DATA WAREHOUSING & MINING

LOAN APPLICATION ANALYSIS

CODE:

app_loan.py

```
from flask import Flask, render_template, request, abort, send_from_directory, url_for, redirect

from sklearn.preprocessing import Normalizer

import pandas as pd

import numpy as np

import joblib

import io

import base64

import matplotlib.pyplot as plt


app = Flask(__name__)


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

def form():

    return render_template('form.html')


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

def predict():

    if request.method == "GET":

        return redirect(url_for('form'))

    elif request.method == "POST":

        name = str(request.form['Name'])

        job = str(request.form['Job'])

        income = int(request.form['AppIn'])

        co_income = int(request.form['CoIn'])

        total = int(income + co_income)
```

```
loan = int(request.form['LoAm'])
term = int(request.form['Term'])
gender = int(request.form['inlineRadioOptions1'])
depent = int(request.form['inlineRadioOptions2'])
marriage = int(request.form['inlineRadioOptions3'])
edu = int(request.form['inlineRadioOptions4'])
credit = int(request.form['inlineRadioOptions5'])
area = int(request.form['inlineRadioOptions6'])

std = np.array([loan, term, total])
std = np.reshape(std, (1,-1))
transform = fit_norm.transform(std)
print(transform)
total_new = transform[0][2]
loan_new = transform[0][0]
term_new =  transform[0][1]

x = np.array([loan_new, term_new, total_new, marriage, depent, edu, credit, area])
x = np.reshape(x, (1,-1))

pred = model.predict(x)
pred_proba = model.predict_proba(x)
prediksi = pred[0]
prediksi_proba = pred_proba[0]

if prediksi == 1:
    status = 'Approved'
else:
    status = 'Not Approved'
```

```
if gender == 0:
    sex = 'Female'
else:
    sex = 'Male'

if marriage == 0:
    nikah = 'No'
else:
    nikah = 'Yes'

if edu == 0:
    pend = 'Graduate'
else:
    pend = 'Non Graduate'

if credit == 0:
    kredit = 'Never'
else:
    kredit = 'Yes'

if area == 0:
    lahan = 'Rural'
elif area == 1:
    lahan = 'Semi-Urban'
else:
    lahan = 'Urban'

labels = ['Not Approved', 'Approved']

plt.figure(figsize=(5,5))
```

```
        plt.title('Loan Eligibility Percentage')
        plt.pie(x= prediksi_proba, explode=[0.05,0.05],
            labels=labels, autopct='%1.1f%%', shadow=True)
        plt.tight_layout()

        img = io.BytesIO()
        plt.savefig(img, format='png', transparent=True)
        plt.close()
        img.seek(0)
        pict_url = base64.b64encode(img.getvalue()).decode()
        pict = f'{pict_url}'

        take_result = {'nama': name, 'pekerjaan': job, 'sex': sex,
                       'keluarga': depent, 'nikah': nikah, 'pendidikan': pend,
                       'kredit': kredit, 'lahan': lahan, 'pendapatan': total,
                       'pinjaman': loan, 'jangka': term, 'prediksi': status}

        return render_template('result.html', data = take_result, gambar = pict)
    else:
        return redirect(url_for('form'))

@app.route('/filetemp/<path:path>')
def filetemp(path):
    return send_from_directory('./templates/image', path)

if __name__ == '__main__':
    model = joblib.load('rfc_model')
    fit_norm = joblib.load('fit_norm')
    app.run(debug=True, port=3000)
```

form.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Loan Approval Checker</title>
    <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bootstrap.min.css"
integrity="sha384-
ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUOhcWr7x9JvoRxT2MZw1T"
crossorigin="anonymous">
    <style>
    body {
        background-color: rgb(34, 200, 238);
        font-family: Segoe UI;
        text-align: center;
        vertical-align: middle
    }
    form {
        display: inline-block;
        margin-left: auto;
        margin-right: auto;
        text-align: left;
        vertical-align: middle
    }
    </style>
</head>

