Formula 1 Elo Calculator

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Link To The Code

Elo Rating System Calculation

The expected result of a player is given by:

$$E_p = \frac{1}{1 + 10^{\frac{R_o - R_p}{400}}}$$

The updated Elo of a player is given by:

$$R'_p = R_p + K(S_p - E_p)$$

Elo Rating System Example

For a player with Elo of 1400 and opponent with Elo 1800:

$$E_p = \frac{1}{1 + 10^{\frac{1800 - 1400}{400}}} = \frac{1}{1 + 10^{\frac{400}{400}}} = \frac{1}{1 + 10^1} = \frac{1}{11} = 0.\overline{09}$$

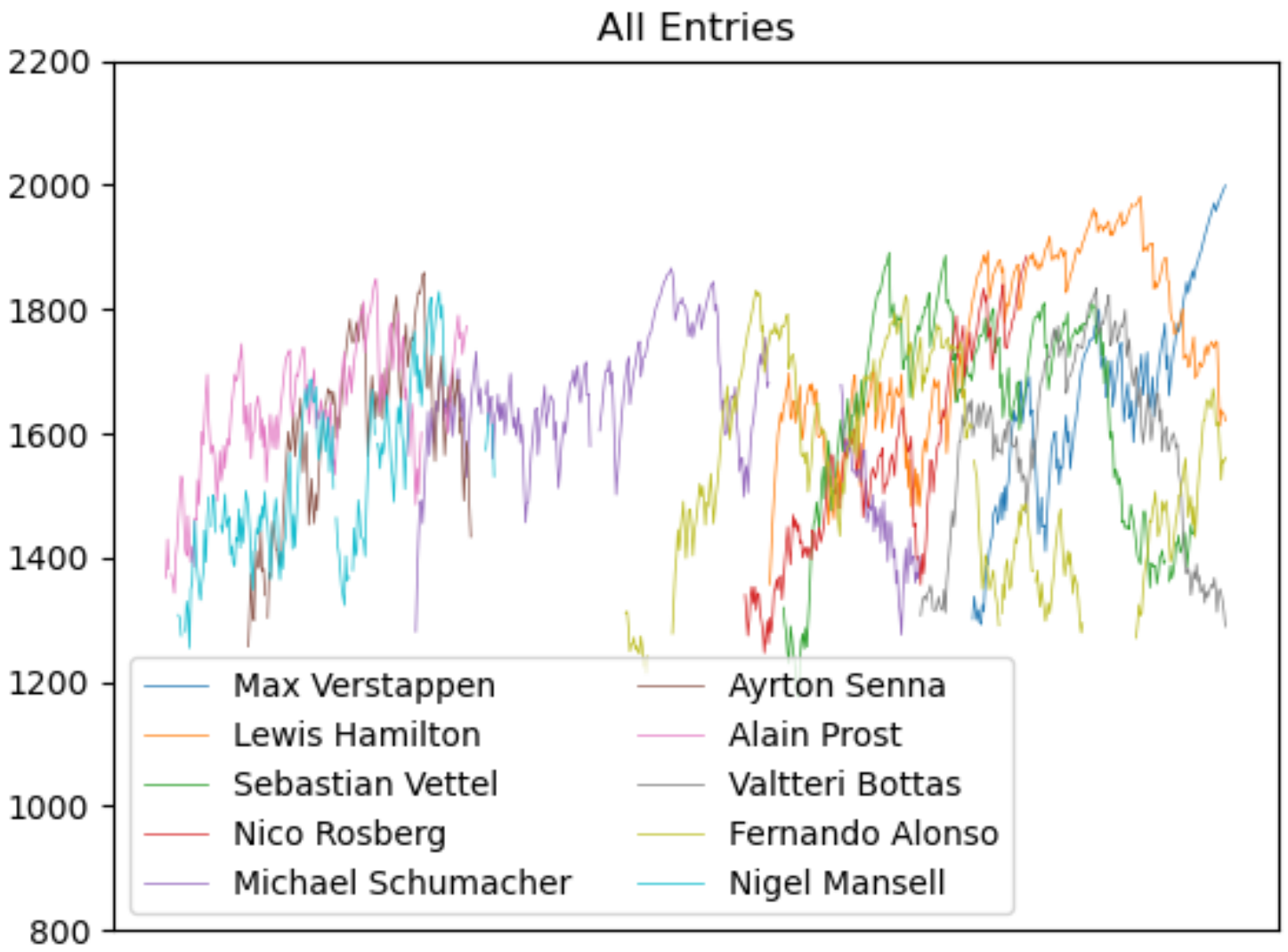
If the player wins (given a K of 9):

$$R'_p = 1400 + 9(1 - 0.\overline{09}) = 1400 + 9(0.\overline{90}) = 1400 + 8.\overline{18} \approx 1408$$

