Accident Analysis in Cities Based on Time, Weather & Road Type

This project analyzes transportation accidents in India using real-world data.
We explore accident distribution by type, state-wise trends, and key insights
for improving safety and reducing deaths.

```
import pandas as pd

# Load the CSV file
df = pd.read_csv('/content/ADSI_Table_1A.2.csv')

# Show first 5 rows of the data
df.head()
```

	Sl. No.	State/UT/City	Road Accidents - Cases	Road Accidents - Injured	Road Accidents - Died	Railway Accidents - Cases	Railway Accidents - Injured	Railway Accidents - Died	Railway Crossing Accidents - Cases	Railway Crossing Accidents - Injured	Railway Crossing Accidents - Died	Total Traffic Accidents - Cases
0	1	Andhra Pradesh	21070	21340	8293	1029	0	1037	0	0	0	22099
1	2	Arunachal Pradesh	215	177	152	0	0	0	0	0	0	215
2	3	Assam	7028	5679	3060	689	0	693	22	0	22	7739
3	4	Bihar	10801	7068	8898	1444	6	1446	52	0	53	12297
4	5	Chhattisgarh	13091	11459	5890	429	21	429	4	0	4	13524

```
# Get structure, types, and missing values
df.info()

# Check for missing values in each column
df.isnull().sum()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 93 entries, 0 to 92
Data columns (total 14 columns):
 #   Column                                Non-Null Count  Dtype 
---  ------                                --------------  ----- 
 0   Sl. No.                               93 non-null     object
 1   State/UT/City                         93 non-null     object
 2   Road Accidents - Cases                93 non-null     int64 
 3   Road Accidents - Injured              93 non-null     int64 
 4   Road Accidents - Died                 93 non-null     int64 
 5   Railway Accidents - Cases             93 non-null     int64 
 6   Railway Accidents - Injured           93 non-null     int64 
 7   Railway Accidents - Died              93 non-null     int64 
 8   Railway Crossing Accidents - Cases    93 non-null     int64 
 9   Railway Crossing Accidents - Injured  93 non-null     int64 
 10  Railway Crossing Accidents - Died     93 non-null     int64 
 11  Total Traffic Accidents - Cases       93 non-null     int64 
 12  Total Traffic Accidents - Injured     93 non-null     int64 
 13  Total Traffic Accidents - Died        93 non-null     int64 
dtypes: int64(12), object(2)
memory usage: 10.3+ KB
```

	0
Sl. No.	0
State/UT/City	0
Road Accidents - Cases	0
Road Accidents - Injured	0
Road Accidents - Died	0
Railway Accidents - Cases	0
Railway Accidents - Injured	0
Railway Accidents - Died	0
Railway Crossing Accidents - Cases	0
Railway Crossing Accidents - Injured	0
Railway Crossing Accidents - Died	0
Total Traffic Accidents - Cases	0
Total Traffic Accidents - Injured	0
Total Traffic Accidents - Died	0

dtype: int64

```
# Confirm it's removed
df.head()
df.rename(columns={
    'State/UT/City': 'State',
    'Road Accidents - Cases': 'Road_Cases',
    'Road Accidents - Injured': 'Road_Injured',
    'Road Accidents - Died': 'Road_Deaths',
    'Railway Accidents - Cases': 'Rail_Cases',
    'Railway Accidents - Injured': 'Rail_Injured',
    'Railway Accidents - Died': 'Rail_Deaths',
    'Railway Crossing Accidents - Cases': 'Crossing_Cases',
    'Railway Crossing Accidents - Injured': 'Crossing_Injured',
    'Railway Crossing Accidents - Died': 'Crossing_Deaths',
    'Total Traffic Accidents - Cases': 'Total_Cases',
    'Total Traffic Accidents - Injured': 'Total_Injured',
    'Total Traffic Accidents - Died': 'Total_Deaths'
}, inplace=True)

# See new column names
df.head()
```

	State	Road_Cases	Road_Injured	Road_Deaths	Rail_Cases	Rail_Injured	Rail_Deaths	Crossing_Cases	Crossing_Injured	Cross
0	Andhra Pradesh	21070	21340	8293	1029	0	1037	0	0	
1	Arunachal Pradesh	215	177	152	0	0	0	0	0	
2	Assam	7028	5679	3060	689	0	693	22	0	
3	Bihar	10801	7068	8898	1444	6	1446	52	0	
4	Chhattisgarh	13091	11459	5890	429	21	429	4	0	

```
df.sort_values(by='Total_Cases', ascending=False).head(5)
```

