Terry Chou
LISUM23: 30
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Data Glacier

Goal: build a website for users to see whether they are qualify for a loan

1. Data Selection: Loan Status

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0	128.0	360.0	1.0
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0	66.0	360.0	1.0
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0	120.0	360.0	1.0
4	LP001008	Male	No	0	Graduate	No	6000	0.0	141.0	360.0	1.0
5	LP001011	Male	Yes	2	Graduate	Yes	5417	4196.0	267.0	360.0	1.0
...	...	...	...	...	...	...	...	...	...	...	...
609	LP002978	Female	No	0	Graduate	No	2900	0.0	71.0	360.0	1.0
610	LP002979	Male	Yes	3+	Graduate	No	4106	0.0	40.0	180.0	1.0
611	LP002983	Male	Yes	1	Graduate	No	8072	240.0	253.0	360.0	1.0
612	LP002984	Male	Yes	2	Graduate	No	7583	0.0	187.0	360.0	1.0
613	LP002990	Female	No	0	Graduate	Yes	4583	0.0	133.0	360.0	0.0

2. Data processing(drop the null values & some modification)

```
Loan_ID              0
Gender              13
Married              3
Dependents          15
Education            0
Self_Employed       32
ApplicantIncome      0
CoapplicantIncome    0
LoanAmount          22
Loan_Amount_Term    14
Credit_History      50
Property_Area        0
Loan_Status          0
dtype: int64
```

```
df_new['Gender_dummy'] = 0
df_new['Married_dummy'] = 0
df_new['Education_dummy'] = 0
df_new['Self_Employed_dummy'] = 0
df_new['Property_Area_dummy'] = 0
df_new['Dependents_dummy'] = 0

df_new['Gender_dummy'] = df_new['Gender'].apply(lambda x: 1.0 if x == 'Male' else 0.0)

df_new['Married_dummy'] = df_new['Married'].apply(lambda x: 1.0 if x == 'Yes' else 0.0)

df_new['Education_dummy'] = df_new['Education'].apply(lambda x: 1.0 if x == 'Graduate' else 0.0)
df_new['Self_Employed_dummy'] = df_new['Self_Employed'].apply(lambda x: 1.0 if x == 'Yes' else 0.0)

property_area_mapping = {
    'Urban': 1.0,
    'Rural': 0.0,
    'Semiurban': 0.5
}
df_new['Property_Area_dummy'] = df_new['Property_Area'].apply(lambda x: property_area_mapping.get(x, 0.0))

Dependents_mapping = {
    '0': 0.0,
    '1': 1.0,
    '2': 2.0,
    '3+': 3.0
}



df_new['Dependents_dummy'] = df_new['Dependents'].apply(lambda x: Dependents_mapping.get(x, 0.0))
```

3. Create and Output the Model

```
from sklearn.linear_model import LogisticRegression
import pickle

# instantiate the model (using the default parameters)
logreg = LogisticRegression(random_state=16)

# fit the model with data
logreg.fit(x_train, y_train)

y_pred = logreg.predict(x_test)
# Output the model
pickle.dump(model, open('logistic_model.pkl', 'wb'))
```

4. Create the Application using Flask & Loaded the model

```python
# -*- coding: utf-8 -*-
"""
Created on Sat Jul 22 14:42:26 2023

@author: terry
"""

import numpy as np
from flask import Flask, request, render_template
import pickle

#Create the application
app = Flask(__name__)

#Loading the model
model = pickle.load(open('logistic_model.pkl','rb'))

#Display the html interface(codes in another page)
@app.route('/')
def home():
    return render_template('index.html')
```

