

Flask API for Backend

```
from flask import Flask, request, render_template
import pickle
import os
import joblib

app = Flask(__name__)

kmeans = pickle.load(open("../Cluster_model/clustering.pkl", "rb"))

encoder = joblib.load(open("../Encoder/label_encoder_class.joblib", "rb"))

def find_model(cluster):
    if(cluster == 0):
        with open('../Models/CLF0/clf.pkl', 'rb') as f:
            model = pickle.load(f)
    elif(cluster == 1):
        with open('../Models/KNN1/knn.pkl', 'rb') as f:
            model = pickle.load(f)
    else:
        with open('../Models/DT2/dt.pkl', 'rb') as f:
            model = pickle.load(f)
    return model

@app.route("/", methods=['GET'])
def index():
    return render_template("main.html")

@app.route("/predict", methods=['POST'])
def predict():
    if request.method == 'POST':
        age = int(request.form["age"])
        T3 = float(request.form["T3"])
        TT4 = float(request.form["TT4"])
        T4U = float(request.form["T4U"])
        FTI = float(request.form["FTI"])
        sex_ = request.form['sex']
        if (sex_ == "Male"):
            sex = 1
        else:
            sex = 0

        thyroxine = request.form["on_thyroxine"]
        if (thyroxine == "true"):
            on_thyroxine = 1
        else:
            on_thyroxine = 0

        query_thyroxine = request.form["query_thyroxine"]
        if (query_thyroxine == "true"):
            query_on_thyroxine = 1
        else:
```

```
query_on_thyroxine = 0

antithyroid_medication = request.form["antithyroid_medication"]
if( antithyroid_medication == "true"):
    on_antithyroid_medication = 1
else:
    on_antithyroid_medication = 0

I131_treatment_ = request.form["I131_treatment"]
if(I131_treatment_ == "true"):
    I131_treatment = 1
else:
    I131_treatment = 0

query_hypothyroid_ = request.form["query_hypothyroid"]
if(query_hypothyroid_ == "true"):
    query_hypothyroid = 1
else:
    query_hypothyroid = 0

hypopituitary_ = request.form["hypopituitary"]
if(hypopituitary_ == "true"):
    hypopituitary = 1
else:
    hypopituitary = 0

psych_ = request.form["psych"]
if(psych_ == "true"):
    psych = 1
else:
    psych = 0

sick_ = request.form['sick']
if (sick_ == 'true'):
    sick = 1
else:
    sick = 0

lithium_ = request.form["lithium"]
if(lithium_ == "true"):
    lithium = 1
else:
    lithium = 0

pregnant_ = request.form['pregnant']
if (pregnant_ == 'true'):
    pregnant = 1
else:
    pregnant = 0

thyroid_surgery_ = request.form['thyroid_surgery']
if (thyroid_surgery_ == 'true'):
    thyroid_surgery = 1
else:
```

```

        thyroid_surgery = 0

    goitre_ = request.form['goitre']
    if(goitre_ == 'true'):
        goitre = 1
    else:
        goitre = 0

    tumor_ = request.form['tumor']
    if (tumor_ == 'true'):
        tumor = 1
    else:
        tumor = 0

    cluster_output = kmeans.predict([[age,
                                      sex, on_thyroxine, query_on_thyroxine,
on_antithyroid_medication, sick, pregnant, thyroid_surgery, I131_treatment,
                                      query_hypothyroid, query_hypothyroid,
lithium, goitre, tumor, hypopituitary, psych, T3,
                                      TT4,
                                      T4U,
                                      FTI]])

    cluster_num = cluster_output

    model = find_model(cluster_num)

    prediction_output = model.predict([[age,
                                      sex, on_thyroxine, query_on_thyroxine,
on_antithyroid_medication, sick, pregnant, thyroid_surgery, I131_treatment,
                                      query_hypothyroid, query_hypothyroid,
lithium, goitre, tumor, hypopituitary, psych, T3,
                                      TT4,
                                      T4U,
                                      FTI
                                      ]])

    prediction = int(prediction_output[0])

    encoded_prediction = encoder.inverse_transform([prediction])

    return f"<div style='display: flex; justify-content: center; align-items: center;
height: 100vh;'><h1>You have {encoded_prediction[0]}</h1></div>"

if __name__ == '__main__':
    app.run(debug=True)

