Comprehensive Analysis of Formula 1 World Championship Trends and Performance Metrics

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Overview

Every millisecond, pit stop, and strategy decision can affect the result in **Formula 1 (F1), one of the most data-rich sports in the world**. The sport has gathered a vast collection of race data, driver statistics, constructor performance, and seasonal trends over the years. With so much data available, the opportunity to transform raw figures into meaningful insights becomes not only valuable but essential for enthusiasts, analysts, and strategic decision-makers. This project aims to identify important trends in the competitive ecosystem of the F1 championship by utilizing interactive dashboards and descriptive analytics. It aims to transform raw data into actionable insights that improve F1 viewership.

F1 analysts, team strategists, fantasy league participants, sports journalists, and passionate followers who are eager to learn more about the sport's development are part of the project's target audience. The visualizations are intended to provide these users with easy-to-use tools for analyzing race outcomes, monitoring team performance, and understanding the complex relationships between constructor and driver performance. By integrating qualifying trends and circuit-level race behavior, the dashboards deliver richer, multi-dimensional insights for both tactical and historical exploration.

Key Objective

The primary objective of this project is to explore and visualize past Formula 1 statistics, emphasizing how various elements such as constructor dominance, driver contributions, and seasonal fluctuations influence the performance environment. Race results, constructor standings, and driver statistics from several seasons were cleaned and organized by the team to create extensive Tableau dashboards that present performance trends in an accessible and engaging form. Here, the focus is on giving clarity through visual storytelling and establishing high-impact measures that characterize success in the sport, rather than predictive modeling.

Problem Statement

The project aims to uncover trends, performance patterns, and strategic insights in F1 racing by visualizing key aspects of the sport across four dimensions: individual driver performance, team success, circuit dynamics, and qualifying metrics. By bringing together multiple datasets from historical F1 races, the project solves the problem of fragmented or hard-to-interpret performance data. It enables users to answer questions like:

- How have top drivers and teams evolved over time?
- Which circuits are most iconic or frequently used?
- What are the average qualifying positions?
- What are the dominant nationalities in F1 performance?

The dashboards convert complex Formula-1 data into intuitive, interactive visuals that support performance analysis, fan engagement, and strategic exploration.

Dataset Description

The data for this project was sourced from the Formula 1 World Championship dataset published by Rohan Rao on Kaggle. This dataset compiles comprehensive historical Formula 1 data from 1950 to 2024, originally extracted and curated from the official Ergast Developer API, a well-known and regularly updated public database of F1 race results and statistics.

Intended Audience

The dashboards are designed to serve a wide spectrum of users, ranging from casual enthusiasts to domain experts, each benefiting in different ways:

- **Formula 1 Fans and Enthusiasts**
    - Gain visual, interactive access to career trends of favorite drivers and teams.
    - Explore season-by-season performance, team dynamics, and circuit usage.

- Understand how elements like pit stops or qualifying position affect outcomes.

- **Sports Analysts and Data Scientists**
  - Use the visualizations to detect patterns, anomalies, and performance shifts over time.
  - Perform comparative analysis across drivers, teams, seasons, and track types.
  - Integrate insights into larger predictive models or reporting workflows.

- **Journalists and Broadcasters**
  - Quickly extract storylines (e.g., Verstappen vs Hamilton seasons, constructor dominance).
  - Use visual evidence to support commentary and enrich pre/post-race coverage.
  - Leverage clean data visuals for audience-friendly broadcast infographics.

- **Teams, Strategists, and Motorsport Professionals (hypothetical use)**
  - Analyze pit stop performance and timing strategies.
  - Evaluate how specific drivers contribute to the constructor points.
  - Identify high-performing circuits or ideal conditions for success.

- **Students, Educators, and Researchers**
  - Learn principles of data visualization and ETL through a real-world dataset.
  - Understand how raw motorsport data can be transformed into actionable insights.
  - Use the dashboards as a case study in courses related to analytics, sports management, or data storytelling.

Dashboards overview

1. Driver Performance over seasons(2000-2024) Dashboard overview

Data Integration and Preparation

This dashboard was sourced from 6 separate CSV files: drivers.csv, drivers_standings.csv, lap_times.csv, qualifying.csv, races.csv, and results.csv. Data preparation and transformation (ETL) were performed using Tableau Prep Builder.

Key steps included:

1. Renaming columns for consistency and clarity.
2. Removing redundant or irrelevant columns.
3. Handling null values appropriately (e.g., removing rows with missing IDs or race outcomes).
4. Joining the datasets into a single unified table on relevant keys like raceId and driverId.

The processed output was exported as a new CSV file and used as the sole data source in Tableau Desktop for building the visualizations.