5. **Create Web Interface**

```html
<!DOCTYPE html>
<html >
<head>
  <meta charset="UTF-8">
  <title>ML API</title>
  <link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300' rel='stylesheet' type='text/css'>
<link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">
```

```
</head>

<body>
 <div class="login">
    <h1>Predict House Price</h1>

     <!-- Main Input For Receiving Query to our ML -->
    <form action="{{ url_for('predict')}}"method="post">

    <!-- Dropdown list for gender -->
      <select name="Gender" required="required">
        <option value="">Select Gender</option>
        <option value="1.0">Male</option>
        <option value="0.0">Female</option>
      </select>
    <!-- Dropdown list for Married -->
      <select name="Married" required="required">
         <option value="">Marritial Status</option>
         <option value="1.0">Yes</option>
         <option value="0.0">No</option>

      </select>

      <select name="Dependents" required="required">
        <option value="">Select Number of Dependents</option>
        <option value="0.0">0</option>
        <option value="1.0">1</option>
        <option value="2.0">2</option>
        <option value="3.0">3+</option>

      </select>

        <!-- Dropdown list for Education -->
      <select name="Education" required="required">
        <option value="">Select Education</option>
        <option value="1.0">Graduate</option>
        <option value="0.0">Not Graduate</option>

      </select>
```

```
    <select name="Education" required="required">
      <option value="">Select Education</option>
      <option value="1.0">Graduate</option>
      <option value="0.0">Not Graduate</option>

    </select>


    <select name="Self_Employed" required="required">
      <option value="">self employed Status</option>
      <option value="1.0">Yes</option>
      <option value="0.0">No</option>

    </select>



      <input type="number" name="ApplicantIncome" placeholder="Applicant Income" required="required" />
      <input type="number" name="CoapplicantIncome" placeholder="Coapplicant Income" required="required" />
      <input type="number" name="LoanAmount" placeholder="Loan Amount" required="required" />
      <input type="number" name="Loan_Amount_Term" placeholder="Loan Amount Term" required="required" />

  <!-- Dropdown list for Credit_History -->
   <select name="Credit_History" required="required">
      <option value="">Select Credit History</option>
      <option value="1.0">1</option>
      <option value="0.0">0</option>

      <!-- Add more options as needed -->
    </select>

  <!-- Dropdown list for Property_Area -->
   <select name="Property_Area" required="required">
      <option value="">Select Property Area</option>
      <option value="1.0">Rural</option>
      <option value="0.5">Semiurban</option>
      <option value="0.0">Urban</option>
      <!-- Add more options as needed -->
    </select>
```

6. Input Values Mapping in the Application

```
dropdown_mappings = {
    "Credit_History": {
        "1.0": 1,
        "0.0": 0,

    },

    "Property_Area": {
        "1.0": 1,
        "0.5": 0.5,
        "0.0": 0
    },

    "Married": {
        "1.0": 1,
        "0.0": 0,
    },

    "Gender": {
        "1.0": 1,
        "0.0": 0,
    },

    "Dependents": {
        "0.0": 0,
        "1.0": 1,
        "2.0": 2,
        "3.0": 3
    },

    "Education": {
        "0.0": 0,
        "1.0": 1,

    },
```

