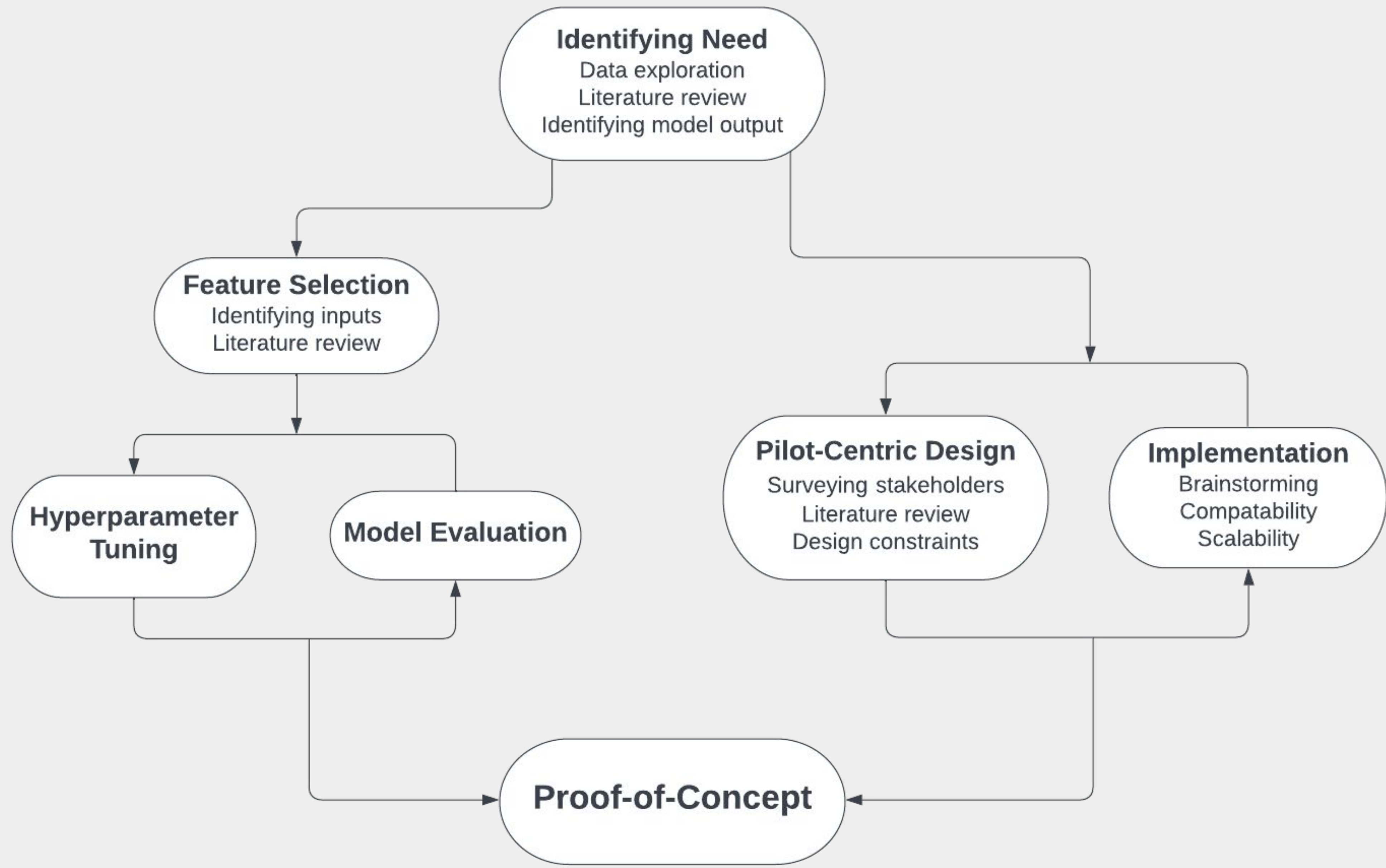
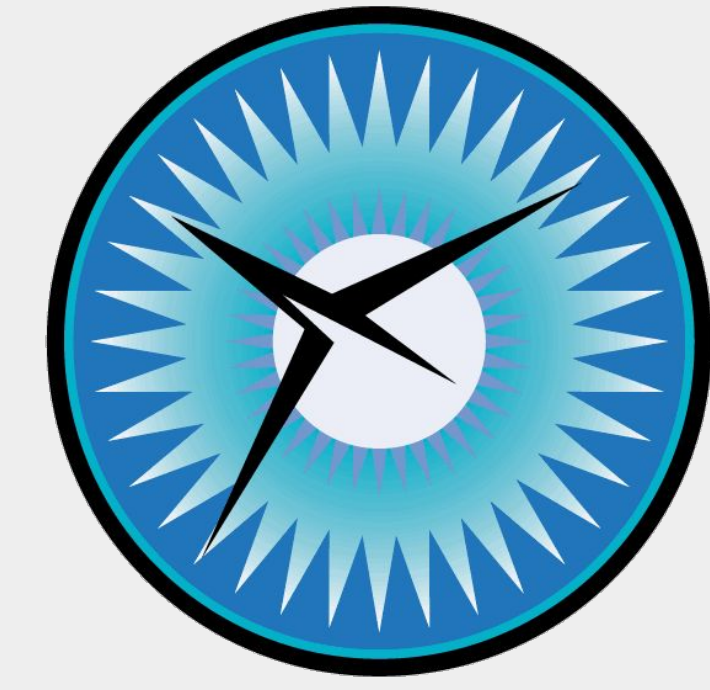