Analysis of the dashboard

The dashboard comprises four main visualizations to present a comprehensive picture of the driver's performance over the last 25 years:

1. **Drivers' Points Over the Season:** A line chart showing how driver points accumulate across seasons. This view highlights performance consistency and year-over-year improvement. The chart is interactive and dynamically updates when a user selects a different driver from the **Full Name** dropdown filter at the top right.

2. **Qualifying Position vs Final Position**: A scatter plot comparing drivers' qualifying positions against final race results. Color coding indicates whether a driver improved, dropped, or maintained their position, using a PositionChange legend. The chart updates based on the driver selected in the same dropdown filter.

3. **Fastest Lap by a Driver in Every Race**: A bar chart that displays the fastest lap (in seconds) achieved by the selected driver in each race, showing trends in race pace across seasons. Like the previous two, this chart also responds to changes in the driver filter.

4. **Total Points by Driver Grouped by Nationality**: A treemap visualization comparing drivers' total points, grouped by their nationality. This is controlled by two interactive filters: a **Nationality** dropdown and a **Year Range** slider. These filters allow users to explore point distributions across countries and time periods, offering geographic and historical context.

Discoveries from visualization

1. Max Verstappen's 2021 season clearly stood out with consistent point scoring and fast laps.

2. Drivers like Lewis Hamilton displayed a high number of position gains, often outperforming their qualifying position.

3. The treemap revealed that a few nationalities dominate point accumulation, especially from countries like the UK, Germany, and the Netherlands.

4. Some drivers consistently posted fast laps but didn't always finish high, suggesting high pace but perhaps race-day inconsistency or mechanical issues.

5. The time span from 2000 to 2024 allows us to observe the rise and fall of dominant drivers, shifts in team performance, and changing competitiveness of the grid.

6. A comparative look at the dashboards for Lewis Hamilton and Max Verstappen reveals notable trends:
   a. Hamilton demonstrates sustained performance with a major leap in points starting in 2014, peaking between 2017–2021 before a gradual decline after 2021. His consistency in fastest laps, especially at recurring circuits like Belgian and Singapore GPs, reflects both adaptability and elite pace over time.

   b. His qualifying vs final position chart shows a mix of dropped and improved positions, with a visible frequency of blue lines (improvements), affirming strong in-race overtaking skills. Notable improvements are seen even from mid-grid starts.

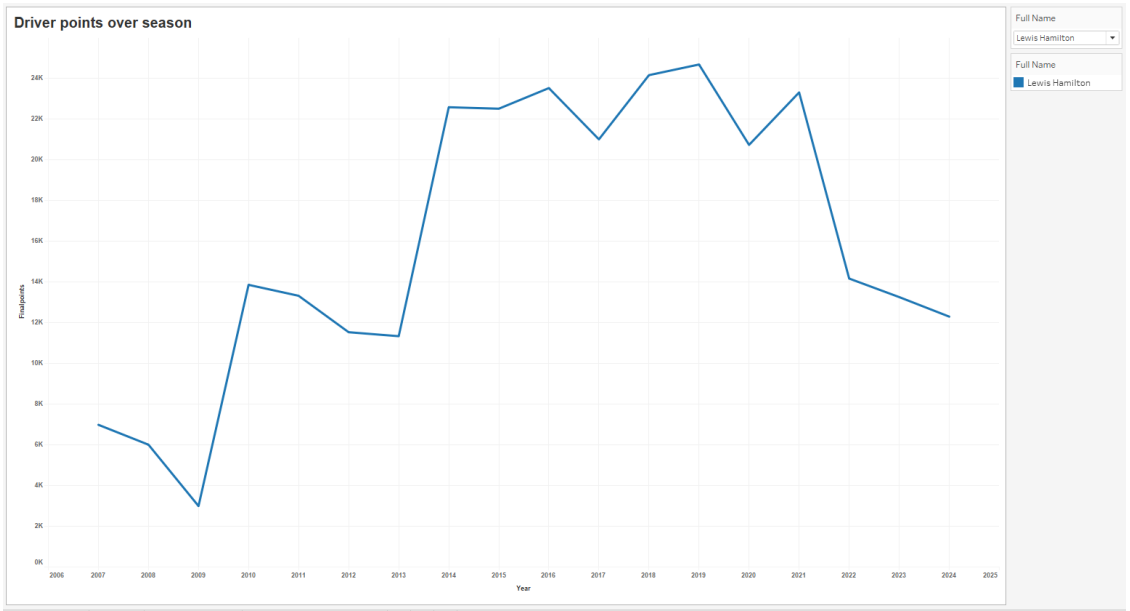
   c. Verstappen, on the other hand, shows a clear acceleration in form starting from 2020, with steep point increases through to 2023. The 2021–2023 phase marks his championship-level performance, with the highest point accumulation and consistently strong fastest laps.

