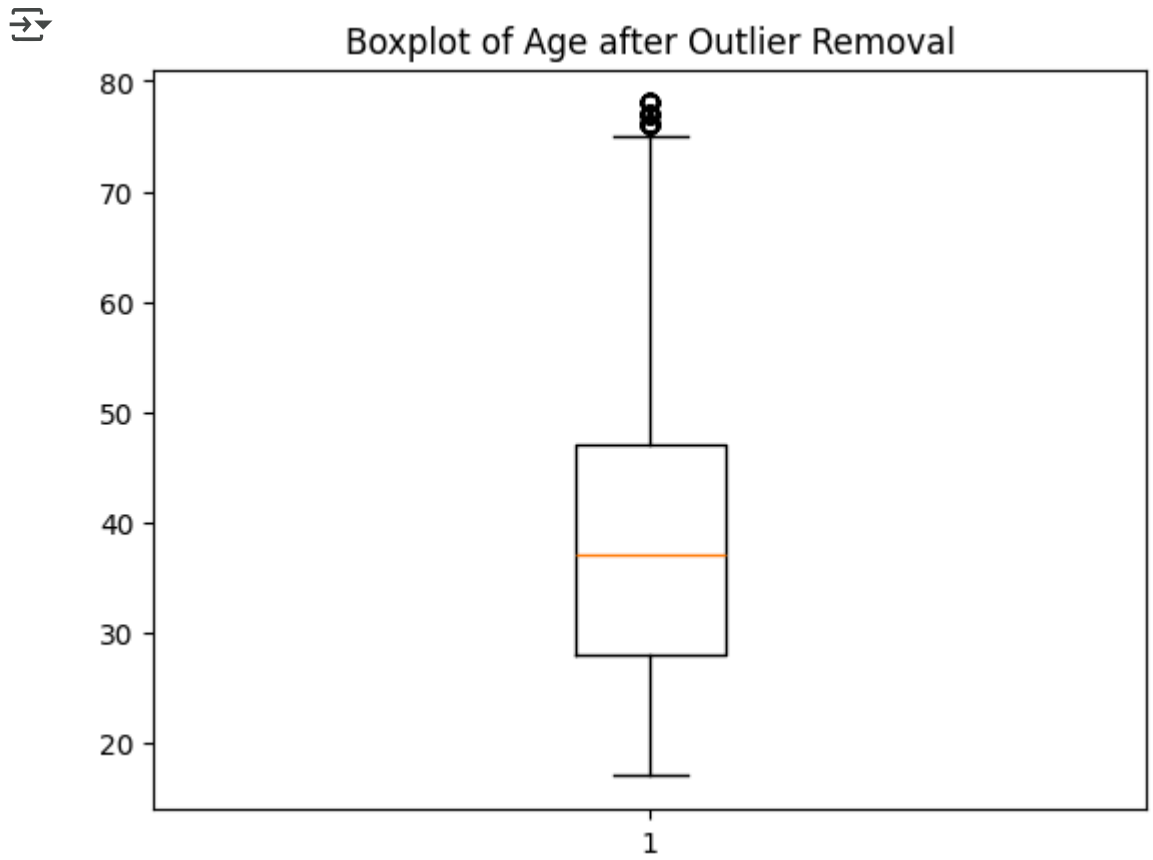
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder, MinMaxScaler
from sklearn.impute import SimpleImputer
from sklearn.neighbors import KNeighborsClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.svm import SVC
from sklearn.neural_network import MLPClassifier
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_scc

# Load dataset
data = pd.read_csv("/content/adult 3.csv")

#  Replace unknown values and remove unwanted rows
data['workclass'].replace({'?': 'others'}, inplace=True)
data['occupation'].replace({'?': 'others'}, inplace=True)
data = data[data['workclass'] != 'Without-pay']
data = data[data['workclass'] != 'Never-worked']
data = data[~data['education'].isin(['5th-6th', '1st-4th', 'Preschool'])]

# Drop redundancy
if 'education' in data.columns:
    data.drop(columns='education', inplace=True)

#  Remove Outliers in 'age'
Q1 = data['age'].quantile(0.25)
Q3 = data['age'].quantile(0.75)
IQR = Q3 - Q1
lower_bound = Q1 - 1.5 * IQR
upper_bound = Q3 + 1.5 * IQR
data = data[(data['age'] >= lower_bound) & (data['age'] <= upper_bound)]

# Boxplot to visualize
plt.boxplot(data['age'])
plt.title("Boxplot of Age after Outlier Removal")
plt.show()

#  Encode Categorical Columns
encoder = LabelEncoder()
for col in ['workclass', 'marital-status', 'occupation', 'relationship', 'race',
    data[col] = encoder.fit_transform(data[col])