<body>
    <br>
    <br>
```

```
    <img
src="https://blog.moneywide.com/assets/images/blog/credit%20analysis%20of%20personal
%20loan.webp" width="600px" height="auto"/>
  <br>
  <br>
  <form method='POST' action="http://127.0.0.1:3000/predict">
  <div class="container" style="margin-top: 2%;">
    <center>
    <p style="color: blue;">FILL IN THE FORM</p>
    </center>
    <div class="row">
      <div class="col">
          <div class="form-group">
            <label for="formName">Name</label>
            <input type="text" class="form-control" name="Name" id="formName">
            <br>

            <label for="formJob">Job</label>
            <input type="text" class="form-control" name="Job" id="formJob">
            <br>

            <label>Applicant Income (US $)</label>
            <input type="number" class="form-control" id="AI" name="AppIn"
step="0.1" min=0>
            <br>

            <label>Co Applicant Income (US $)</label>
            <input type="number" class="form-control" id="CoI" name="CoIn"
step="0.1" min=0>
            <br>

            <label>Loan Amount (Thousand US $)</label>
```

```
                <input type="number" class="form-control" id="LoA" name="LoAm"
step="0.1" min=0>
                <br>

                <label>Loan Amount Term (Days)</label>
                <input type="number" class="form-control" id="LoTe" name="Term"
step="1" min=0>
                <br>
            </div>
        </div>

        <div class="col">
            <label for="formGender">Gender: </label><br>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions1"
id="genderMen"
                    value=1>
                <label class="form-check-label" for="genderMen">Male</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions1"
id="genderWomen"
                    value=0>
                <label class="form-check-label" for="genderWomen">Female</label>
            </div>
            <br><br>

            <label for="formDep">Dependents: </label><br>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions2"
id="dep0"
                    value=0>
```

```
                <label class="form-check-label" for="dep0">0</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions2"
id="dep1"
                    value=1>
                <label class="form-check-label" for="dep1">1</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions2"
id="dep2"
                    value=2>
                <label class="form-check-label" for="dep2">2</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions2"
id="dep3"
                    value=3>
                <label class="form-check-label" for="dep3">>2</label>
            </div>
        <br><br>

        <label for="formMar">Marriage: </label><br>
            <div class="form-check form-check-inline">
              <input class="form-check-input" type="radio" name="inlineRadioOptions3"
id="marNo"
                    value=0>
                <label class="form-check-label" for="marNo">No</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions3"
id="marYes"
```

```
                    value=1>
                <label class="form-check-label" for="marYes">Yes</label>
            </div>
        <br><br>

        <label for="formEdu">Education: </label><br>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions4"
id="eduNo"
                    value=1>
                <label class="form-check-label" for="eduNo">Non Graduate</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions4"
id="eduYes"
                    value=0>
                <label class="form-check-label" for="eduYes">Graduate</label>
            </div>
        <br><br>

        <label for="formHis">Credit History: </label><br>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions5"
id="hisNo"
                    value=0>
                <label class="form-check-label" for="hisNo">Never</label>
            </div>
            <div class="form-check form-check-inline">
                <input class="form-check-input" type="radio" name="inlineRadioOptions5"
id="hisYes"
                    value=1>
                <label class="form-check-label" for="hisYes">Yes</label>
```

```
            </div>
            <br><br>

            <label for="formPro">Property Area: </label><br>
                <div class="form-check form-check-inline">
                    <input class="form-check-input" type="radio" name="inlineRadioOptions6"
id="area0"
                        value=0>
                    <label class="form-check-label" for="area0">Rural</label>
                </div>
                <div class="form-check form-check-inline">
                    <input class="form-check-input" type="radio" name="inlineRadioOptions6"
id="area1"
                        value=1>
                    <label class="form-check-label" for="dep1">Semiurban</label>
                </div>
                <div class="form-check form-check-inline">
                    <input class="form-check-input" type="radio" name="inlineRadioOptions6"
id="area2"
                        value=2>
                    <label class="form-check-label" for="area2">Urban</label>
                </div>
            <br><br><br><br>
        </div>
    </div>
    <center>
        <input class="btn btn-primary btn-lg" href="/predict" style="color: white;"
role="button"
            type="submit" value="Predict" />
    </center>
  </div>
  </form>
```

