**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">

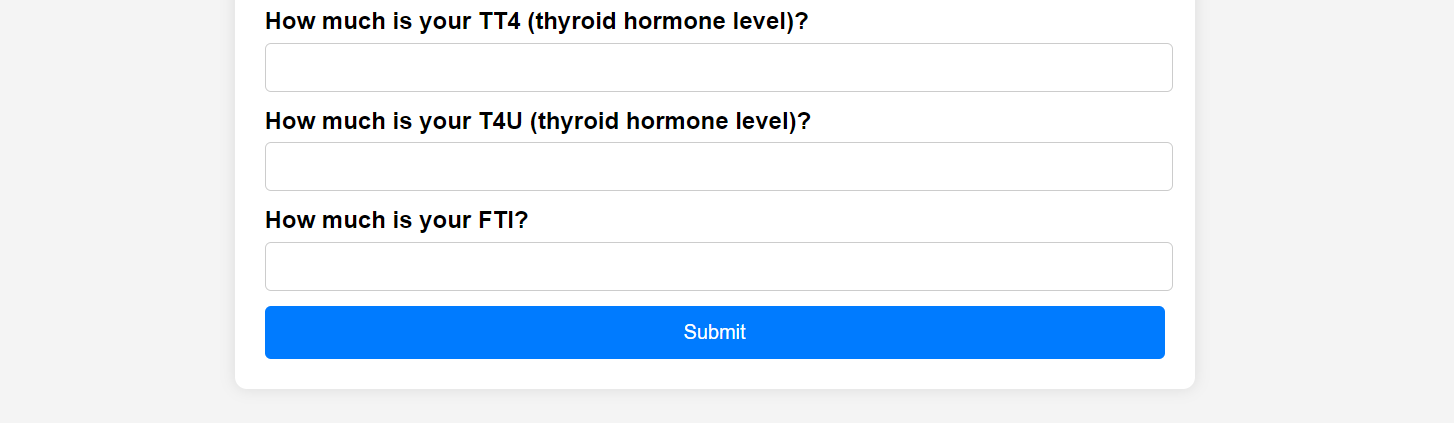
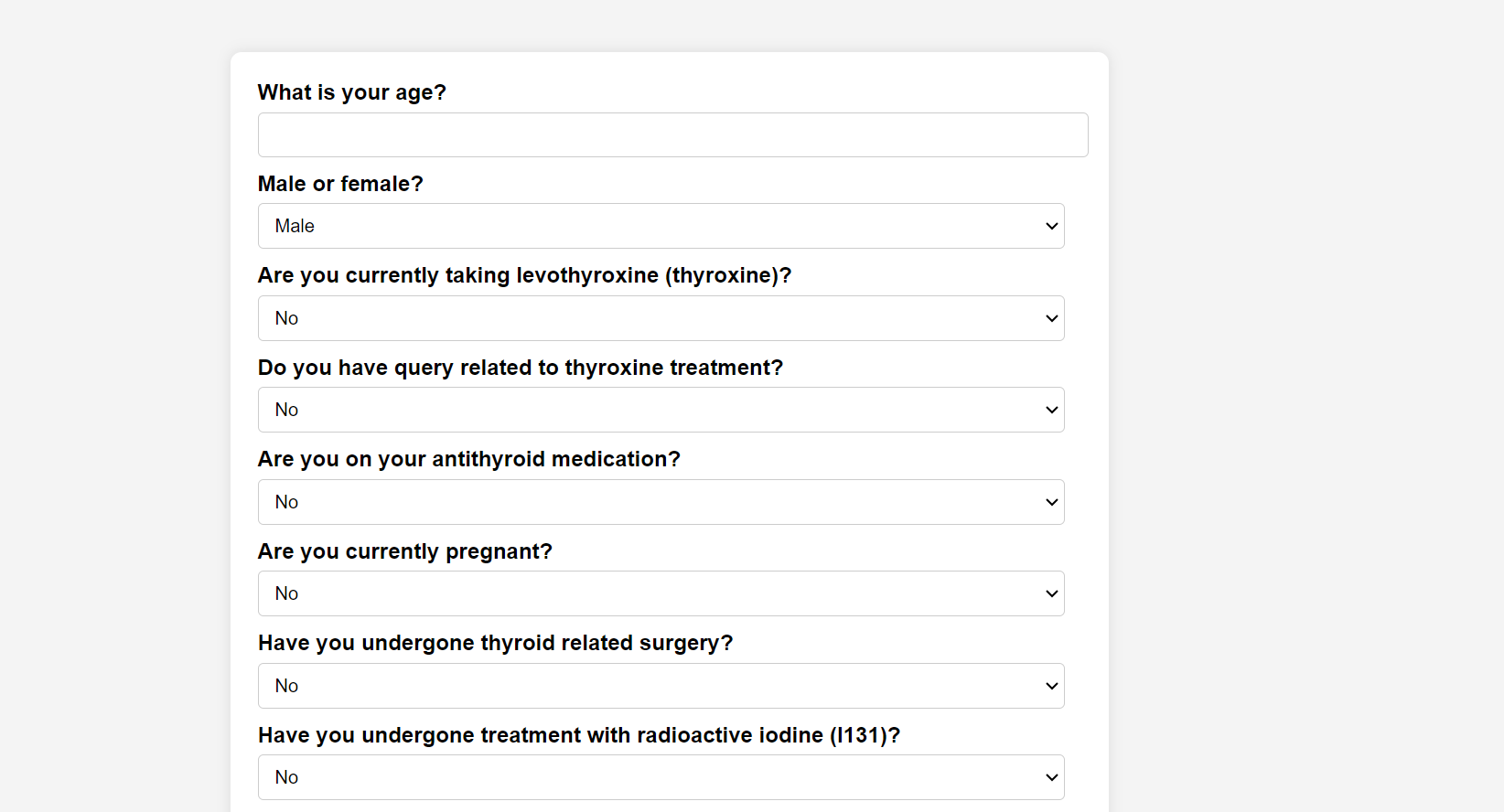
    </form>