#  Encode Target
if 'income' in data.columns:
    data['income'] = encoder.fit_transform(data['income'])  # 0: <=50K, 1: >50K

# Split features and labels
X = data.drop(columns='income')
y = data['income']
```

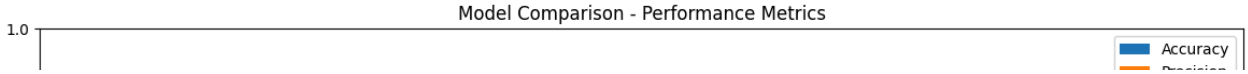
```
#  Impute missing values
imputer = SimpleImputer(strategy='mean')
X_imputed = imputer.fit_transform(X)

# MinMax Scaling
scaler = MinMaxScaler()
X_scaled = scaler.fit_transform(X_imputed)

#  Train-Test Split
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2, r

#  Apply Models and Evaluate
models = {
    "KNN": KNeighborsClassifier(),
    "Logistic Regression": LogisticRegression(max_iter=1000),
    "Decision Tree": DecisionTreeClassifier(),
    "SVC": SVC(probability=True),
    "MLP (ANN)": MLPClassifier(max_iter=1000, random_state=42)
}
```




```
results = []
for name, model in models.items():
    model.fit(X_train, y_train)
    y_pred = model.predict(X_test)
    metrics = {
        "Model": name,
        "Accuracy": accuracy_score(y_test, y_pred),
        "Precision": precision_score(y_test, y_pred),
```

```
            "Recall": recall_score(y_test, y_pred),
            "F1 Score": f1_score(y_test, y_pred)
        }
        results.append(metrics)
        print(f"\n=== {name} Classification Report ===")
        print(classification_report(y_test, y_pred))

    #  Visualize Results
    results_df = pd.DataFrame(results)

    # Bar Graph Comparison
    results_df.set_index("Model")[['Accuracy', 'Precision', 'Recall', 'F1 Score']].plot(kind=
    plt.title("Model Comparison - Performance Metrics")
    plt.ylabel("Score")
    plt.ylim(0, 1)
    plt.grid(axis='y')
    plt.tight_layout()
    plt.show()

    # Print Final Comparison Table
    print("\n=== Final Comparison Table ===")
    print(results_df.round(4))
```

```
=== KNN Classification Report ===
              precision    recall  f1-score   support

           0       0.86      0.91      0.89      7185
           1       0.67      0.57      0.62      2369

    accuracy                           0.82      9554
   macro avg       0.77      0.74      0.75      9554
weighted avg       0.82      0.82      0.82      9554


=== Logistic Regression Classification Report ===
              precision    recall  f1-score   support

           0       0.84      0.94      0.89      7185
           1       0.72      0.46      0.56      2369

    accuracy                           0.82      9554
   macro avg       0.78      0.70      0.72      9554
weighted avg       0.81      0.82      0.81      9554


=== Decision Tree Classification Report ===
              precision    recall  f1-score   support

           0       0.88      0.87      0.87      7185
           1       0.62      0.62      0.62      2369

    accuracy                           0.81      9554
   macro avg       0.75      0.75      0.75      9554
weighted avg       0.81      0.81      0.81      9554


=== SVC Classification Report ===
              precision    recall  f1-score   support

           0       0.86      0.95      0.90      7185
           1       0.77      0.53      0.63      2369

    accuracy                           0.84      9554
   macro avg       0.82      0.74      0.76      9554
weighted avg       0.84      0.84      0.83      9554


=== MLP (ANN) Classification Report ===
              precision    recall  f1-score   support

           0       0.87      0.94      0.90      7185
           1       0.77      0.57      0.66      2369

    accuracy                           0.85      9554
   macro avg       0.82      0.76      0.78      9554
weighted avg       0.84      0.85      0.84      9554
```




