Work in Progress

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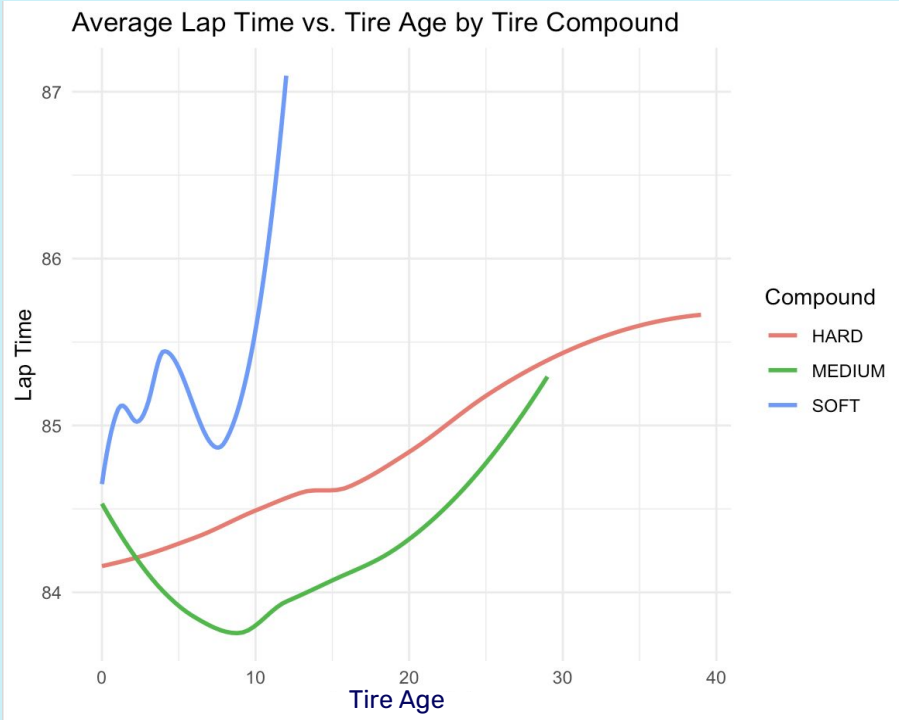
Overview

- **How does tire compound affect lap times during a race?**
  - Examine the relationship between tire compounds, lap times, drivers and other variables in Formula 1 racing
  - Find optimal tire age and compound that achieves the fastest lap or finishes top in the race
- Hungarian Grand Prix 2024
- **Data**: Open F1 (https://openf1.org/)
  - Open-source API that provides real time and historical F1 data
  - Our data: driver data, lap data, stint data
  - Created columns: stint_length

Average Lap Time vs. Tire Age by Compound

- Peaks in lap times represent tire wear and drop in tire performance
- The softer the compound the quicker it deteriorates and needs to be changed.
- **Interesting Insight:**
  - Soft tires are usually the fastest and have short stint length, however, we see that it was the slowest of the three this race.