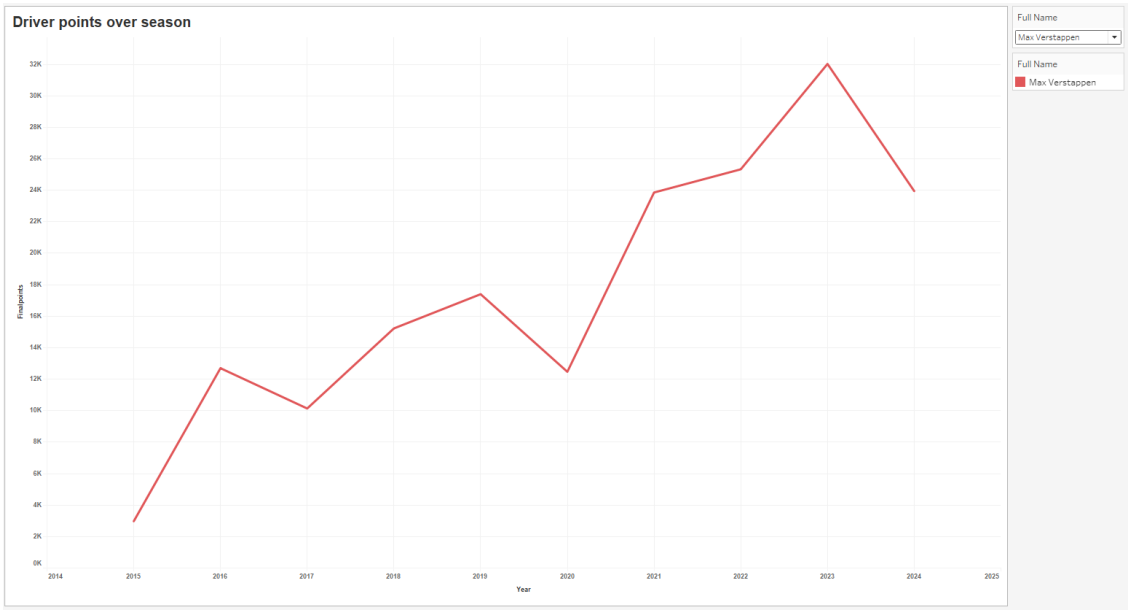
   d. His fastest laps are often recorded at high-speed circuits like the Belgian GP, indicating car performance optimization and high-speed consistency.

   e. The qualifying vs final position chart for Verstappen shows many races where he either maintained or improved upon strong qualifying positions (lots of orange and

green), highlighting his ability to convert front-row starts into race wins more often than not.

f. This comparison illustrates the evolving competitive narrative between a seasoned champion and a rising dominant force in the sport.





7. The Treemap visualization adds additional layers of insight:

a. The United Kingdom dominates in total driver points, primarily due to Lewis Hamilton's overwhelming contribution, supported by Jenson Button, Lando Norris, and George Russell.

b. Germany follows closely, showcasing not just Sebastian Vettel and Michael Schumacher, but also consistent support from Nico Rosberg and Nico Hülkenberg, reflecting depth over decades.

c. The Netherlands stands out through Max Verstappen alone, indicating how one elite driver can carry national point representation.

d. Countries like Finland and Spain display balanced contributions, with Raikkonnen and Bottas for Finland, and Alonso and Sainz for Spain.

e. The treemap effectively visualizes how some nations have broad driver depth while others concentrate performance through standout individuals.

f. It also supports temporal analysis through the year slider, enabling identification of rising drivers and shifts in dominance by nationality over time.

Challenges & Solutions

1. Managing and transforming large datasets (e.g., lap_times had over 400,000 records).
2. Handling missing or malformed fastestLapTime data.
3. Ensuring joins in Tableau Prep maintained row integrity and did not duplicate data.
4. Initial attempts at using fastestLapTime (in time format) failed in Tableau and had to be replaced with milliseconds-based calculations.
5. Selecting the correct data sources: The original dataset contained 14 CSV files, from which only 6 were used. Choosing the right ones required a deep understanding of their relevance to the dashboard objectives, while ensuring that no important data was accidentally excluded. This step was essential to build a clean, performant, and accurate visualization base.