</div>

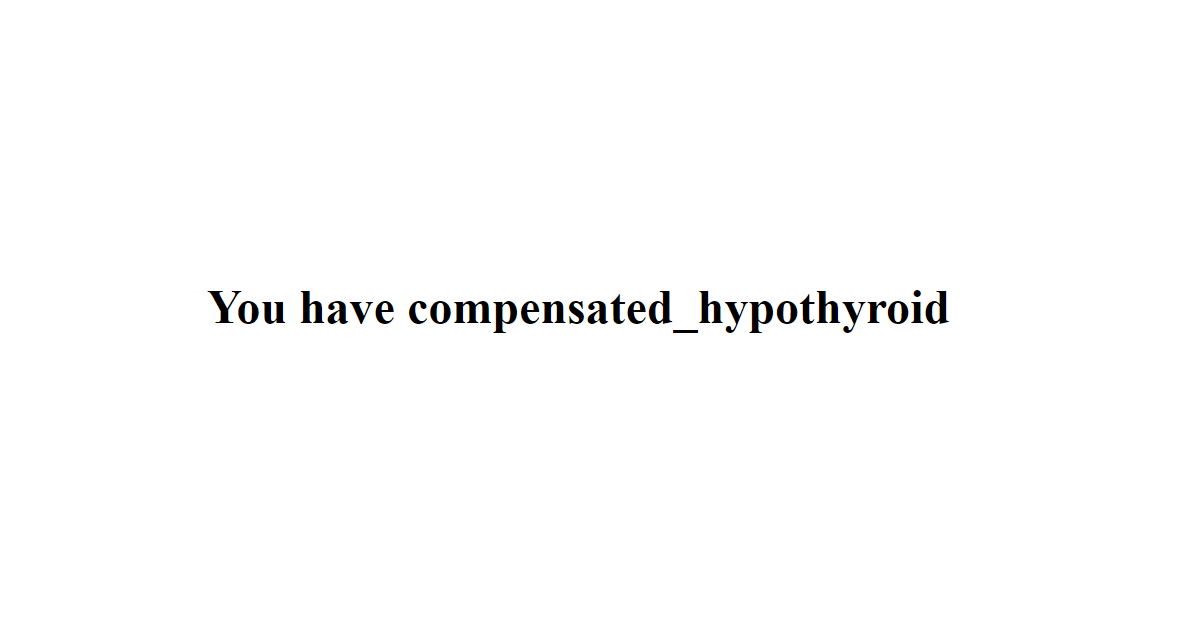
</body>

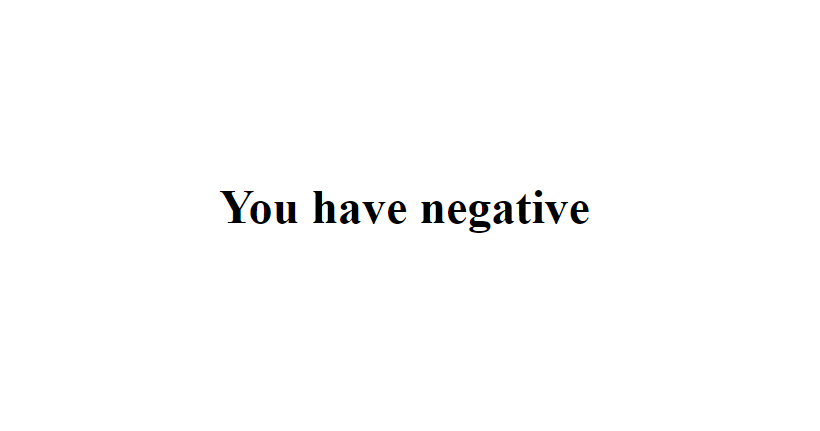
</html>

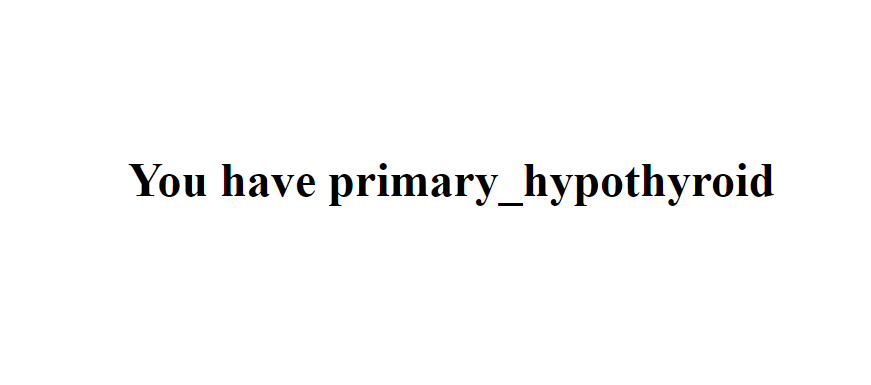
