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import streamlit as st
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error, r2_score

# 1. 数据加载
st.title('数据加载与预处理')
st.write('上传 CSV 文件')

# 1. 数据加载
st.sidebar.header('1. 数据加载')
uploaded_file = st.sidebar.file_uploader("上传 CSV 文件", type="csv")

if uploaded_file is not None:
    data = pd.read_csv(uploaded_file)
    st.subheader('数据预览')
    st.write(data.head())

# 2. 特征选择
st.sidebar.header('2. 特征选择')
features = st.sidebar.multiselect('选择特征', data.columns)
target = st.sidebar.selectbox('选择目标变量', data.columns)

if features and target:
    X = data[features]
    y = data[target]

# 3. 数据划分
st.sidebar.header('3. 数据划分')
test_size = st.sidebar.slider('测试集大小 (%)', 10, 40, 20)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=test_size/100, random_state=42)

# 4. 模型选择
st.sidebar.header('4. 模型选择')
model_name = st.sidebar.selectbox('选择模型', ['Linear Regression', 'Decision Tree Regressor', 'Random Forest Regressor'])

if model_name == 'Linear Regression':
    model = LinearRegression()
elif model_name == 'Decision Tree Regressor':
    max_depth = st.sidebar.slider('最大深度', 1, 20, 5)
    model = DecisionTreeRegressor(max_depth=max_depth)
elif model_name == 'Random Forest Regressor':
    n_estimators = st.sidebar.slider('估计器数量', 10, 200, 100)
    max_depth = st.sidebar.slider('最大深度', 1, 20, 5)
    model = RandomForestRegressor(n_estimators=n_estimators, max_depth=max_depth)
else:
    model = LinearRegression()

# 5. 模型训练
model.fit(X_train, y_train)
y_pred = model.predict(X_test)

# 6. 模型评估
st.subheader('模型评估')
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)
st.write(f'MSE: {mse:.2f}')
st.write(f'R2 Score: {r2:.2f}')

# 7. 特征重要性
st.subheader('特征重要性')
if hasattr(model, 'feature_importances_'):
    st.subheader('特征重要性')
    feat_importances = pd.Series(model.feature_importances_, index=features)
    fig2, ax2 = plt.subplots()
    feat_importances.plot.bar(ax=ax2)
    st.pyplot(fig2)
else:
    st.warning('该模型不支持特征重要性分析')
else:
    st.info('请上传 CSV 文件')

```