```
import pandas as pd
from sklearn.preprocessing import LabelEncoder, MinMaxScaler
```

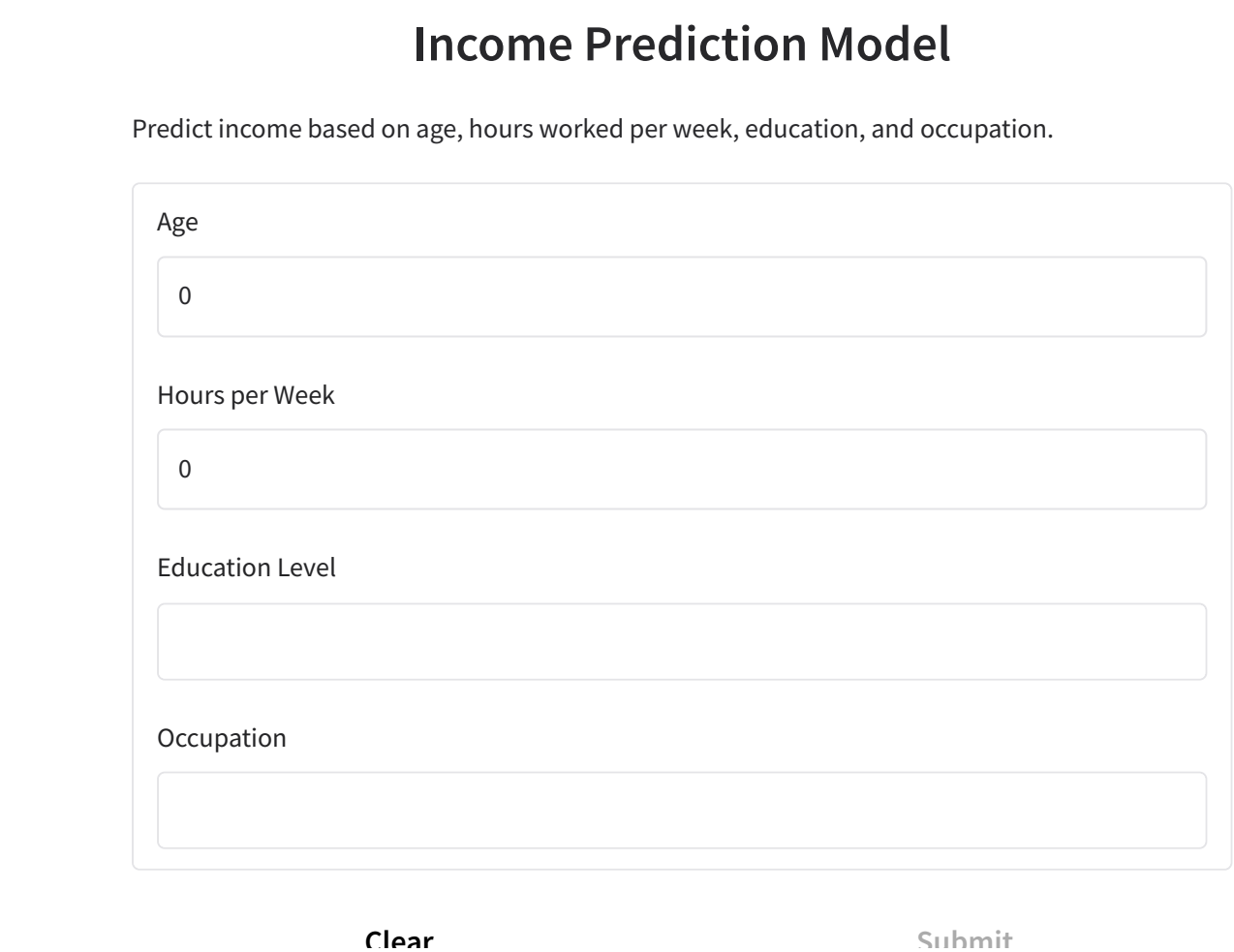
```
from sklearn.svm import SVC
from sklearn.model_selection import train_test_split
import joblib

# Load data
data = pd.read_csv("/content/adult 3.csv")

# Basic cleaning
data['workclass'].replace({'?': 'others'}, inplace=True)
data['occupation'].replace({'?': 'others'}, inplace=True)
data = data[data['workclass'] != 'Without-pay']
data = data[data['workclass'] != 'Never-worked']
data = data[~data['education'].isin(['5th-6th', '1st-4th', 'Preschool'])]

if 'education' in data.columns:
    data.drop(columns='education', inplace=True)

# Encode categorical variables
le_occupation = LabelEncoder()

data['occupation'] = le_occupation.fit_transform(data['occupation'].astype(str))

# Target encoding
target_le = LabelEncoder()
data['income'] = target_le.fit_transform(data['income'])

# Select features
features = ['age', 'hours-per-week', 'occupation'] # 'education' removed
X = data[features]
y = data['income']

# Scale
scaler = MinMaxScaler()
X_scaled = scaler.fit_transform(X)

# Train model
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2, random_st
model = SVC(probability=True)
model.fit(X_train, y_train)

# Save model and encoders
joblib.dump(model, "salary_model.pkl")
joblib.dump(le_occupation, "le_occupation.pkl")
joblib.dump(scaler, "scaler.pkl")
```