```
</body>
</html>
```

result.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Loan Application Analysis</title>
    <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bootstrap.min.css"
integrity="sha384-
ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUOhcWr7x9JvoRxT2MZw1T"
crossorigin="anonymous">
    <style>
    body {
        background-color: rgb(34, 200, 238);
        font-family: Segoe UI;
        text-align: center;
        vertical-align: middle
    }
    form {
        display: inline-block;
        margin-left: auto;
        margin-right: auto;
        text-align: left;
        vertical-align: middle
    }
    </style>
</head>
```

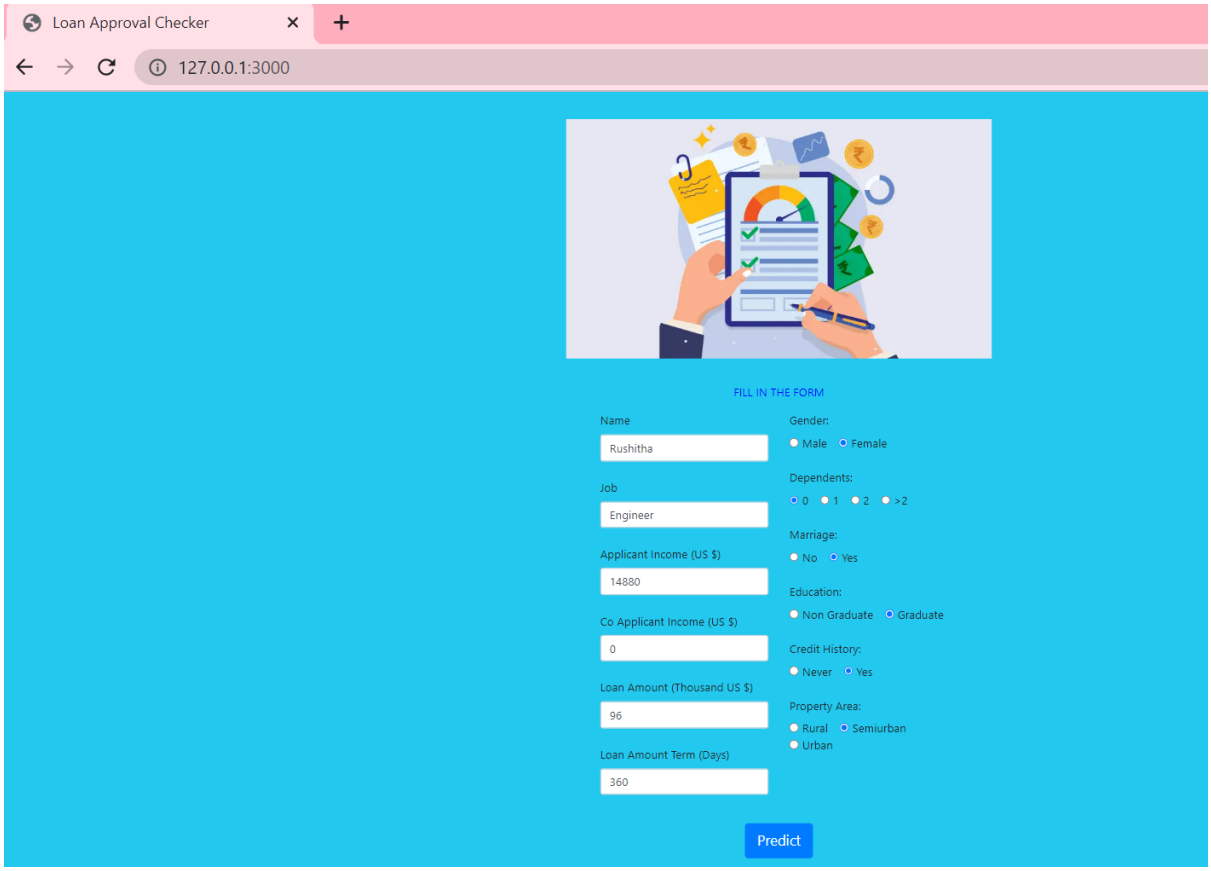
```
<body>
    <div>
        <form action="http://127.0.0.1:2070">
            <nav style="background-color: rgb(34, 238, 190);text-align: center; height: 50px;
padding: 5px;">
                <a class="navbar-brand" href="/" style="color: white;">Loan Eligibility
Checker</a>
            </nav>
        </form>
    </div>

<center>
<h1 style="background-color:#00D0FF; width: 900px; padding: 10px 0px 10px;;
    border: 4px solid blue; text-align:justify; opacity:0.9; font-size: large;">
    <center>
        <p style="color: blue; font: size 100px;">LOAN ELIGIBILITY</p>
    </center>
    <div class="container">
        <div class="row justify-content-md-center">
            <div class="col col-lg-2">Name</div>
            <div class="col col-lg-2">{{data['nama']}}</div>
            <div class="col col-lg-2">Credit History</div>
            <div class="col col-lg-2">{{data['kredit']}}</div>
        <div class="w-100"></div>
            <div class="col col-lg-2">Gender</div>
            <div class="col col-lg-2">{{data['sex']}}</div>
            <div class="col col-lg-2">Property Area</div>
            <div class="col col-lg-2">{{data['lahan']}}</div>
        <div class="w-100"></div>
            <div class="col col-lg-2">Job</div>
            <div class="col col-lg-2">{{data['pekerjaan']}}</div>
```

