Project Structure:

Arduino

fraud_detection/

│

├── app.py

├── fraud_detection_model.pkl

├── requirements.txt

├── static/

│ └── styles.css

├── templates/

│ └── index.html

└── utils.py

1.app.py :

This is the main Flask application file.

```
from flask import Flask, request, jsonify, render_template
import pickle
import numpy as np
import logging
from utils import preprocess_input

app = Flask(__name__)

# Configure logging
logging.basicConfig(level=logging.INFO)

# Load the trained model
```

```
try:
    with open('fraud_detection_model.pkl', 'rb') as file:
        model = pickle.load(file)
    logging.info("Model loaded successfully.")
except Exception as e:
    logging.error(f"Error loading model: {e}")
    model = None

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

@app.route('/predict', methods=['POST'])
def predict():
    try:
        data = request.form.to_dict()
        logging.info(f"Received data: {data}")
        data = preprocess_input(data)
        prediction = model.predict([data])
        result = 'Fraudulent' if prediction[0] == 1 else 'Not Fraudulent'
        logging.info(f"Prediction: {result}")
        return jsonify({'prediction': result})
    except Exception as e:
        logging.error(f"Error during prediction: {e}")
        return jsonify({'error': str(e)}), 500

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

2.utils.py :

This file contains utility functions for data preprocessing.

```
import numpy as np

def preprocess_input(data):
    try:
        processed_data = [
            float(data['amount']),
            int(data['transaction_type']),
            # Add more fields as required by your model
        ]
        return np.array(processed_data)
    except KeyError as e:
        raise ValueError(f"Missing value for: {e}")
    except ValueError as e:
        raise ValueError(f"Invalid value: {e}")
```

3. requirements.txt :

```
Flask==2.0.2
numpy==1.21.2
scikit-learn==0.24.2
```

4. fraud_detection_model.apk :

Serialized machine learning model. Example code to create this file:

```
import pickle
from sklearn.ensemble import RandomForestClassifier
```

```
# Sample data and labels (replace with your actual dataset)
X = [[0.1, 1], [0.2, 0], [0.3, 1], [0.4, 0]]
y = [0, 1, 0, 1]

model = RandomForestClassifier()
model.fit(X, y)