	State	Road_Cases	Road_Injured	Road_Deaths	Rail_Cases	Rail_Injured	Rail_Deaths	Crossing_Cases	Crossing_Injured	Crossing
38	Total (All India)	446768	423158	171100	23139	2457	20792	2560	112	
28	Total (States)	433111	407881	168370	22285	2350	20043	2557	112	
92	Total (Cities)	66402	57140	15967	1563	105	1442	271	1	
22	Tamil Nadu	64105	67703	17884	2012	189	1833	0	0	
12	Madhya Pradesh	51965	51264	13918	1275	0	1275	239	0	

```
df.sort_values(by='Road_Deaths', ascending=False).head(5)
```

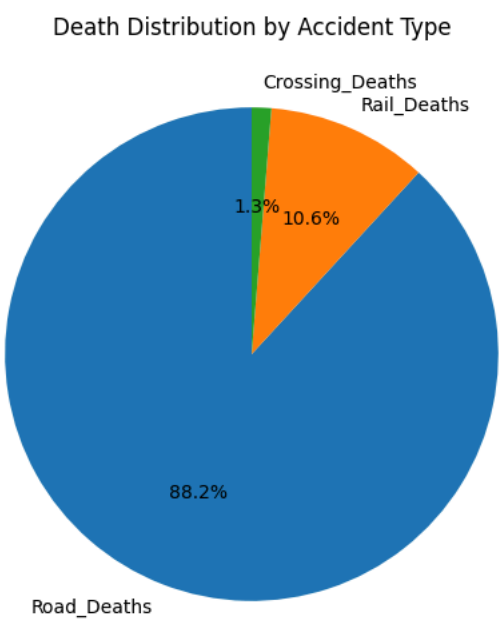
	State	Road_Cases	Road_Injured	Road_Deaths	Rail_Cases	Rail_Injured	Rail_Deaths	Crossing_Cases	Crossing_Injured	Crossing
38	Total (All India)	446768	423158	171100	23139	2457	20792	2560	112	
28	Total (States)	433111	407881	168370	22285	2350	20043	2557	112	
25	Uttar Pradesh	36875	21696	24109	3190	35	3166	1340	4	
22	Tamil Nadu	64105	67703	17884	2012	189	1833	0	0	
92	Total (Cities)	66402	57140	15967	1563	105	1442	271	1	

```
df.sort_values(by='Total_Injured', ascending=False).head(5)
```

	State	Road_Cases	Road_Injured	Road_Deaths	Rail_Cases	Rail_Injured	Rail_Deaths	Crossing_Cases	Crossing_Injured	Crossing
38	Total (All India)	446768	423158	171100	23139	2457	20792	2560	112	
28	Total (States)	433111	407881	168370	22285	2350	20043	2557	112	
22	Tamil Nadu	64105	67703	17884	2012	189	1833	0	0	
92	Total (Cities)	66402	57140	15967	1563	105	1442	271	1	
12	Madhya Pradesh	51965	51264	13918	1275	0	1275	239	0	

```
import matplotlib.pyplot as plt

death_distribution = df[['Road_Deaths', 'Rail_Deaths', 'Crossing_Deaths']].sum()
```