**Frontend**

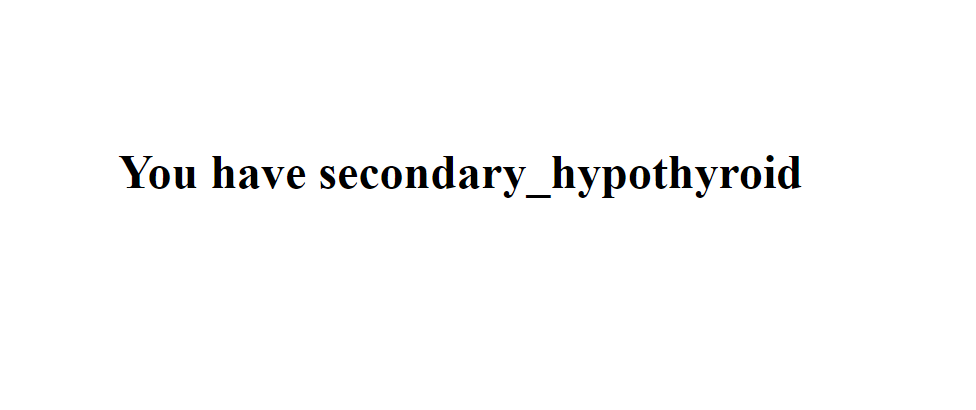
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**Output**

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