F1 Grand Prix  
Prediction Model

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Model design

The prediction model comprises four distinct regression models: three Random Forest Regression models for predicting the number of stints, tire life, and average lap time, and one Random Forest Classifier for predicting the compound type.

Initially, the model forecasts the number of stints, which then informs the compound type and tire life prediction models. Subsequently, all predicted data is utilized in the average lap time prediction model.

Compound

Average lap time

Tyre life

Number of stints

1. Driver Performance and Variability

# How the Model Adapts to Different Drivers

The model captures driver differences through three main approaches:

Individual Driver Analysis

* Records each driver's best lap and sector times
* Tracks maximum speeds in different track sections
* Considers past performance patterns

Performance Patterns

* Starting position helps identify likely strategy options
* Team data provides context about car capabilities
* Past race analysis informs strategy predictions

Team Performance

* Includes team-specific pit stop patterns
* Accounts for differences in car performance
* Considers typical team strategy preferences

**Handling Different Types of Drivers**

* Uses separate predictions for number of stops, tire choices, and pit timing
* Combines multiple data points to understand driver patterns
* Adjusts predictions based on each driver's specific characteristics

2. Adapting to Race Conditions

# Weather Handling

Weather Measurements

* Air temperature
* Humidity
* Pressure
* Surface temperature
* Rainfall

3. Model Structure and Flexibility

# Technical Approach

Model Structure

Separate components predict:

* Number of pit stops
* Tire compound choices
* Pit stop timing
* Expected lap times

This approach allows easier modification and improvements for separate components.

# Ease of Use

Input Options

* Works with single driver or full grid data
* Handles common data formats
* Processes incomplete information effectively

4. Understanding the Predictions

# What Affects Predictions

Key Factors

* How starting position affects strategy
* Team influence on pit stops
* Weather impact on tire choices
* Past performance patterns

# Clear Results

Organized Output

* Clear table showing all strategy details
* Stint-by-stint strategy breakdown
* Visual strategy timeline

Conclusion

My model effectively predicts race strategies while remaining clear and usable. Its design allows for ongoing improvements and handles varying race conditions well. The output format makes it practical for use.