

Overview

This project is an interactive machine learning-powered web application that predicts and visualizes the potential severity of road accidents based on various contributing factors. Built with Python and Streamlit, the dashboard combines predictive analytics with comprehensive data visualization to help users understand accident risks and patterns.

Create a requirements.txt with the following:

streamlit

pandas

numpy

matplotlib

seaborn

xgboost

Then install using:

pip install -r requirements.txt

Project Structure

```
| app.py           # Main Streamlit application  
| accident_severity_model.pkl # Pre-trained model (required)  
| README.md       # This file
```

How to Run the App

1. Clone this repository or place all files in one folder.
2. Make sure accident_severity_model.pkl is in the same directory.
3. Open terminal in that folder and activate virtual environment if needed.

4. Run the app using:

```
streamlit run app.py
```

5. Open browser and go to:

👉 <http://localhost:8501>

🔧 How It Works

- The app loads a trained **XGBoost model** from a .pkl file using pickle.
 - User inputs are converted to numerical values using defined mappings.
 - The input is passed to the model to predict accident severity:
 - **Slight**
 - **Serious**
 - **Fatal**
 - The app displays the prediction and updates a live session history.
 - Visualizations like **pie chart**, **bar plot**, **box plot**, and **violin plot** are used to analyze past predictions.
-

📊 Features

- **Real-time predictions** for accident severity
 - **Feature importance graph** (model explainability)
 - **Prediction history table**
 - **Casualties vs Severity** (box plot)
 - **Speed vs Severity** (violin plot)
 - Easy UI with Streamlit and attractive charts using matplotlib and seaborn
-

⚠ Troubleshooting

Problem

ModuleNotFoundError

Solution

Run pip install for the missing package

accident_severity_model.pkl missing Make sure the model file is in same folder

Port not opening / App not launching Run: streamlit run app.py and check browser

Empty visualizations

Make a few predictions first

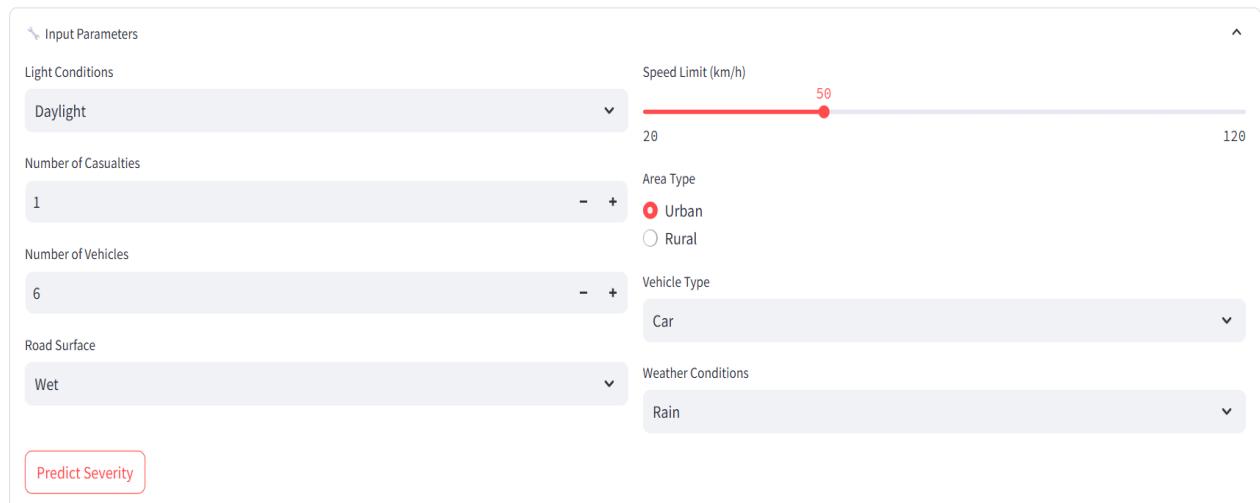
👏 Credits

- Developed using [Streamlit](#)
 - Machine learning powered by [XGBoost](#)
 - Visualization with matplotlib and seaborn
-