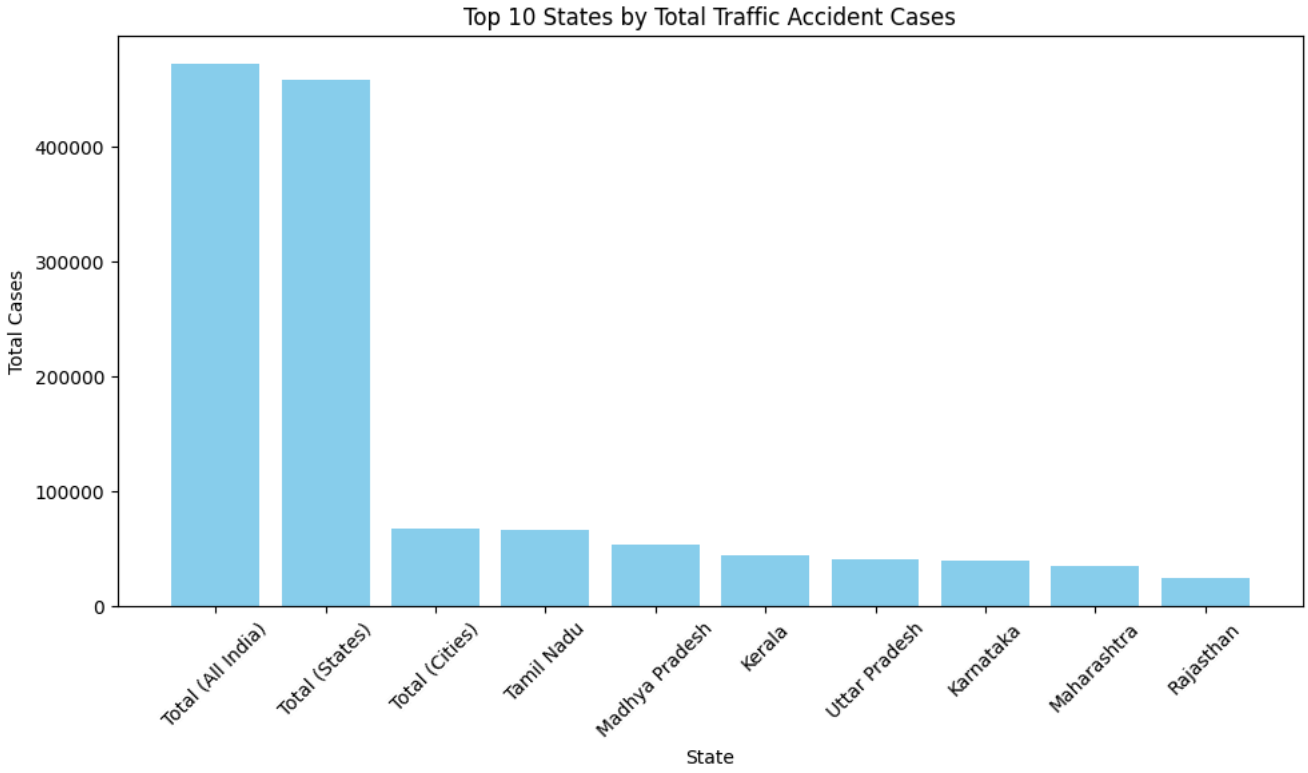
```
# Plot pie chart
plt.figure(figsize=(6,6))
death_distribution.plot(kind='pie', autopct='%1.1f%%', startangle=90)
plt.title("Death Distribution by Accident Type")
plt.ylabel("")
plt.show()
```




```
print("Total Road Accident Cases:", df['Road_Cases'].sum())
print("Total Railway Accident Cases:", df['Rail_Cases'].sum())
print("Total Railway Crossing Cases:", df['Crossing_Cases'].sum())
```

```
Total Road Accident Cases: 1473108
Total Railway Accident Cases: 72543
Total Railway Crossing Cases: 8222
```

```
import matplotlib.pyplot as plt

top10_states = df.sort_values(by='Total_Cases', ascending=False).head(10)

plt.figure(figsize=(10,6))
plt.bar(top10_states['State'], top10_states['Total_Cases'], color='skyblue')
plt.xticks(rotation=45)
plt.title("Top 10 States by Total Traffic Accident Cases")
plt.xlabel("State")
plt.ylabel("Total Cases")
plt.tight_layout()
plt.show()
```



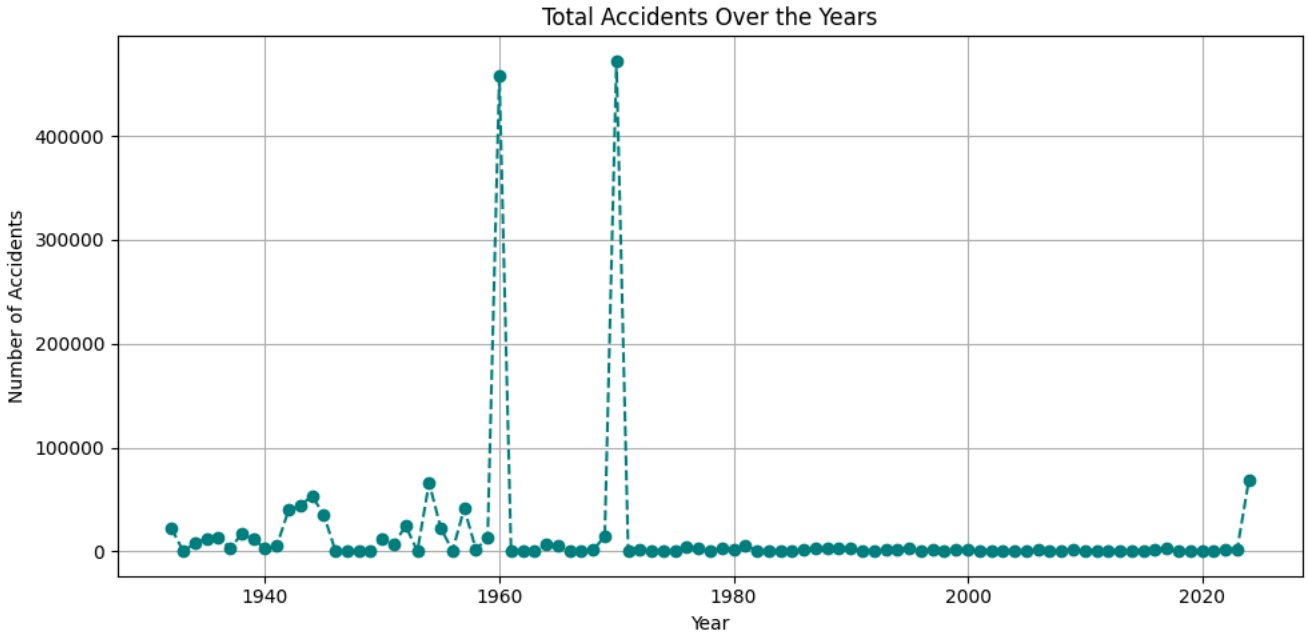
Double-click (or enter) to edit

```
print(len(df))
```