```
/tmp/ipython-input-11-3688869629.py:11: FutureWarning: A value is trying to be set on
The behavior will change in pandas 3.0. This inplace method will never work because t

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({


  data['workclass'].replace({'?': 'others'}, inplace=True)
/tmp/ipython-input-11-3688869629.py:12: FutureWarning: A value is trying to be set on
The behavior will change in pandas 3.0. This inplace method will never work because t

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({
```

```
        data['occupation'].replace({'?': 'others'}, inplace=True)
      ['scaler.pkl']


loaded_model = joblib.load("salary_model.pkl")
loaded_occupation_encoder = joblib.load("le_occupation.pkl")
loaded_scaler = joblib.load("scaler.pkl")


def predict_income(age, hours_per_week, education, occupation):
    # Create a DataFrame from input
    input_data = pd.DataFrame({
        'age': [age],
        'hours-per-week': [hours_per_week],
        'education': [education],
        'occupation': [occupation]
    })

    # Encode occupation - Handle potential unseen values
    try:
        input_data['occupation'] = loaded_occupation_encoder.transform(input_data['occupa
    except ValueError:
        # Handle unseen occupation by assigning a default value or raising an error
        # For simplicity, let's assign a value outside the range of encoded values
        input_data['occupation'] = -1 # Or handle as needed

    # Select and order features for scaling
    features_for_scaling = input_data[['age', 'hours-per-week', 'occupation']]

    # Scale numerical features
    scaled_input = loaded_scaler.transform(features_for_scaling)

    # Predict using the loaded model
    prediction = loaded_model.predict(scaled_input)

    # Convert numerical prediction back to human-readable label
    # Assuming the target encoder was fitted on ['<=50K', '>50K'] resulting in 0 and 1
    income_label = "<=50K" if prediction[0] == 0 else ">50K"

    return income_label


import gradio as gr


# Define input components
age_input = gr.Number(label="Age", minimum=0, maximum=100)
hours_input = gr.Number(label="Hours per Week", minimum=0, maximum=168)
# Since the model only used occupation, education input will not be used in prediction
# but we will include it in the interface as per the original request.
education_input = gr.Textbox(label="Education Level")
occupation_input = gr.Textbox(label="Occupation")
```

```
# Define output component
output_text = gr.Textbox(label="Predicted Income")

# Create the Gradio interface
iface = gr.Interface(
    fn=predict_income,
    inputs=[age_input, hours_input, education_input, occupation_input],
    outputs=output_text,
    title="Income Prediction Model",
    description="Predict income based on age, hours worked per week, education, and occup
)


iface.launch(share=True)
```

```
Rerunning server... use `close()` to stop if you need to change `launch()` parameters
----
Colab notebook detected. To show errors in colab notebook, set debug=True in launch()
* Running on public URL: https://eab4500e2351dfafc1.gradio.live

This share link expires in 1 week. For free permanent hosting and GPU upgrades, run `
```




```
import gradio as gr

# Step 1: Login UI
def login(username, password):
    if username == "deeksha" and password == "yaminn":
```

```
            return gr.update(visible=True), "Login Successful!"
        else:
            return gr.update(visible=False), "Login Failed. Try again."

    # Step 2: Salary Prediction App (hidden until login success)
    with gr.Blocks() as demo:
        gr.Markdown("## 🔒 Login Now")
        username = gr.Textbox(label="Username")
        password = gr.Textbox(label="Password", type="password")
        login_btn = gr.Button("LOGIN")
        login_msg = gr.Textbox(label="", interactive=False)

        # Salary Prediction Section (Initially Hidden)
        with gr.Column(visible=False) as predict_ui:
            gr.Markdown("Salary Prediction")
            age = gr.Number(label="Age")
            hours = gr.Number(label="Hours per Week")
            edu = gr.Textbox(label="Education") # Note: This input is not used in the predic
            occ = gr.Textbox(label="Occupation")
            predict_btn = gr.Button("Predict")
            output = gr.Textbox(label="Predicted Income")

            # Link the predict button to the predict_income function with the correct inputs
            predict_btn.click(fn=predict_income, inputs=[age, hours, edu, occ], outputs=outp

        login_btn.click(fn=login, inputs=[username, password], outputs=[predict_ui, login_ms
```

```
It looks like you are running Gradio on a hosted a Jupyter notebook. For the Gradic a

Colab notebook detected. To show errors in colab notebook, set debug=True in launch )
* Running on public URL: https://5454e50959ce546d2f.gradio.live
```

grades, run `