

Benefits of the Linear Regression Model

A linear regression model for predicting traffic accident severity provides several advantages, especially for underdeveloped countries. These nations often face challenges such as limited funding, poor road infrastructure, and insufficient traffic data. The model helps uncover relationships between factors like weather conditions, speed limits, lighting, and the number of vehicles involved, and how these contribute to accident severity.

One key benefit is **data-driven decision-making**. Governments and road safety agencies can use the insights from the model to create informed strategies instead of relying on assumptions or outdated statistics. It also enhances **resource allocation** by identifying the most critical areas and times of risk, allowing limited manpower and budget to be used more effectively. Emergency responders, too, can benefit by strategically placing resources like ambulances in areas where severe accidents are more likely.

Another advantage is the model's potential to support **research, public awareness, and education**. It can be used in campaigns to inform the public about high-risk behaviors, such as overspeeding during rain or driving in low-light conditions. This makes the model not just a technical tool but also an educational and communication resource for promoting safer road practices.

How the Model Supports Accident Prevention

The model plays a direct role in **preventing traffic accidents** by helping identify high-risk scenarios in advance. For example, if the model shows that accident severity increases significantly during rain at speeds above 70 km/h, authorities can enforce **lower speed limits during rainfall** or install warning signs in vulnerable areas. These interventions are low-cost yet highly effective in preventing accidents.

By analyzing historical accident data, the model also highlights **patterns of danger**, such as poor visibility at night or slippery rural roads after rain. With this information, policymakers can implement preventive measures like adding street lights, installing reflective road markers, or resurfacing roads with better grip.

Furthermore, **real-time prediction and alerts** are possible if the model is integrated into a live system. For instance, during bad weather, traffic management centers could issue warnings or adjust traffic signals to reduce accident risks. The model empowers local governments to act proactively rather than reactively, preventing loss of life and injuries.