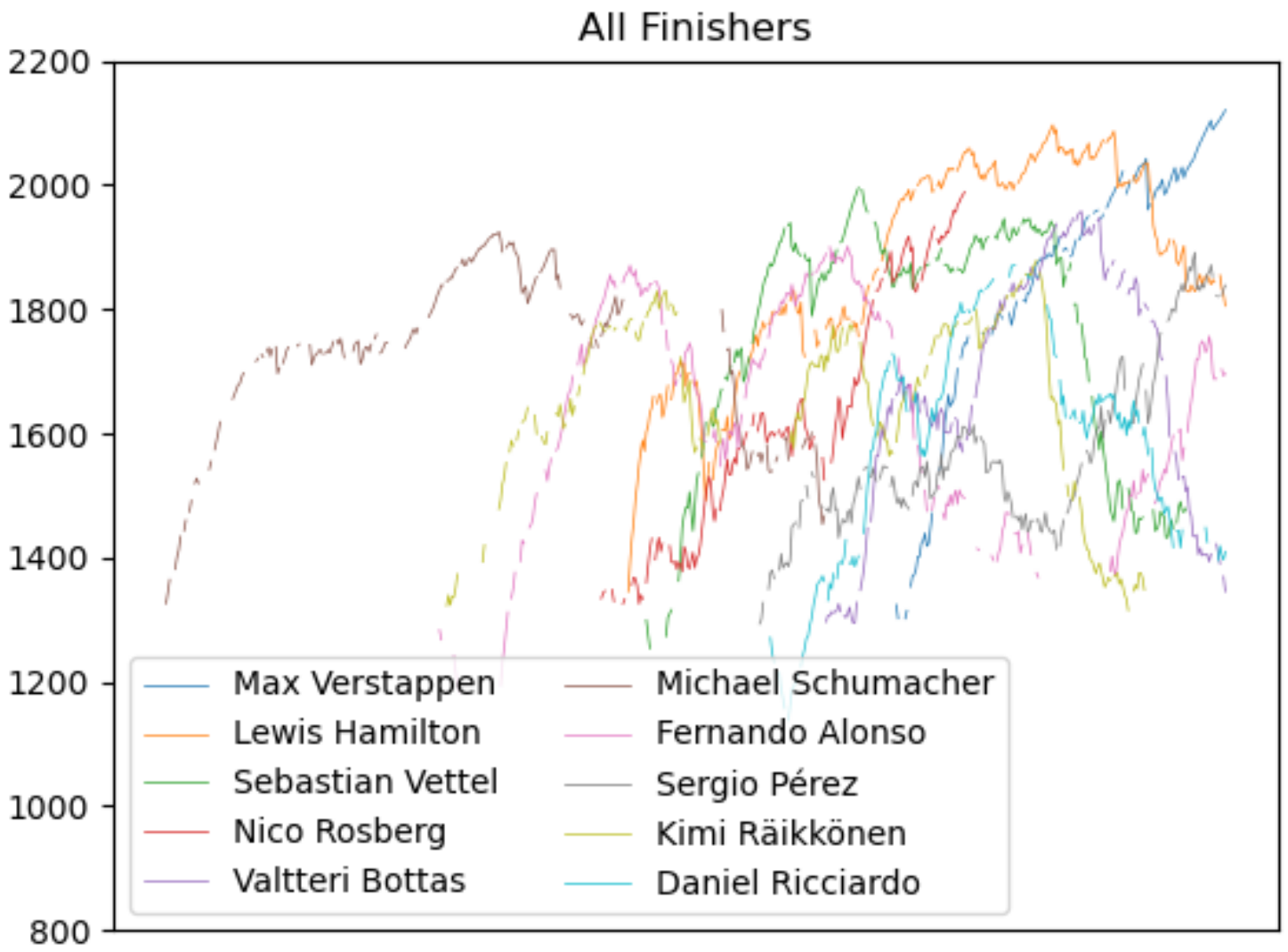
How I Calculated Elo

- Each race was considered a a series of 1 on 1 races between all drivers competing.
- The Elo changes from each 1 on 1 was summed to give a new Elo for each driver.
- This was repeated for each race in a given time period.
- A base k Value of 5 was selected.

