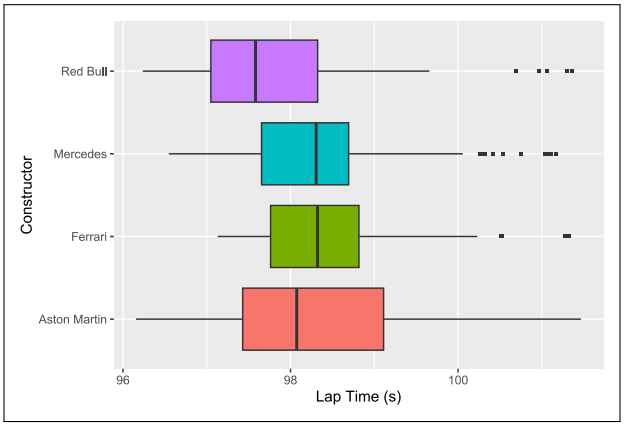
2023 Formula One World Championship

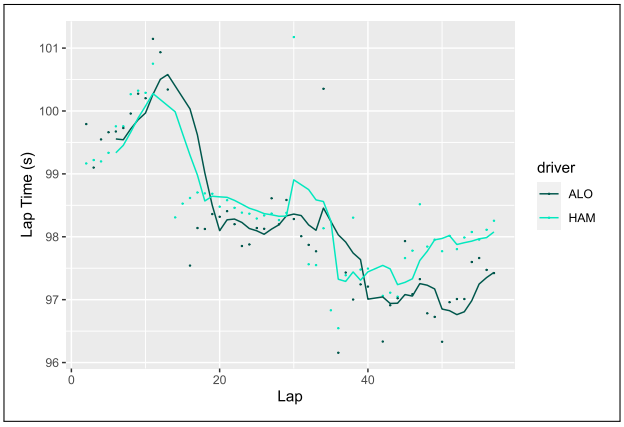
Introduction

The 2022 Formula One season brought some exciting changes to the sport, aiming to improve how closely cars can follow each other on the track. Along with these adjustments, we saw the resurgence of a long-standing rival and the decline of a previously dominant team. At the beginning of the season, Max Verstappen and Charles Leclerc were strong contenders for the driver's championship. However, as the season progressed, Verstappen and Red Bull eventually secured both titles. Looking ahead to the 2023 season, Red Bull is considered the favorite, with Ferrari and Mercedes expected to catch up. This report focuses on each team's race pace and compares drivers in every Grand Prix from the mentioned three teams along with a surprising new competitor: Aston Martin.

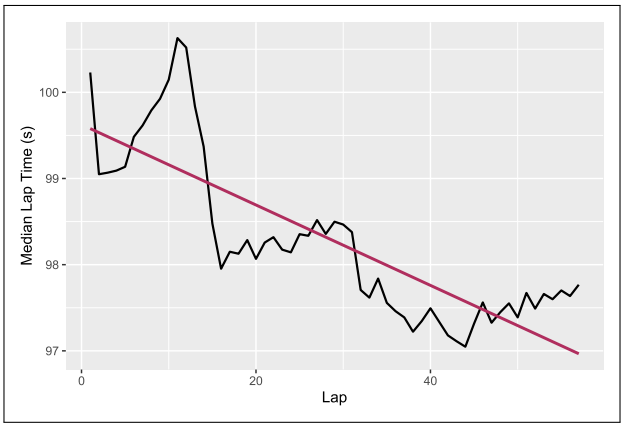
Bahrain Grand Prix



The Bahrain Grand Prix marked the thrilling beginning of the 2023 Formula One season. Max Verstappen added another pole position to his collection, edging out Sergio Perez by around 0.100 seconds. Fernando Alonso was the star of the Grand Prix after his remarkable overtakes on Lewis Hamilton and Carlos Sainz, earning him a well-deserved spot on the podium. The race had its first and only safety car laps 41 and 42, after Charles Leclerc's unfortunate engine issue. Red Bull showcased their speed, emerging as the fastest constructor, followed by Aston Martin at a median of 0.500 seconds behind. Ferrari and Mercedes displayed comparable performance, trailing around 0.700 seconds behind Red Bull. As a result of his victory, Max Verstappen took the lead in the drivers' standings, followed by Perez, Alonso, and Sainz.[1]



Alonso and Hamilton matched lap times until the first round of pit stops. Both drivers started on soft tyres and later switched to the hard compounds. Viewers got to see their battle on lap 37 when Alonso went head-to-head with Hamilton for the first 9 turns, until finally overtaking him in turn 10. With high tyre degradation, they both made two pit stops. In the end, Alonso secured third place, while Hamilton settled for fifth.[2]



With a Lap Time Reduction Factor[3] of 0.032 seconds per lap, the advantage was not too high. The Sakhir International Circuit's high tyre wear was evident here, causing significant lap time increases until lap 12. Most drivers were on the soft compound tyre. The first significant drop in times occurred between laps 13 and 15, when most teams except Red Bull switched to the hard tyres. The second drop was between laps 30 and 38 to run the hard tyres.

Notes

1. All the visualizations of each Grand Prix are made from a distinct subset of the **lap_times.csv** data set. Outliers are defined as $1.5 \times$ IQR and are respectively removed to create the mentioned subset.

2. For head-to-head battles between drivers, their individual lap times are represented by the colour-coded points on the plot, followed by a 5-lap moving average line of their times.

3. The Lap Time Reduction Factor (LRF) is gathered from the line of best fit of median lap times from each Grand Prix. This report assumes the LRF is a result of three factors: **reduction in fuel load, increase in track grip, and increase in tyre wear**. The LRF does not take into account difference in tyre compound or tyre life between drivers.