**Presentation Script – Accident Severity Prediction Analysis**

***(7 minutes)***

**1. Introduction (1 min)**

*"Good afternoon, everyone! I’ll walk you through our findings on predicting accident severity using machine learning."*

*As my colleagues said, we analyzed road accident data from France and applied different machine-learning models to classify accident severity. Our goal was to understand what factors contribute to severe injuries and how we can improve road safety through data-driven insights.*

*Let’s dive into the models, their performance, and what we learned.*

**2. Model Performance Overview (2 min)**

*"We tested multiple models, but I’ll focus on the three that performed best:* ***Random Forest, XGBoost, and LightGBM****."*

**Random Forest:**

*"This model performed well, especially in distinguishing non-fatal cases. It achieved an* ***F1-score of 0.97 for non-fatal injuries****, showing a good balance of precision and recall. However, it struggled slightly with more severe cases."*

**XGBoost:**

*"XGBoost was our strongest model for non-fatal cases, achieving an F1-score of* ***0.98****. It also handled severe injuries better than Random Forest, with an F1-score of* ***0.59****. Its strength lies in how it processes imbalanced data—something crucial for accident prediction."*

**LightGBM:**

*"LightGBM delivered competitive performance across all categories. It was* ***fast*** *and* ***efficient****, making it an attractive option for real-time applications. However, its recall for severe injuries was slightly lower compared to XGBoost."*

*"Now, predicting accident severity isn’t just about accuracy—it’s about understanding* ***why*** *a model makes certain predictions. That’s where interpretability comes in."*

**3. Feature Importance and Interpretability (2 min)**

*"We used* ***SHAP*** *and* ***LIME*** *to interpret our models, and the results were insightful!"*

**XGBoost Insights:**

*"XGBoost showed that the* ***most important factors*** *in accident severity are* ***safety equipment, vehicle type, location, and speed****. Interestingly,* ***higher speeds strongly correlate with more severe injuries****."*

**LightGBM Insights:**

*"LightGBM highlighted* ***road conditions, lighting, and collision type*** *as key predictors. It also revealed strong interactions between factors—for example,* ***poor lighting combined with high speed increased severity significantly****."*

**Random Forest Insights:**

*"Random Forest confirmed similar trends but placed* ***more emphasis on user category and vehicle type****—meaning that the role of the person in the accident (driver, passenger, pedestrian) plays a significant role in injury severity."*

*"So, what does all this mean in real life?"*

**4. Real-Life Recommendations (1 min)**

*"Based on our analysis, we identified four key areas where changes can reduce accident severity:"*

1️⃣ **Speed Regulations:** Enforcing speed limits in high-risk areas can significantly reduce the number of severe injuries.

2️⃣ **Safety Equipment Awareness:** Promoting the use of **seat belts and airbags**—especially for passengers—could lower injury severity.

3️⃣ **Improving Road Infrastructure:** Better **lighting, clearer road signs, and safer intersections** in accident-prone areas can have a big impact.

4️⃣ **Driver Training Programs:** Refresher courses for **older drivers** and safety programs for **young drivers** could help reduce risk.

*"These insights can help policymakers and city planners make data-driven decisions to improve road safety."*

**5. Future Enhancements & Conclusion (1 min)**

*"Our models performed well, but there’s always room for improvement! Here are some areas we’d like to explore next:"*

✅ **Adding Real-Time Data:** Incorporating **weather conditions, traffic congestion, and vehicle safety ratings** can improve predictions.  
✅ **Driver Behavior Analysis:** If we can track **speeding history and phone usage**, we may get even better risk assessments.  
✅ **Fine-Tuning Model Performance:** By balancing the dataset further and experimenting with ensemble methods, we can enhance predictions for severe injuries.

*"In conclusion, machine learning has the potential to transform road safety. By analyzing accident data, we can identify risk factors, inform policies, and ultimately* ***save lives****. Thank you for your time, and I’d be happy to take any questions!"*

**Delivery Tips**

✅ **Practice with a timer**—this script is structured to fit within 7 minutes.  
✅ **Engage with eye contact**—avoid just reading, and emphasize key points naturally.  
✅ **Use a confident and clear voice**—highlight numbers and insights dynamically.

Let me know if you want any adjustments! 🚀