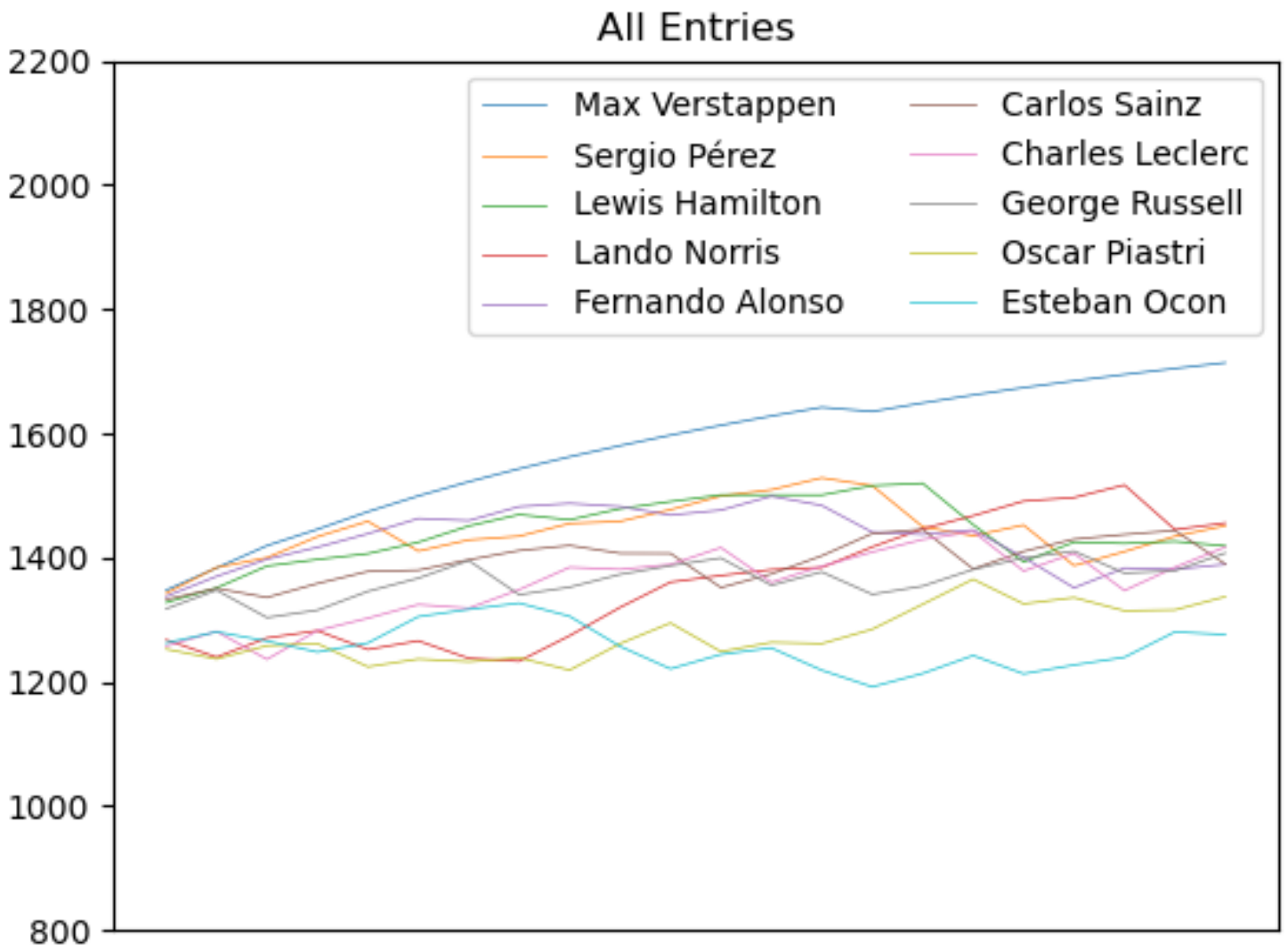
Top 10 Maximum Elo All Entries



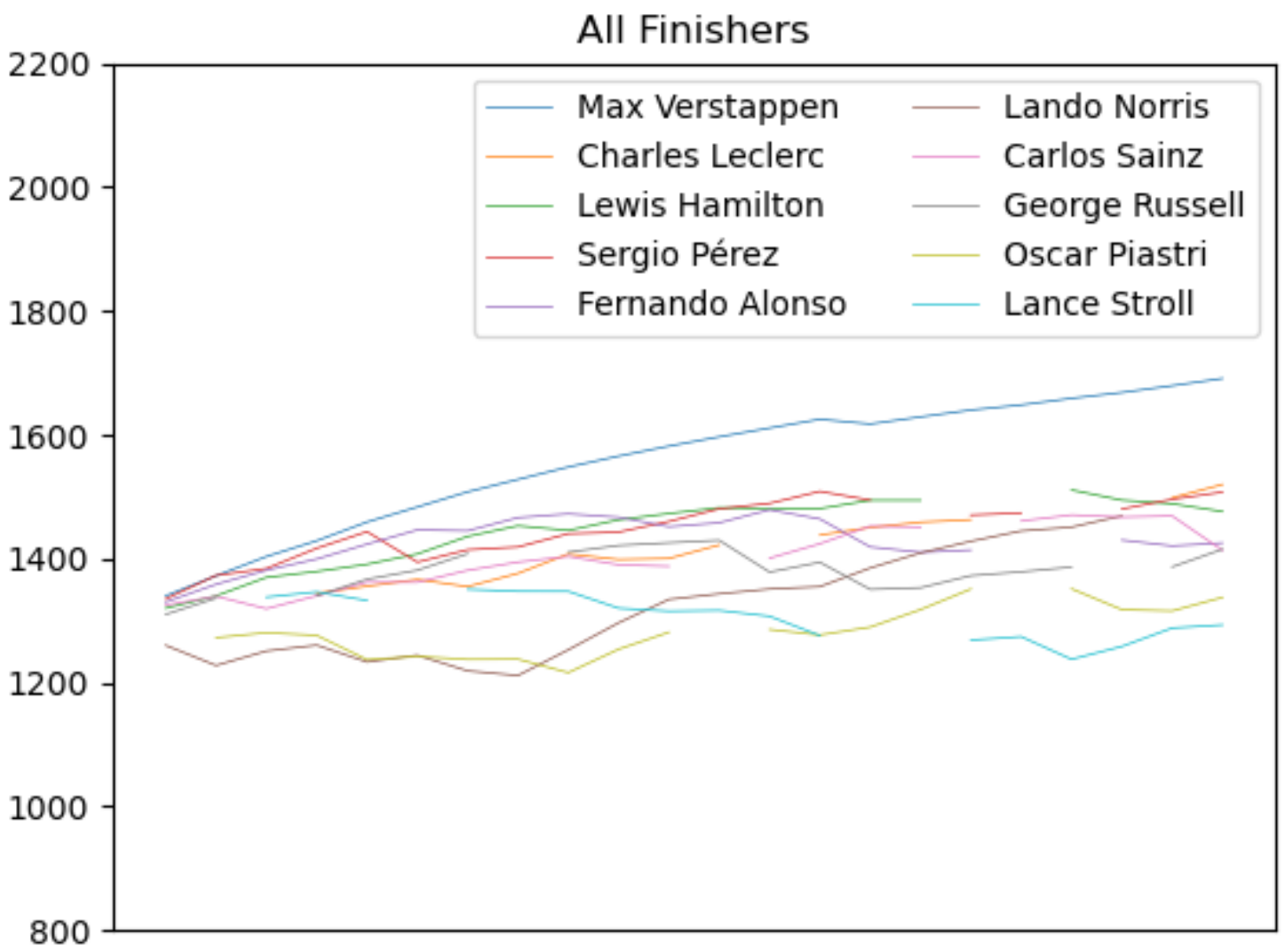
Top 10 Maximum Elo All Finishers



Top 10 Maximum Elo 2023 Entries



Top 10 Maximum Elo 2023 Finishers



Issues With The Data

- For some reason ”\N” was used as a placeholder.
  - Handled by replacing ”\N” with np.NaN
- Before 1961, cars were often shared between drivers.
  - Handled by dividing the K value in each 1 on 1 by the number of drivers.
  - Eg. Car1 with 2 drivers and Car2 with 1, the K values of all interactions would be divided by 2.

Possible Future Development

- Analyse the effect of more races in a season.
  - Perhaps vary the K value of each interaction by the number of races in a season.
- Create a way to factor in the relative performance of different cars.
- Investigate the case of inflation of the Elo values over time.
- Include results from Qualifying and the new Sprint Races.
- Compare the Elo ratings from each year against the Championship Standings.

Thanks

All data was taken from CSV's found at ergast.com and checked against other sources for accuracy.

Any Questions?