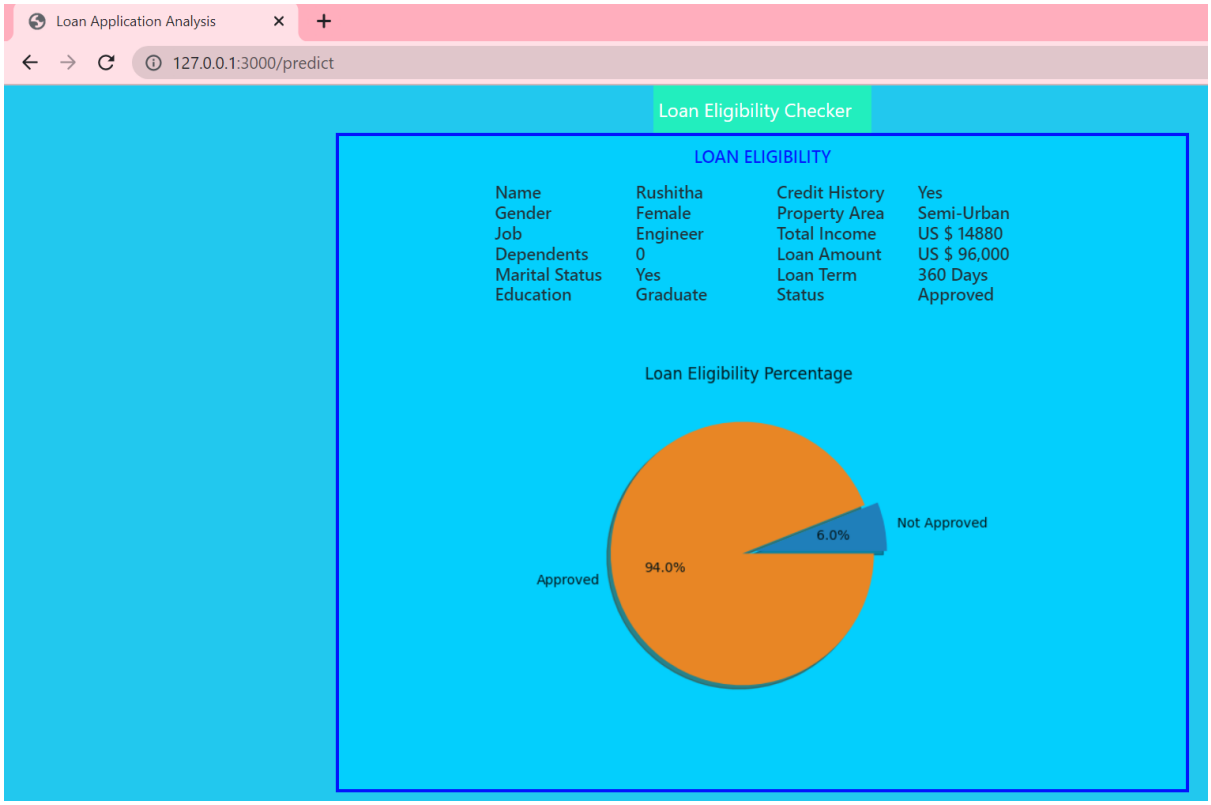
```
            <div class="col col-lg-2">Total Income</div>
            <div class="col col-lg-2">US $ {{data['pendapatan']}}</div>
        <div class="w-100"></div>
            <div class="col col-lg-2">Dependents</div>
            <div class="col col-lg-2">{{data['keluarga']}}</div>
            <div class="col col-lg-2">Loan Amount</div>
            <div class="col col-lg-2">US $ {{data['pinjaman']}},000</div>
        <div class="w-100"></div>
            <div class="col col-lg-2">Marital Status</div>
            <div class="col col-lg-2">{{data['nikah']}}</div>
            <div class="col col-lg-2">Loan Term</div>
            <div class="col col-lg-2">{{data['jangka']}} Days</div>
        <div class="w-100"></div>
            <div class="col col-lg-2">Education</div>
            <div class="col col-lg-2">{{data['pendidikan']}}</div>
            <div class="col col-lg-2">Status</div>
            <div class="col col-lg-2">{{data['prediksi']}}</div>
        </div>
    </div>

    <center>
        <img src="{{gambar}}" align='middle'/>
    </center>
</h1>
</center>
</body>
</html>
```