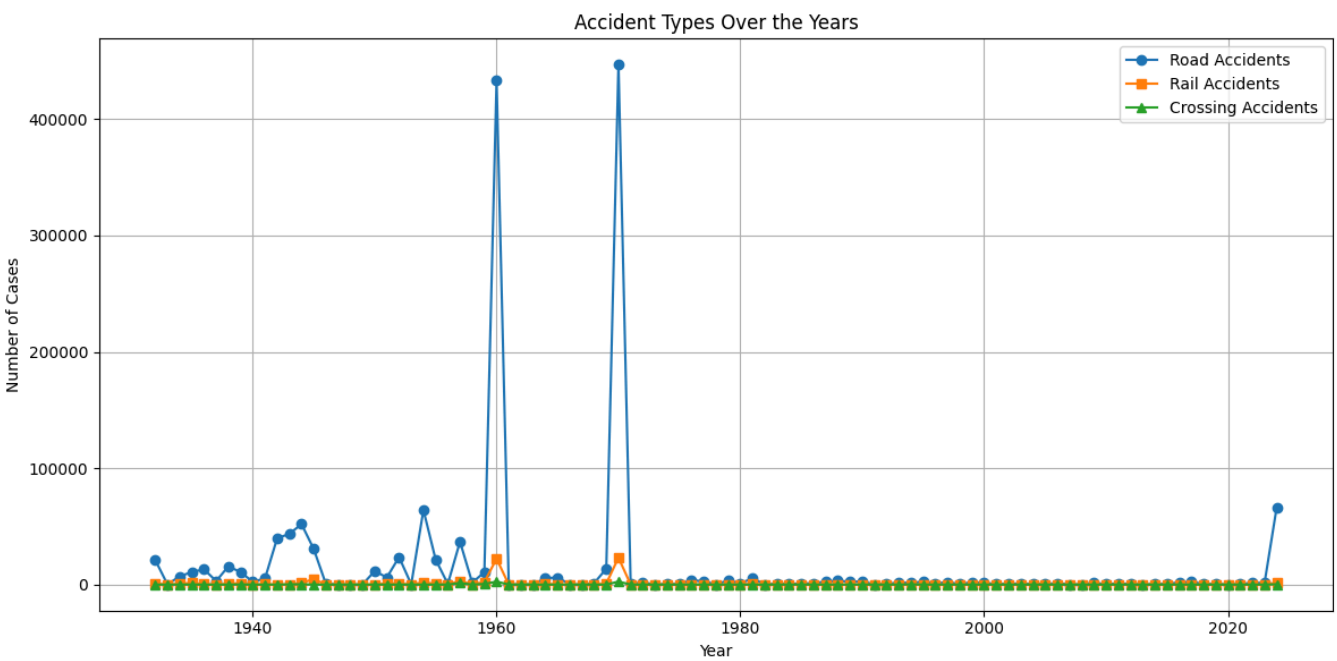
```
93
```

```
df['Year'] = list(range(1932, 2025))  # 1932 to 2024 = 93 years
```

```
import matplotlib.pyplot as plt

# Group by year and sum total accidents
yearly_accidents = df.groupby('Year')['Total_Cases'].sum()

# Plot the trend
plt.figure(figsize=(10, 5))
yearly_accidents.plot(marker='o', linestyle='--', color='teal')
plt.title("Total Accidents Over the Years")
plt.xlabel("Year")
plt.ylabel("Number of Accidents")
plt.grid(True)
plt.tight_layout()
plt.show()
```

