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RAM



Disk



--- Generating Simulated Data ---

Generated 5000 records.



| | accident_id | date | time_of_day_hour | road_type | weather_condition | \ |
|---|-------------|------------|------------------|--------------|-------------------|---|
| 0 | 0 | 2023-04-13 | 23 | Highway | Clear | |
| 1 | 1 | 2023-12-15 | 9 | Rural Road | Rainy | |
| 2 | 2 | 2023-09-28 | 6 | Urban Street | Rainy | |
| 3 | 3 | 2023-04-17 | 16 | Highway | Foggy | |
| 4 | 4 | 2023-03-13 | 3 | Rural Road | Clear | |

| | speed_limit_mph | num_vehicles_involved | junction_type | driver_age_group | \ |
|---|-----------------|-----------------------|---------------|------------------|---|
| 0 | 30 | 4 | Crossroads | <25 | |
| 1 | 75 | 4 | Roundabout | 25-50 | |
| 2 | 45 | 2 | Roundabout | >50 | |
| 3 | 45 | 2 | None | 25-50 | |
| 4 | 45 | 1 | None | 25-50 | |

severity

0 Serious

1 Serious

10:02

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```
severity
0 Serious
1 Serious
2 Serious
3 Serious
4 Minor
```

```
--- Data Info ---
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 5000 entries, 0 to 4999
```

```
Data columns (total 10 columns):
```

| # | Column | Non-Null Count | Dtype |
|---|-----------------------|----------------|----------------|
| 0 | accident_id | 5000 non-null | int64 |
| 1 | date | 5000 non-null | datetime64[ns] |
| 2 | time_of_day_hour | 5000 non-null | int64 |
| 3 | road_type | 5000 non-null | object |
| 4 | weather_condition | 5000 non-null | object |
| 5 | speed_limit_mph | 5000 non-null | int64 |
| 6 | num_vehicles_involved | 5000 non-null | int64 |



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```
6  num_vehicles_involved  5000 non-null  int64
7  junction_type          5000 non-null  object
8  driver_age_group       5000 non-null  object
9  severity                5000 non-null  object
```

```
dtypes: datetime64[ns](1), int64(4), object(5)
```

```
memory usage: 390.8+ KB
```

```
--- Data Preprocessing ---
```

```
Features after encoding: ['time_of_day_hour', 'speed_limit_mph', 'num_vehicles_involved', 'road_type_Rural Road', 'road_type_
```

```
Shape of features (X): (5000, 13)
```

```
Shape of target (y): (5000,)
```

```
Training set size: 4000 samples
```

```
Testing set size: 1000 samples
```

```
--- Model Training (Random Forest Classifier) ---
```

```
Model training complete.
```

```
--- Model Prediction and Evaluation ---
```

```
Accuracy: 0.5460
```

10:03

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Accuracy: 0.5460



Classification Report:

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| Minor | 0.60 | 0.64 | 0.62 | 331 |
| Serious | 0.59 | 0.63 | 0.61 | 484 |
| Fatal | 0.22 | 0.15 | 0.18 | 185 |
| accuracy | | | 0.55 | 1000 |
| macro avg | 0.47 | 0.48 | 0.47 | 1000 |
| weighted avg | 0.52 | 0.55 | 0.53 | 1000 |

Confusion Matrix:

```
[[213  93  25]
 [107 305  72]
 [ 37 120  28]]
```

Basic Analysis & Visualization



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--- Basic Analysis & Visualization ---



