

Recognising Handwritten Digits with Deep Learning for AI Applications

1. Project Structure

```
handwritten_digit_recognition/  
|  
|- static/  
|   |- style.css  
|  
|- templates/  
|   |- index.html  
|  
|- model/  
|   |- digit_model.h5  
|  
|- app.py  
|- script.js  
|- requirements.txt
```

2. index.html

```
<!DOCTYPE html>  
<html>  
<head>  
    <title>Digit Recognizer</title>  
    <link rel="stylesheet" href="/static/style.css">  
</head>  
<body>  
    <h1>Handwritten Digit Recognition</h1>  
    <form id="uploadForm" enctype="multipart/form-data">  
        <input type="file" name="file" accept="image/*" required>  
        <button type="submit">Predict</button>  
    </form>  
    <p id="result"></p>  
    <script src="/script.js"></script>  
</body>  
</html>
```

3. style.css

```
body {  
    font-family: Arial;  
    text-align: center;  
    margin-top: 50px;  
}  
form {  
    margin-bottom: 20px;  
}
```

4. script.js

```
document.getElementById("uploadForm").onsubmit = async function (e) {
    e.preventDefault();
    const formData = new FormData(this);
    const response = await fetch('/predict', {
        method: 'POST',
        body: formData
    });
    const result = await response.json();
    document.getElementById("result").innerText = "Predicted Digit: " + result.digit;
};
```

5. app.py

```
from flask import Flask, request, render_template, jsonify
from tensorflow.keras.models import load_model
import numpy as np
from PIL import Image
import io

app = Flask(__name__)
model = load_model("model/digit_model.h5")

@app.route('/')
def index():
    return render_template("index.html")

@app.route('/predict', methods=['POST'])
def predict():
    file = request.files['file']
    img = Image.open(file).convert('L').resize((28, 28))
    img = np.array(img)
    img = img.reshape(1, 28, 28, 1) / 255.0
    prediction = model.predict(img)
    digit = np.argmax(prediction)
    return jsonify({'digit': int(digit)})

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