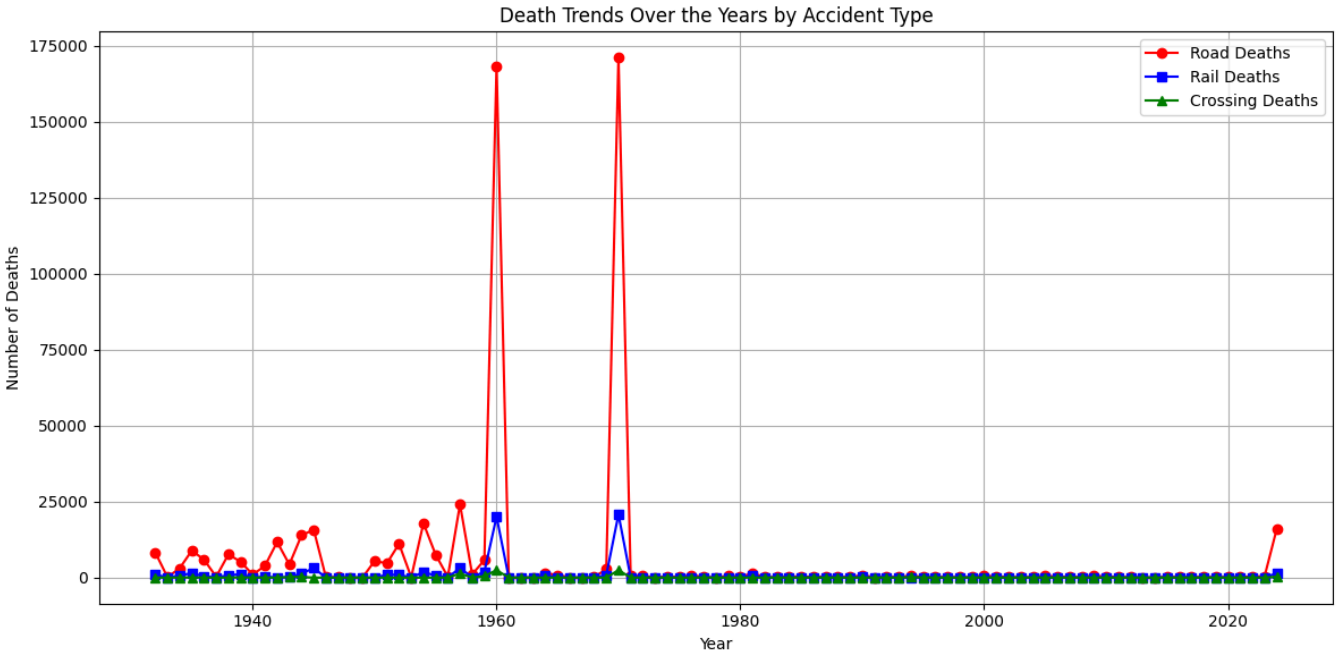



```
plt.figure(figsize=(12,6))

plt.plot(df['Year'], df['Road_Cases'], label='Road Accidents', marker='o')
plt.plot(df['Year'], df['Rail_Cases'], label='Rail Accidents', marker='s')
plt.plot(df['Year'], df['Crossing_Cases'], label='Crossing Accidents', marker='^')

plt.title("Accident Types Over the Years")
plt.xlabel("Year")
plt.ylabel("Number of Cases")
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```




```
plt.figure(figsize=(12,6))

plt.plot(df['Year'], df['Road_Deaths'], label='Road Deaths', marker='o', color='red')
plt.plot(df['Year'], df['Rail_Deaths'], label='Rail Deaths', marker='s', color='blue')
plt.plot(df['Year'], df['Crossing_Deaths'], label='Crossing Deaths', marker='^', color='green')

plt.title("Death Trends Over the Years by Accident Type")
plt.xlabel("Year")
plt.ylabel("Number of Deaths")
```

```
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```




```
# Create a new column for total deaths (if not already present)
df['Total_Deaths'] = df[['Road_Deaths', 'Rail_Deaths', 'Crossing_Deaths']].sum(axis=1)

# Group by State and calculate total deaths
state_deaths = df.groupby('State')['Total_Deaths'].sum().sort_values(ascending=False).head(10)

# Plotting the top 10 states
plt.figure(figsize=(10,6))
state_deaths.plot(kind='bar', color='crimson')
plt.title("Top 10 States with Highest Total Deaths")
plt.xlabel("State")
plt.ylabel("Total Deaths")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```