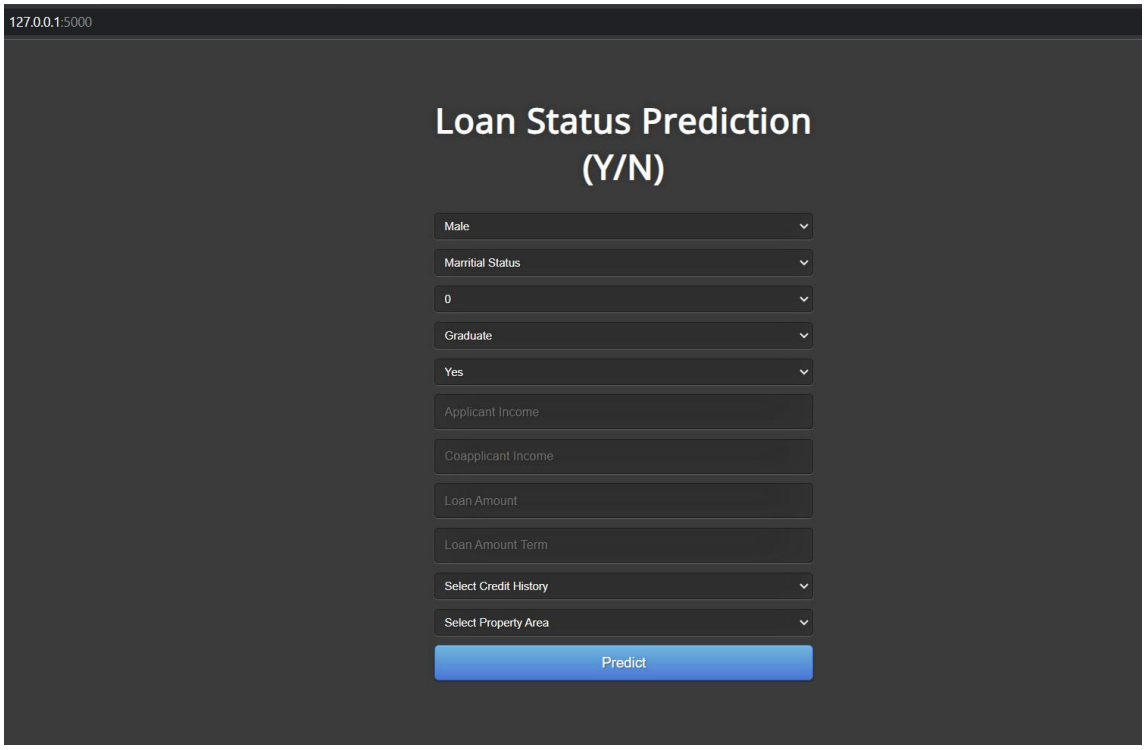
7. **Prediction Output**

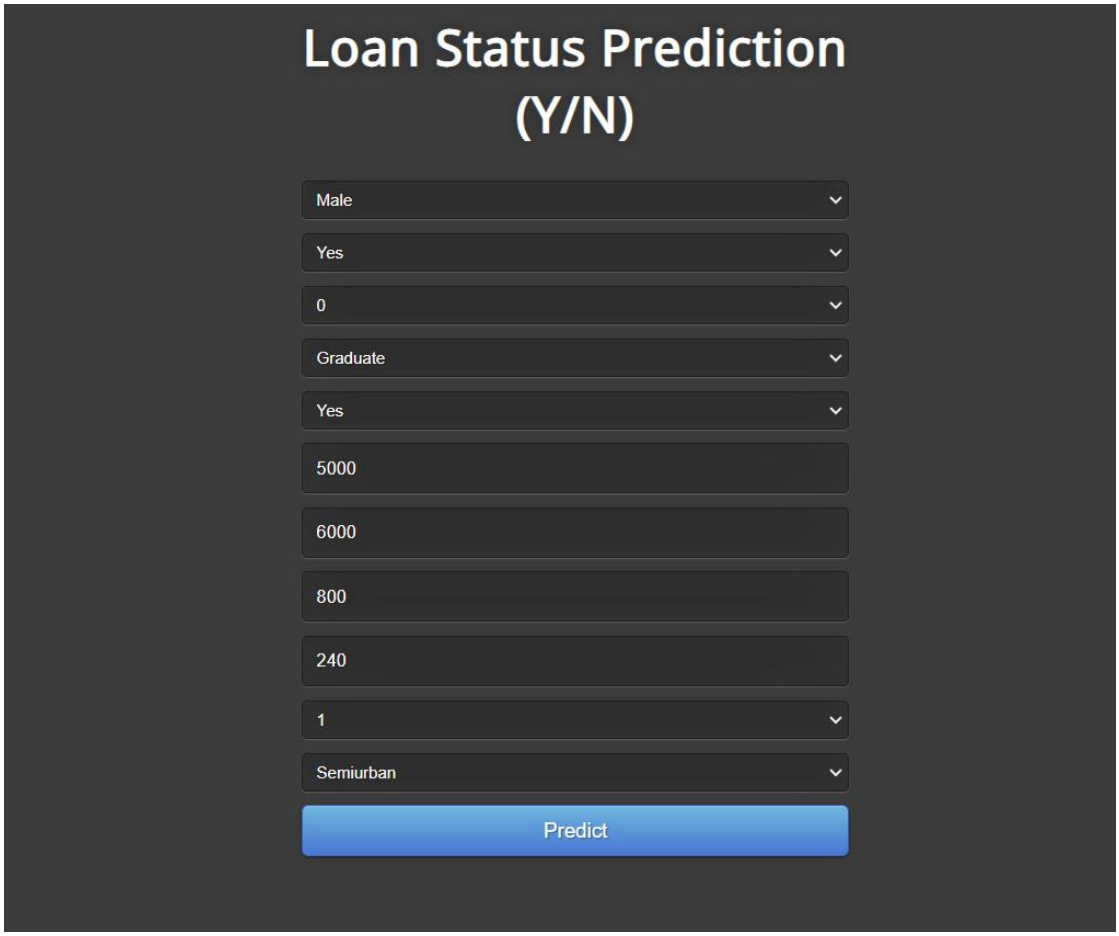
```python
@app.route('/predict',methods=['POST'])
def predict():
    '''
    For rendering results on HTML GUI
    '''

    form_values = request.form.to_dict()

    for dropdown_name, dropdown_mapping in dropdown_mappings.items():
        selected_value = form_values.get(dropdown_name, "")
        form_values[dropdown_name] = dropdown_mapping.get(selected_value, 0)



    #int_features = [int(x) for x in request.form.values()]
    int_features = [int(x) for x in form_values.values()]

    final_features = [np.array(int_features)]
    prediction = model.predict(final_features)

    #output = round(prediction[0], 2)
    output = prediction[0]

    return render_template('index.html', prediction_text = 'Loan Status is: {}'.format(output))


if __name__ == "__main__":
    app.run(port=5000, debug = True)
```