📸 Screenshots

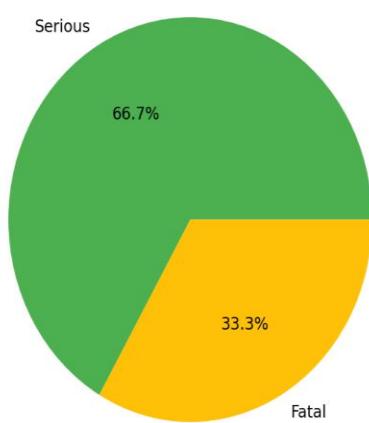
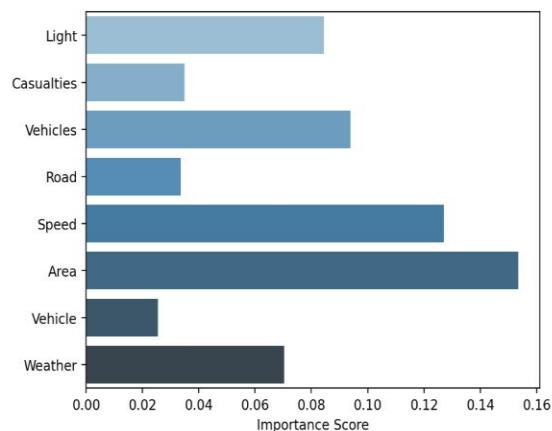
🚗 Accident Severity Prediction Dashboard

Predict and visualize accident severity based on key factors.



The screenshot shows a Streamlit dashboard titled "Accident Severity Prediction Dashboard". The interface is divided into several sections:

- Input Parameters:** A header for the input fields.
- Light Conditions:** A dropdown menu set to "Daylight".
- Number of Casualties:** An input field containing the value "1".
- Number of Vehicles:** An input field containing the value "6".
- Road Surface:** A dropdown menu set to "Wet".
- Speed Limit (km/h):** A slider control with a red handle set at "50", ranging from "20" to "120".
- Area Type:** A radio button group where "Urban" is selected (indicated by a red dot).
- Vehicle Type:** A dropdown menu set to "Car".
- Weather Conditions:** A dropdown menu set to "Rain".
- Predict Severity:** A red-bordered button at the bottom left.

Severity Distribution**Key Influencing Factors****Prediction Result: Fatal**

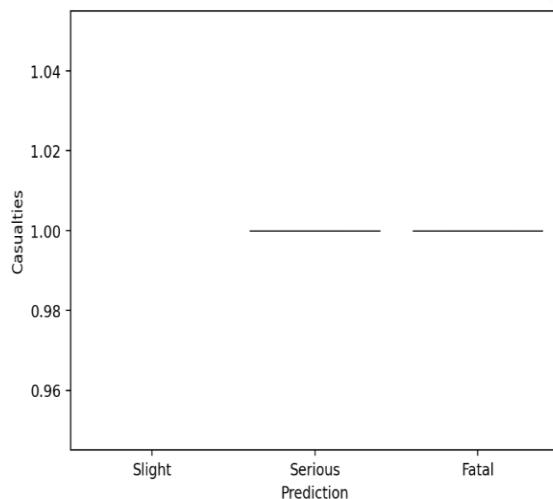
This accident has high risk of fatalities

Prediction History

	Light	Casualties	Vehicles	Road	Speed	Area	Vehicle_Type	Weather	Prediction
0	Daylight	1	2	Dry	50	Urban	Car	Clear	Serious
1	Daylight	1	6	Wet	50	Urban	Car	Clear	Serious
2	Daylight	1	6	Wet	50	Urban	Car	Rain	Fatal

Trend Analysis

Casualties vs Severity



Speed Distribution by Severity