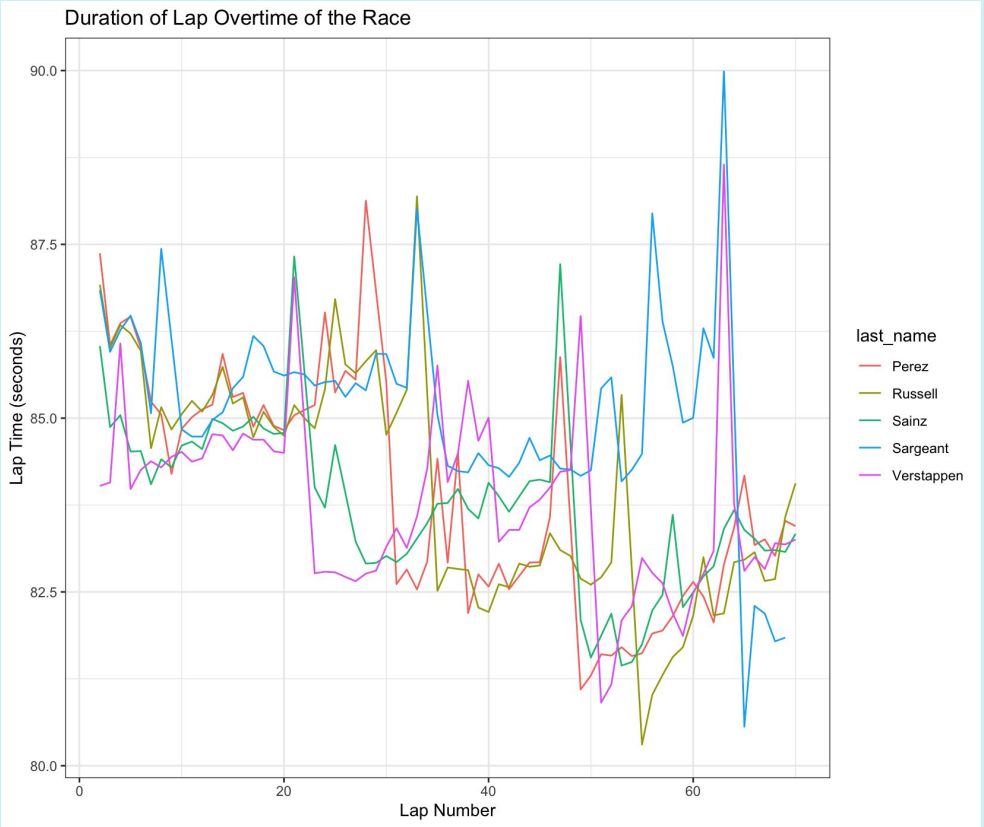
Duration of Lap vs. Lap Number

- This graph shows the duration of each lap against its lap number by the drivers who attained the 5 fastest laps.
- Low peaks show where fastest laps were attained.
- Shows fluctuation of lap times over laps
- Fastest laps were reached towards the end of the race

Interesting Insight: no specific correlation with when the fastest lap is attained or who attains it.

Future Plans:

- Add in where tire compounds are changed/ pit stops happen
- Compare the drivers who have the fastest laps with the drivers who actually finished top 5
- Compare what tire compound is best for finishing ahead vs. getting the fastest lap
- Possibly change into 3 different graphs showing the 3 different stints

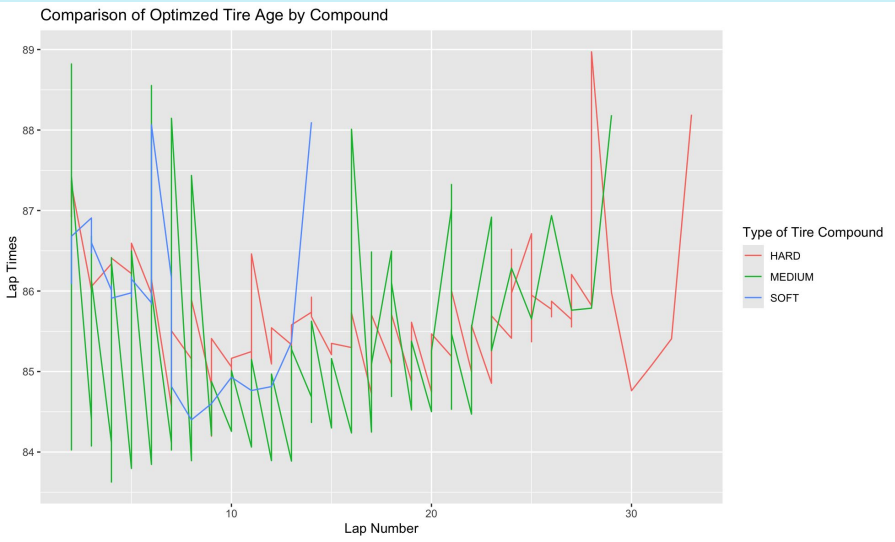


Optimum Tire Age

- At what age does each tire type produce their fastest lap times?
- The graph is difficult to interpret due to all the lines running up and down.

Possible Solutions:

- Finding the line of best fit for each tire compound
- Using a different graph that will showcase the needed relationship



Tables

- Displays the fastest lap time for each driver for the medium compound

- Will create the same table for the other compounds (soft, hard) to compare lap times and see how they vary among the compounds.

Driver's Fastest Lap on the Medium Compound

Driver	Fastest Lap (Medium)
Max Verstappen	80.908
Sergio Perez	81.096
Carlos Sainz	81.441
Lando Norris	81.712
Oscar Piastri	81.716
George Russell	82.211
Charles Leclerc	82.299
Pierre Gasly	83.340
Fernando Alonso	83.792
Lewis Hamilton	84.001
Lance Stroll	84.176
Yuki Tsunoda	84.541
Valtteri Bottas	84.876
Logan Sargeant	85.070
Daniel Ricciardo	85.717
Guanyu Zhou	85.991
Esteban Ocon	86.158
Nico Hulkenberg	88.821

Challenges

- There was so much data that we had to condense it to one race: Hungary 2024

- The visualizations were very cluttered and hard to interpret because grouping by compounds created sporadic lines.
    - We are thinking of ways to aggregate or separate the data to make cleaner and more interpretable visualizations.

- Missing data & Outliers
    - The lap duration values for lap 1 were null because the standing start doesn't count for a full lap.
        - We removed lap 1 to eliminate the null data issue.
    - Outlaps created outliers and skewed the data.
        - We removed them because the lap time was not an accurate indicator of a race lap time.

Questions?