Safety with Numbers: A Data-Driven Approach to Mitigating Aviation Accidents

Team Members: Ryan Truhn, Benjamin Aziel, Fayad Sarker, Jake Sigman, Sohaib Bhatti

Advisors: Dr. Masoud Masoumi, Dr. Bahareh Estejab



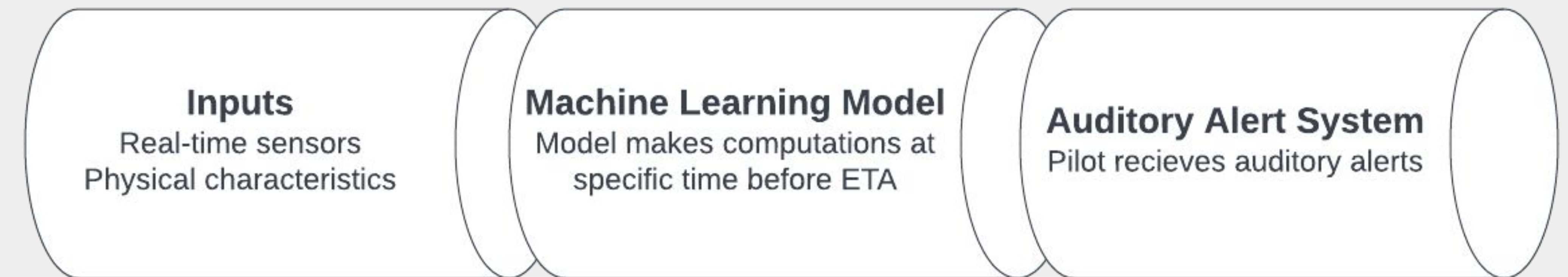
Forming a Solution

- 83% of runway excursions (54% of all accidents) could have been avoided with a decision to go-around (Flight Safety Foundation)
- Only 3% of unstable approaches result in go-around policy compliance
- **LARRAS (Landing Approach Risk Reduction and Assessment System)**
 - Auditory alert system designed to enhance pilot situational awareness

Dataset

- National Transportation Safety Board (NTSB) aviation accident database
 - International flight info from 2008-2022
 - **Tables used:** Events, Aircrafts, Event Sequence
- Cleaned and balanced dataset
- Implemented feature selection
- **Final dataset:** 1,254 observations and 22 features

