problems</option>

<option value="0">No Credit Problem</option>

<option value="1">No Tax Lien</option>

<option value="2">Some Credit promblem</option>

</select><br><br>

<b>Enter Your Credit Age </b> <select id="Credit Age" name="Credit Age">

<option value="">Select Credit Age</option>

<option value="0">Exceptional Credit Age</option>

<option value="1">Good Credit Age</option>

<option value="2">Short Credit Age</option>

</select><br><br>

<button type="submit" class="my-cta-button">Predict</button>

</form>

</div>

<div class="op">

<p>{{showcase}}</p>

</div>

</div>

</body>

</html>

Css code…………………………………………………

body {

font-size: 14px;

line-height: 1.8;

color: #222;

font-weight: 500;

font-family: 'Poppins', sans-serif;

margin: 0;

background: #282828;

padding: 50px 0;

}

.container {

width: 1400px;

margin: 0 auto;

background: #fff;

display: -webkit-flex;

border-radius: 10px;

}

.form-img{

position: relative;

width: 385px;

margin-bottom: -8px;

}

img {

max-width: 100%;

max-height:100%;

border-radius: 10px;

}

.img-content{

position: absolute;

top: 50%;

left: 50%;

transform: translate(-50%,-50%);

-moz-transform: translate(-50%,-50%);

-webkit-transform: translate(-50%,-50%);

-o-transform: translate(-50%,-50%);

-ms-transform: translate(-50%,-50%);

text-align: center;

width: 100%;

}

h1{

line-height: 1.2;

margin: 0;

padding: 0;

font-weight: 900;

color: #fff;

text-shadow: 2px 2px 4px #000000;

font-family: 'Poppins', sans-serif;

font-size: 26px;

text-transform: uppercase;

margin-bottom: 10px;

}

.lform

{

background-image: url("https://image.shutterstock.com/image-photo/financial-loan-negotiation-discussion-among-260nw-1166876998.jpg");

width: 1015px;

margin-top: -2px;

}

.form-ip

{

padding: 60px 115px 90px 80px;

margin-bottom: -8px;

}

form{

display: block;

margin-top: 0em;

}

.form-row {

margin: 0 -30px;

margin-bottom: 2rem;

}

.form-row .form-group {

width: 50%;

padding: 0 30px;

}

label{

font-weight: 700;

text-transform: uppercase;

margin-bottom: 7px;

position: relative;

}

label, input {

display: block;

width: 100%;

cursor: default;

}

input,select {

box-sizing: border-box;

border: 1px solid #ebebeb;

padding: 8px 15px;

border-radius: 5px;

-moz-border-radius: 5px;

-webkit-border-radius: 5px;

-o-border-radius: 5px;

-ms-border-radius: 5px;

font-size: 14px;

font-family: 'Poppins', sans-serif;

}

input:focus {

border: 1px solid #329e5e;

}

.form-submit{

text-align: center;

}

#submit {

background: #329e5e;

color: #fff;

margin-right: 25px;

}

#submit:hover {

background-color: #267747;

}

.submit {

width: 150px;

height: 50px;

display: inline-block;

font-family: 'Poppins', sans-serif;

font-weight: 700;

font-size: 1rem;

padding: 10px;

border: none;

cursor: pointer;

text-transform: uppercase;

border-radius: 5px;

}

.op {

position: absolute;

left: 1035px;

top: 50%;

font-size: 2rem;

font-weight: bold;

}