Source code for Enhancing road safety AI with driven traffic accident analysis and prediction

```python
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlit.pyplot as plt
from sklearn.ensemble import Isolation Forest
np.random.seed(42)
data = pd.DataFrame({
    'speed': np.random.normal(60, 10, 1000),
    'visibility': np.random.normal(80, 15, 1000),
    'accident_severity': np.random.randint(1, 5, 1000),
    'location_x': np.random.uniform(0, 100, 1000),
    'location_y': np.random.uniform(0, 100, 1000)
}
plt.figure(figsize=(10, 6))
sns.kdeplot(data['speed'], shade=True, color='blue')
plt.title('Kernel Density Estimation for Vehicle Speed')
plt.xlabel('Speed (km/h)')
plt.ylabel('Density')
plt.grid(True)
plt.show()
features = data[['speed', 'visibility']]
iso_forest = IsolationForest(contamination=0.05)
outliers = iso_forest.fit_predict(features)
data['outlier'] = outliers
data['outlier'] = data['outlier'].map({1: 'Inlier', -1: 'Outlier'})
plt.figure(figsize=(10, 6))
sns.scatterplot(x='speed', y='visibility', hue='outlier', data=data,
            palette={'Inlier': 'blue', 'Outlier': 'red'})
plt.title('Outlier Detection: Speed vs Visibility')
plt.xlabel('Speed (km/h)')
plt.ylabel('Visibility (%)')
plt.grid(True)
plt.show()
heatmap_data = data.pivot_table(
    values='accident_severity',
    index=pd.cut(data['location_y'], bins=20),
    columns=pd.cut(data['location_x'], bins=20),
    aggfunc='mean'
)

plt.figure(figsize=(12, 8))
sns.heatmap(heatmap_data, cmap='YlOrRd', linewidths=0.5)
plt.title('Heatmap of Accident Severity by Location')
plt.xlabel('Location X')
plt.ylabel('Location Y')
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plt.show()
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