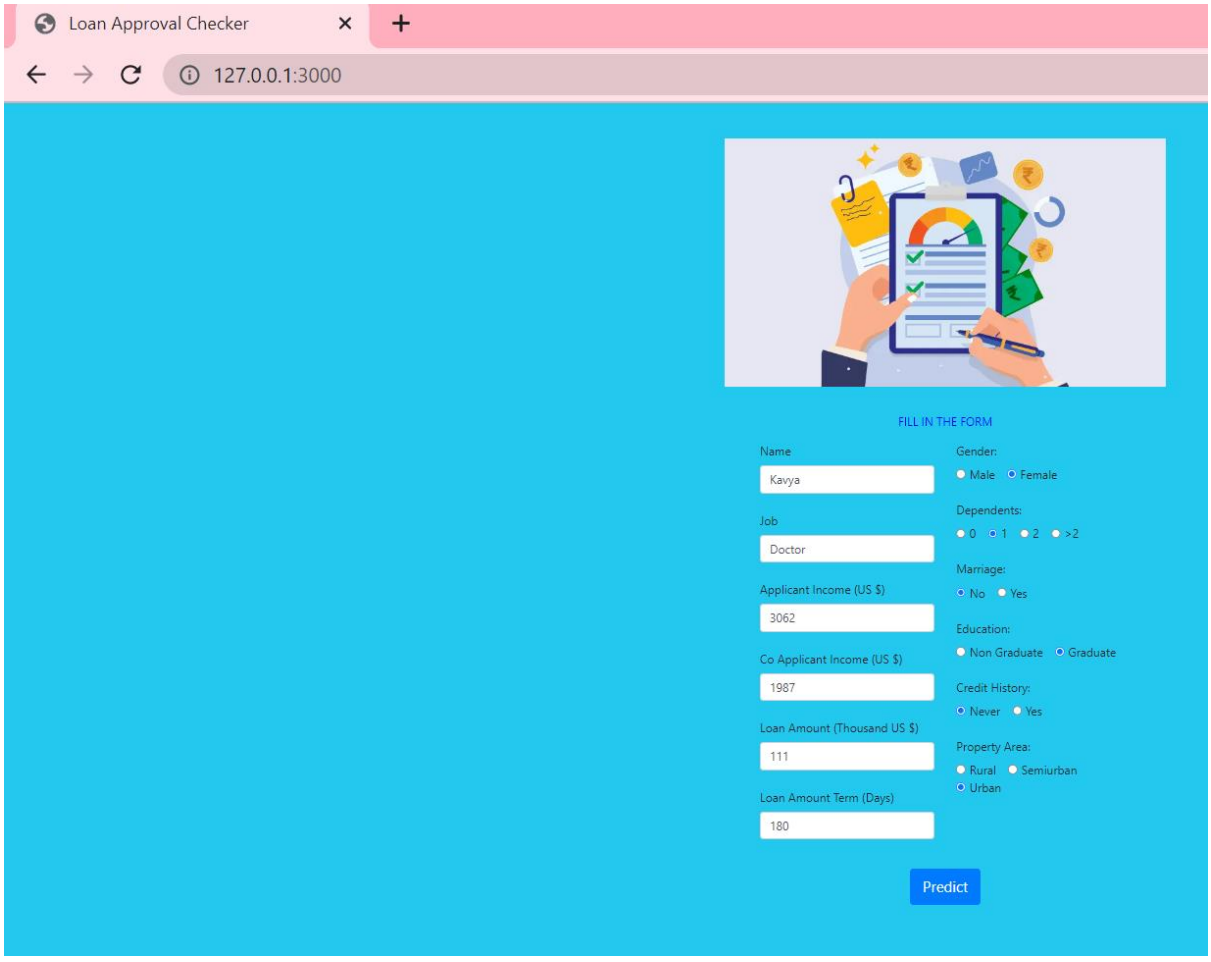
EXECUTION:

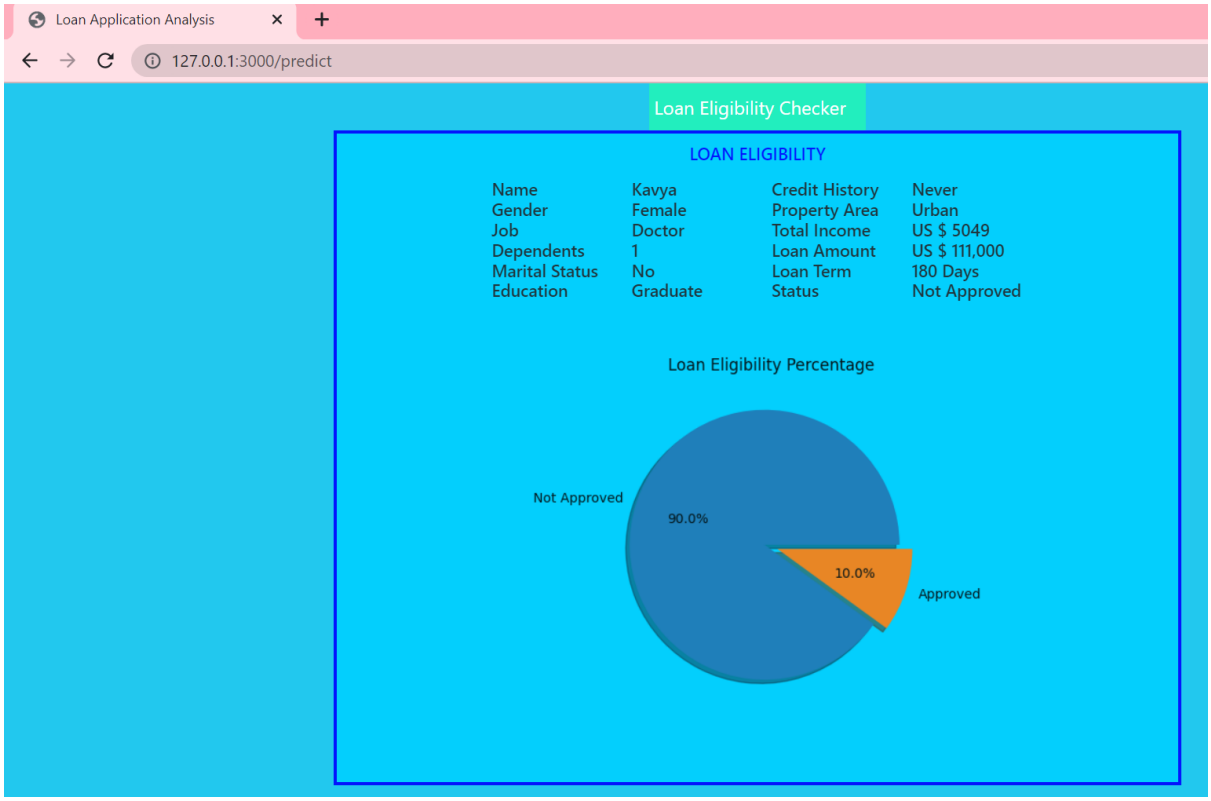
```
Command Prompt - python  app_loan.py
Microsoft Windows [Version 10.0.19044.2130]
(c) Microsoft Corporation. All rights reserved.

C:\Users\lenovo>cd C:\Users\lenovo\Downloads\3 - 1\DATA SCIENCE PE-2 (DWM)\VS CODES\Loan_Approval_Prediction-master

C:\Users\lenovo\Downloads\3 - 1\DATA SCIENCE PE-2 (DWM)\VS CODES\Loan_Approval_Prediction-master>python app_loan.py
C:\Users\lenovo\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\numpy\_distributor_init.py:30: U
serWarning: loaded more than 1 DLL from .libs:
C:\Users\lenovo\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\numpy\.libs\libopenblas.EL2C6PLE
4ZYW3ECEVIV3OXXGRN2NRFM2.gfortran-win_amd64.dll
C:\Users\lenovo\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\numpy\.libs\libopenblas.XWYDX2IK
DW2NMTWSFYNGFUWKQU3LYTCZ.gfortran-win_amd64.dll
  warnings.warn("loaded more than 1 DLL from .libs:"
C:\Users\lenovo\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\sklearn\base.py:329: UserWarning
: Trying to unpickle estimator DecisionTreeClassifier from version 0.22.1 when using version 1.0.2. This might lead to breaking code or invalid results. Use at your own ris
k. For more info please refer to:
https://scikit-learn.org/stable/modules/model_persistence.html#security-maintainability-limitations
  warnings.warn(
C:\Users\lenovo\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\sklearn\base.py:329: UserWarning
: Trying to unpickle estimator RandomForestClassifier from version 0.22.1 when using version 1.0.2. This might lead to breaking code or invalid results. Use at your own ris
k. For more info please refer to:
https://scikit-learn.org/stable/modules/model_persistence.html#security-maintainability-limitations
  warnings.warn(
C:\Users\lenovo\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\sklearn\base.py:329: UserWarning
: Trying to unpickle estimator Normalizer from version 0.22.1 when using version 1.0.2. This might lead to breaking code or invalid results. Use at your own risk. For more
info please refer to:
https://scikit-learn.org/stable/modules/model_persistence.html#security-maintainability-limitations
  warnings.warn(
 * Serving Flask app 'app_loan' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Running on http://127.0.0.1:3000 (Press CTRL+C to quit)
```