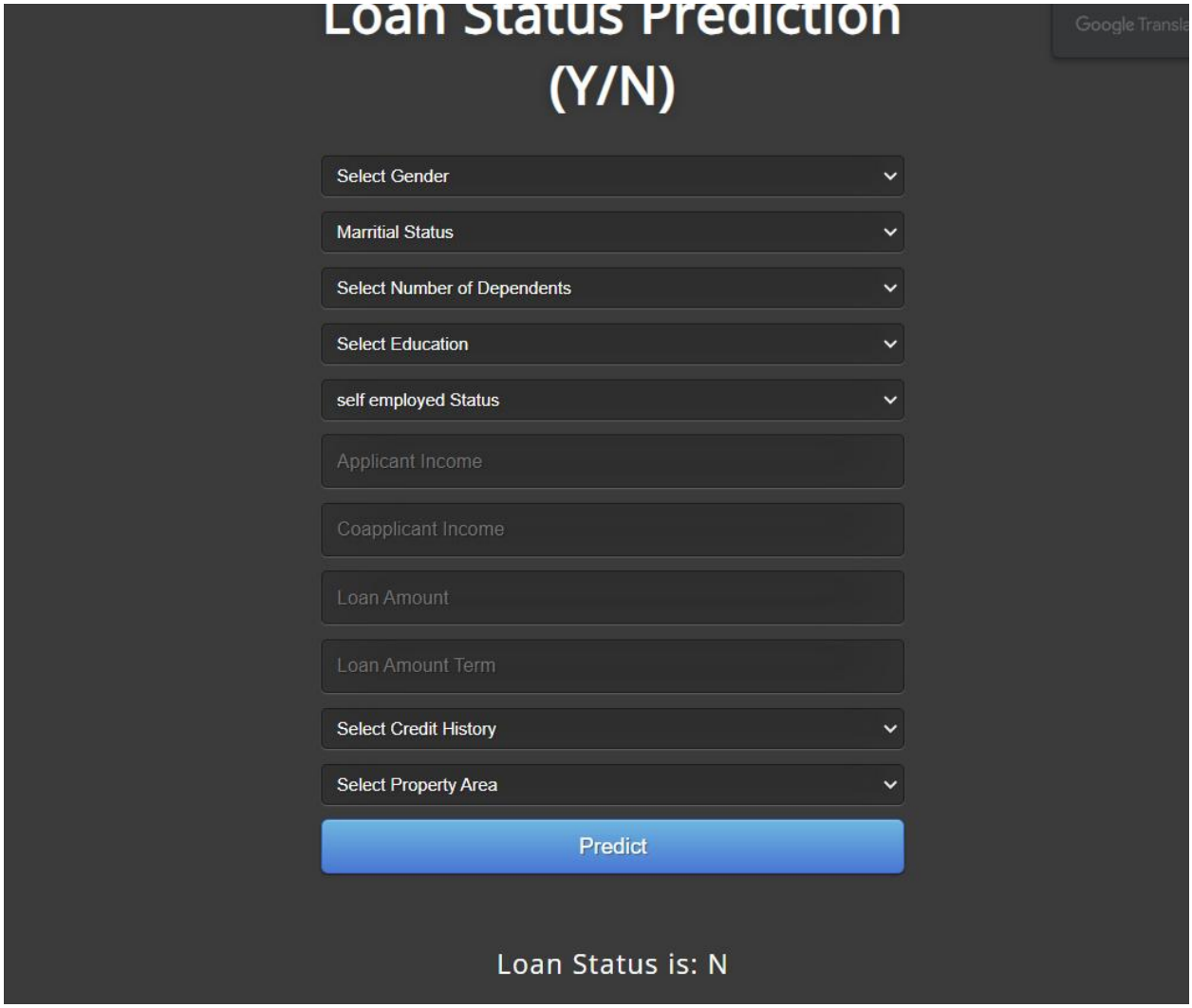
8. **Style adjustment (position & adding scrollbar)**

```css
.container {
  position: absolute;
  top: 10%; /* Adjust the percentage to move the content up or down */
  left: 13%;

  margin: -150px 0 0 -200px; /* Adjust the negative margin to center the container */
  width: 1500px;
  height: 800px;
  overflow-y: auto; /* Add a vertical scrollbar when content overflows */
  padding-right: 20px; /* Add padding on the right side for the scrollbar */
  box-sizing: border-box; /* Include padding in the width calculation */
}


.center {
  display: flex;
  flex-direction: column;
  align-items: center;
  justify-content: center;
  height: 100%;
}
```

9. Final Deployment and Testing




Loan Status Prediction
(Y/N)
Male
Yes
0
Graduate
Yes
5000
6000
800
240
1
Semiurban
Predict


Loan Status Prediction (Y/N)
Google Transla
Select Gender
Marritial Status
Select Number of Dependents
Select Education
self employed Status
Applicant Income
Coapplicant Income
Loan Amount
Loan Amount Term
Select Credit History
Select Property Area
Predict
Loan Status is: N