Concept



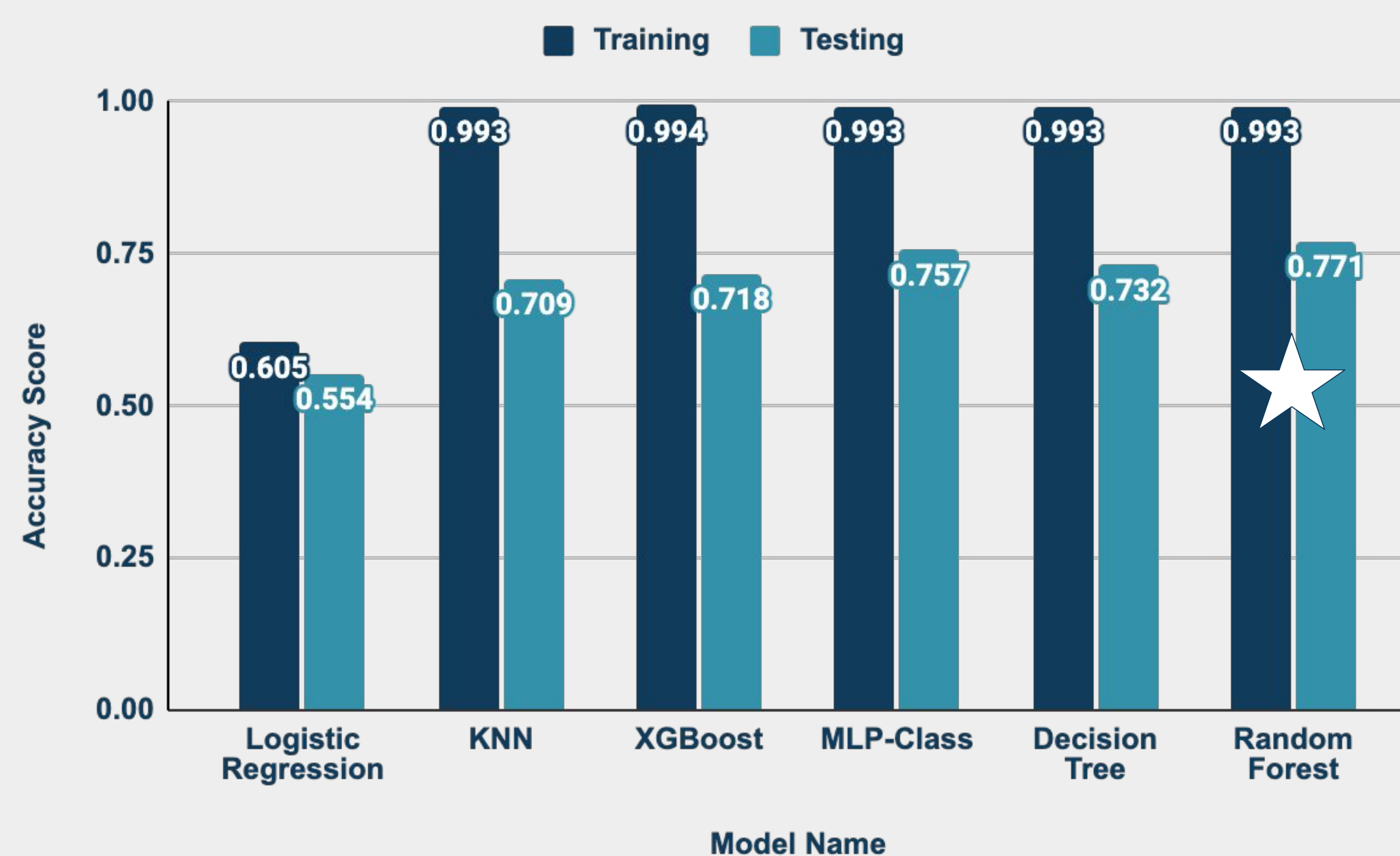
Implementation

- Unstabilized approaches are the top cause of crashes
- Pilots must check for stabilized approach at certain altitudes
- Plane cockpits already filled with visual indicators
 - Auditory alerts inform pilots whether to go around without overwhelming them

Auditory Alert	Time Before Arrival	Benefit
“Go-around”	Few seconds - 20 minutes	Shorter auditory alert during critical landing stages reduces interference and prevents sudden dangerous adjustments by the pilot
“Landing Risk High”	60 minutes	Auditory alert delivered an hour prior prompts early vigilance and prevents overlooking relevant sensors, reducing the risk of late recognition during landing
“Landing Risk Medium”		

Model Development

- **6 models trained and tested:** Logistic Regression, KNN, XGBoost, MLP-Classifer, Decision Tree, Random Forest
- 80/20 training/testing split
- Evaluated on Accuracy Score:
Accuracy = (# of Correct Predictions) / (Total # of Predictions)



Conclusion

- Random Forest model is the best ML model for the data
- LARRAS helps pilots manage information overload during crucial flight moments
- Clear and concise auditory warnings communicate potential safety hazards effectively
- Enhanced situational awareness enables pilots to make informed decisions

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