OUTPUT SCREENS:




Loan Application Analysis
127.0.0.1:3000/predict
Loan Eligibility Checker
LOAN ELIGIBILITY
Name Rushitha
Gender Female
Job Engineer
Dependents 0
Marital Status Yes
Education Graduate
Credit History Yes
Property Area Semi-Urban
Total Income US $ 14880
Loan Amount US $ 96,000
Loan Term 360 Days
Status Approved
Loan Eligibility Percentage
6.0%
Not Approved
94.0%
Approved


Loan Approval Checker
127.0.0.1:3000
FILL IN THE FORM
Name
Kavya
Job
Doctor
Applicant Income (US $)
3062
Co Applicant Income (US $)
1987
Loan Amount (Thousand US $)
111
Loan Amount Term (Days)
180
Gender:
Male Female
Dependents:
0 1 2 >2
Marriage:
No Yes
Education:
Non Graduate Graduate
Credit History:
Never Yes
Property Area:
Rural Semiurban
Urban
Predict


Loan Application Analysis
127.0.0.1:3000/predict
Loan Eligibility Checker
LOAN ELIGIBILITY
Name Kavya
Gender Female
Job Doctor
Dependents 1
Marital Status No
Education Graduate
Credit History Never
Property Area Urban
Total Income US $ 5049
Loan Amount US $ 111,000
Loan Term 180 Days
Status Not Approved
Loan Eligibility Percentage
Not Approved
90.0%
10.0%
Approved