```

HTML & CSS For Frontend

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Thyroid Form</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      background-color: #f4f4f4;
      margin: 0;
      padding: 0;
    }
    .container {
      max-width: 600px;
      margin: 50px auto;
      background-color: #fff;
      padding: 20px;
      border-radius: 8px;
      box-shadow: 0 0 10px rgba(0,0,0,0.1);
    }
    form label {
      display: block;
      margin-bottom: 5px;
      font-weight: bold;
    }
    form input[type="text"], form select, form input[type="checkbox"] {
      width: calc(100% - 12px);
      padding: 8px;
      margin-bottom: 10px;
      border: 1px solid #ccc;
      border-radius: 4px;
    }
    form input[type="submit"] {
      width: 100%;
      padding: 10px;
      background-color: #007bff;
      color: #fff;
      border: none;
      border-radius: 4px;
      cursor: pointer;
    }
    form input[type="submit"]:hover {
      background-color: #0056b3;
    }
  </style>
</head>
<body>
  <div class="container">
    <form action="/predict" method="post">
      <label for="age">What is your age?</label>
```

```
<input type="text" name="age"><br>

<label for="sex">Male or female?</label>
<select name="sex">
  <option value="Male">Male</option>
  <option value="Female">Female</option>
</select><br>

<label for="on_thyroxine">Are you currently taking levothyroxine
(thyroxine)?</label>
<select name="on_thyroxine">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>

<label for="query_thyroxine">Do you have query related to thyroxine
treatment?</label>
<select name="query_thyroxine">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>

<label for="antithyroid_medication">Are you on your antithyroid
medication?</label>
<select name="antithyroid_medication">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>

<label for="pregnant">Are you currently pregnant?</label>
<select name="pregnant">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>

<label for="thyroid_surgery">Have you undergone thyroid related surgery?</label>
<select name="thyroid_surgery">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>

<label for="I131_treatment">Have you undergone treatment with radioactive iodine
(I131)?</label>
<select name="I131_treatment">
  <option value="true">Yes</option>
```

```
    <option value="false" selected>No</option>
</select><br>
```

<label for="query_hypothyroid">Have you been diagnosed with hypothyroidism or hyperthyroidism?</label>

```
<select name="query_hypothyroid">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

<label for="lithium">Are you on any lithium medication?</label>

```
<select name="lithium">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

<label for="hypopituitary">Have you been diagnosed with hypopituitarism?</label>

```
<select name="hypopituitary">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

<label for="goitre">Have you ever been diagnosed with a goiter (enlarged thyroid gland)?</label>

```
<select name="goitre">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

<label for="tumor">Have you ever been diagnosed with a thyroid tumor?</label>

```
<select name="tumor">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

<label for="psych">Have you ever been diagnosed with a psychiatric disorder?</label>

```
<select name="psych">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

<label for="sick">Have you been feeling unwell lately?</label>

```
<select name="sick">
  <option value="true">Yes</option>
  <option value="false" selected>No</option>
</select><br>
```

```
<label for="T3">How much is your T3 (thyroid hormone level)?</label>
<input type="text" name="T3"><br>

<label for="TT4">How much is your TT4 (thyroid hormone level)?</label>
<input type="text" name="TT4"><br>

<label for="T4U">How much is your T4U (thyroid hormone level)?</label>
<input type="text" name="T4U"><br>

<label for="FTI">How much is your FTI?</label>
<input type="text" name="FTI"><br>

    <input type="submit" value="Submit">
  </form>
</div>
</body>
</html>
```

Frontend

What is your age?

Male or female?

Are you currently taking levothyroxine (thyroxine)?

Do you have query related to thyroxine treatment?

Are you on your antithyroid medication?

Are you currently pregnant?

Have you undergone thyroid related surgery?

Have you undergone treatment with radioactive iodine (I131)?

Have you been diagnosed with hypothyroidism or hyperthyroidism?

Are you on any lithium medication?

Have you been diagnosed with hypopituitarism?

Have you ever been diagnosed with a goiter (enlarged thyroid gland)?

Have you ever been diagnosed with a thyroid tumor?

Have you ever been diagnosed with a psychiatric disorder?

Have you been feeling unwell lately?

How much is your T3 (thyroid hormone level)?

How much is your TT4 (thyroid hormone level)?

How much is your T4U (thyroid hormone level)?

How much is your FTI?

Submit

Output

You have compensated_hypothyroid

You have negative

You have primary_hypothyroid

You have secondary_hypothyroid