Feature Importances for Accident Severity Prediction





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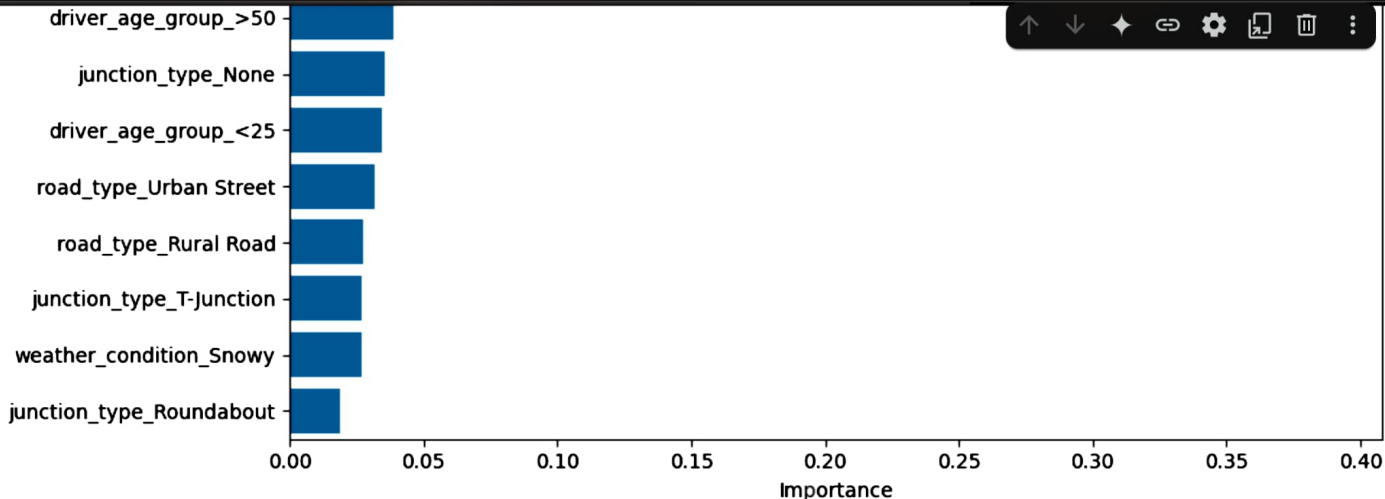
RAM



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Feature



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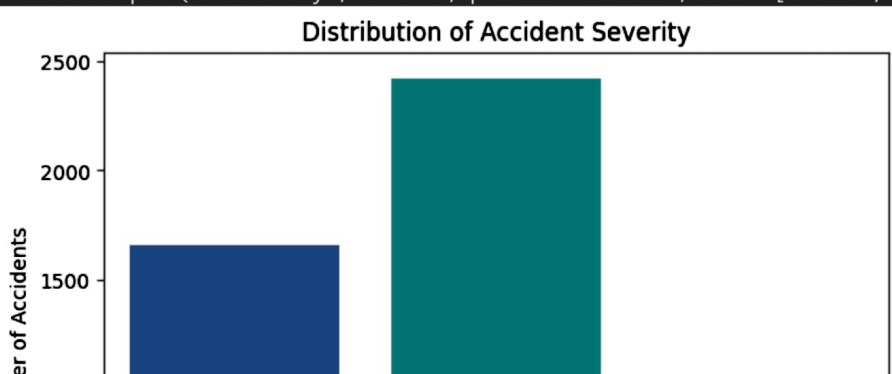


```
<ipython-input-1-5807591ab518>:113: FutureWarning:
```



```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue`
```

```
sns.countplot(x='severity', data=df, palette='viridis', order=['Minor', 'Serious', 'Fatal'])
```



10:05

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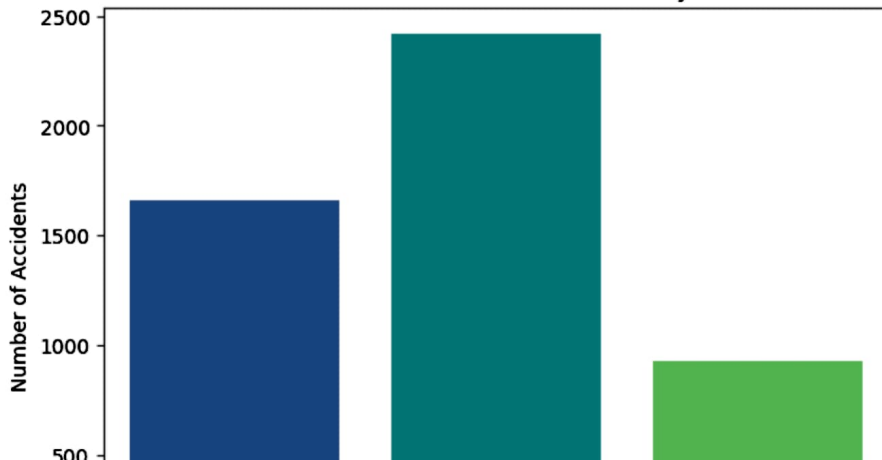
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Distribution of Accident Severity





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0

Minor

Serious
Severity

Fatal

Accidents by Weather Condition and Severity



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