# Save the model
with open('fraud_detection_model.pkl', 'wb') as file:
    pickle.dump(model, file)
```

index.html & css & js

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Online Payment Fraud Detection</title>
    <link href="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.css" rel="stylesheet">
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/uikit/3.6.16/css/uikit.min.css" />
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-beta3/css/all.min.css" />
    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f8f9fa;
        }
```

```
.container {
    margin-top: 50px;
}
.navbar-brand img {
    max-height: 40px;
    margin-right: 10px;
}
.footer {
    background-color: #343a40;
    color: white;
    padding: 20px 0;
}
.footer a {
    color: white;
}
.footer a:hover {
    color: #d3d3d3;
    text-decoration: none;
}
.social-icons {
    position: fixed;
    top: 50%;
    left: 10px;
    transform: translateY(-50%);
}
.social-icons a {
    display: block;
    margin: 10px 0;
    font-size: 24px;
```

```
}
.social-icons a.facebook {
    color: #3b5998;
}
.social-icons a.twitter {
    color: #1da1f2;
}
.social-icons a.linkedin {
    color: #0077b5;
}
.social-icons a.instagram {
    color: #e4405f;
}
.features {
    margin-top: 50px;
}
body {
    font-family: Arial, sans-serif;
    background-color: #f8f9fa;
}
.navbar {
    background-color: #004085; /* Dark blue background */
}
.navbar-brand, .navbar-nav .nav-link {
    color: #ffffff !important; /* White text color */
}
.navbar-brand img {
    max-height: 40px;
    margin-right: 10px;
```

```
        }
        .logo-container {
            text-align: center;
            margin-top: 20px;
        }
        .logo-container img {
            max-width: 150px;
        }
        .logo-container h1 {
            font-size: 2em;
            color: #004085;
            margin-top: 10px;
        }
        .footer {
            background-color: #343a40;
            color: white;
            padding: 20px 0;
        }
        .footer a {
            color: white;
        }
        .footer a:hover {
            color: #d3d3d3;
            text-decoration: none;
        }
    </style>
</head>
<body>
```

```
<nav class="navbar navbar-expand-lg navbar-light">
  <a class="navbar-brand" href="index.html">
    <img src="https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRs9S4Qo_MMjeBCJ687yIfT-mYzZsaB7WupQalUYccjlQ&s" > Fraud Detection
  </a>
  <button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarNav" aria-controls="navbarNav" aria-expanded="false" aria-label="Toggle navigation">
    <span class="navbar-toggler-icon"></span>
  </button>
  <div class="collapse navbar-collapse" id="navbarNav">
    <ul class="navbar-nav ml-auto">
      <li class="nav-item active">
        <a class="nav-link" href="index.html">Home</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="detection.html">Detection</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="about.html">About Us</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="contact.html">Contact</a>
      </li>
    </ul>
  </div>
</nav>

<div class="container logo-container">
```

```
    <img src="https://encrypted-
tbn0.gstatic.com/images?q=tbn:ANd9GcRs9S4Qo_MMjeBCJ687yIfT-
mYzZsaB7WupQalUYccjlQ&s" alt="Fraud Detection Logo">

    <h1>Welcome to Fraud Detection System</h1>

    <p class="lead">Protect your online transactions with our advanced fraud detection system using
machine learning.</p>

    <hr class="my-4">

    <p>Click the button below to start detecting fraud in your transactions.</p>

    <a class="btn btn-primary btn-lg" href="detection.html" role="button">Start Detection</a>

</div>


<div class="features">

    <h2 class="mb-4">Our Features</h2>

    <div class="row">

        <div class="col-md-4">

            <div class="card uk-card uk-card-default uk-card-body">

                <h5 class="card-title">Real-time Detection</h5>

                <p class="card-text">Our system detects fraudulent transactions in real-time, ensuring
your transactions are secure.</p>

            </div>

        </div>

        <div class="col-md-4">

            <div class="card uk-card uk-card-default uk-card-body">

                <h5 class="card-title">Machine Learning Algorithms</h5>

                <p class="card-text">We use advanced machine learning algorithms to identify and
prevent fraud with high accuracy.</p>

            </div>

        </div>

        <div class="col-md-4">

            <div class="card uk-card uk-card-default uk-card-body">

                <h5 class="card-title">Comprehensive Reports</h5>
```

```
            <p class="card-text">Get detailed reports on each transaction, including the fraud detection results and analysis.</p>
          </div>
        </div>
    </div>
</div>
</div>

<div class="social-icons">
<a href="#" class="facebook"><i class="fab fa-facebook-f"></i></a>
<a href="#" class="twitter"><i class="fab fa-twitter"></i></a>
<a href="#" class="linkedin"><i class="fab fa-linkedin-in"></i></a>
<a href="#" class="instagram"><i class="fab fa-instagram"></i></a>
</div>

<footer class="footer">
<div class="container text-center">
    <p>&copy; 2024 Fraud Detection System. All rights reserved.</p>
    <p>Contact us: <a href="mailto:info@frauddetection.com">info@frauddetection.com</a></p>
    <p>
        Follow us on:
        <a href="#" class="mx-2"><i class="fab fa-facebook-f facebook"></i></a>
        <a href="#" class="mx-2"><i class="fab fa-twitter twitter"></i></a>
        <a href="#" class="mx-2"><i class="fab fa-linkedin-in linkedin"></i></a>
        <a href="#" class="mx-2"><i class="fab fa-instagram instagram"></i></a>
    </p>
</div>
</footer>

<script src="https://code.jquery.com/jquery-3.5.1.slim.min.js"></script>
```

<script src="https://cdn.jsdelivr.net/npm/@popperjs/core@2.5.3/dist/umd/popper.min.js"></script>

<script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"></script>

<script src="https://cdnjs.cloudflare.com/ajax/libs/uikit/3.6.16/js/uikit.min.js"></script>

<script src="https://cdnjs.cloudflare.com/ajax/libs/uikit/3.6.16/js/uikit-icons.min.js"></script>

</body>

</html>

Running the Application

1.Navigate to the project directory

2.Install packages

pip install -r requirements.txt

3. Run the Flask application:

python app.py

4. Open the web browser and go to **http://127.0.0.1:5000/** to see the web interface and make predictions.