Adaptations from the Original Plan

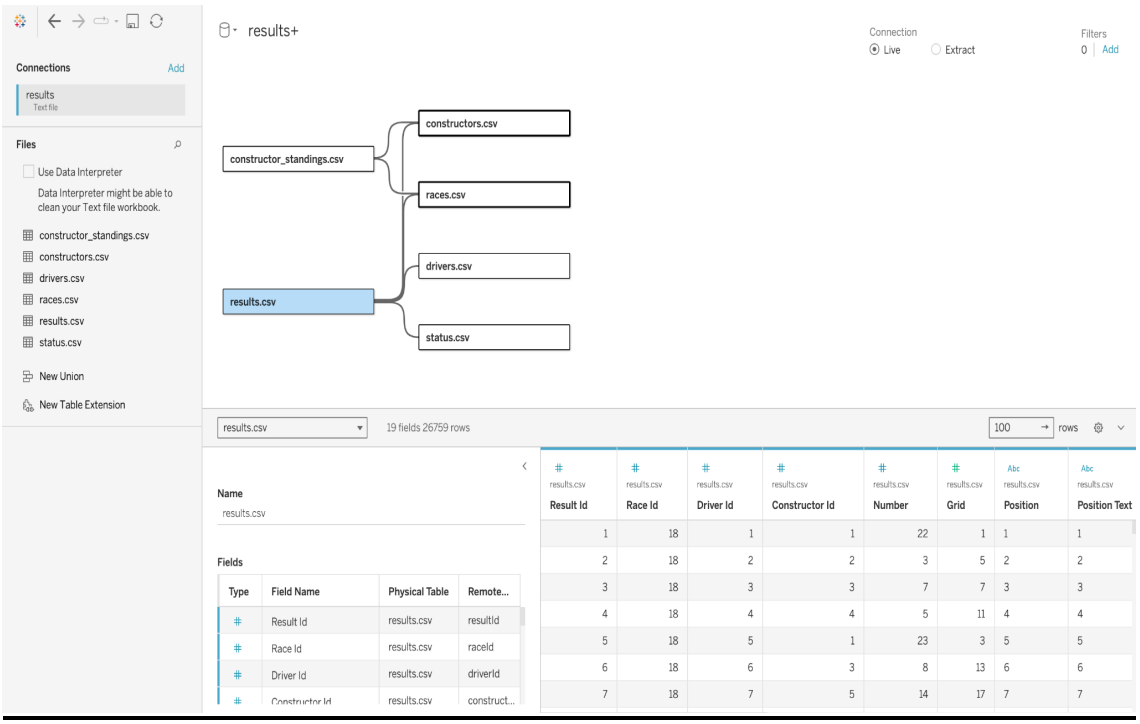
1. Planned to use fastest LapTime in time format but switched to using milliseconds due to datatype issues.
2. Switched final visualization from “Wins per Season” to a treemap view of “Total Points by Nationality” for better space usage and interpretability.
3. Simplified some visualizations by converting aggregated fields into dimensions to avoid unwanted summing.
4. Originally intended to allow multi-driver comparisons in the visualizations by enabling multi-select in the Full Name filter. However, this created cluttered and less interpretable visuals. Therefore, the approach was revised to show data for a single driver at a time for the first three visualizations (line chart, scatter plot, and bar chart), improving clarity and user experience.

2. Constructor (Team) Success Dashboard Overview:

Data Integration and Preparation

To build the dashboard, the raw data required a thorough preprocessing pipeline. This was handled using Python’s powerful data preprocessing libraries, Pandas and NumPy. During preprocessing, null-like values denoted by “\N” were standardized and replaced with "Unknown", date and time columns were converted into human-readable formats with data type “datetime”, and redundant or irrelevant fields were dropped to streamline analysis. Duplicate rows were also eliminated to maintain data integrity.

Six core dataset files were utilized to power the dashboard: constructors.csv, drivers.csv, races.csv, constructor_standings.csv, results.csv, and status.csv.



All datasets were joined and loaded directly in Tableau, using the visual data model interface. As shown in the attached diagram, the relationships were constructed carefully based on primary keys like raceId, driverId, and constructorId, ensuring a robust foundation for the dashboard visuals.

Analysis of the Dashboard

The dashboard is made up of four visual charts and a central KPI section, designed to present a comprehensive picture of a constructor's legacy in F1 history.

1. **KPIs (Key Performance Indicators)**: Displays the selected constructor name along with three performance indicators: total wins, total points, and the best performing driver (based on their contribution to team points). This area gives users an instant performance snapshot, and the values update dynamically based on the selected constructor.

2. **Points & Wins per Season**: Located in the Top Left corner of the dashboard. A dual-coded bar chart showing total points and number of wins (height of bar) and win

occurrence (bar color) per season. Bars are color-coded to indicate winning seasons, making it easy to identify dominant years at a glance. This helps users track year-over-year team performance and identify peak periods.

3. **Driver Contributions to Team Points**: Located in the Top Right corner of the dashboard. Represented as a donut chart, this visual illustrates the percentage contribution of each driver to the constructor's total points. It effectively highlights driver impact and team dependency.

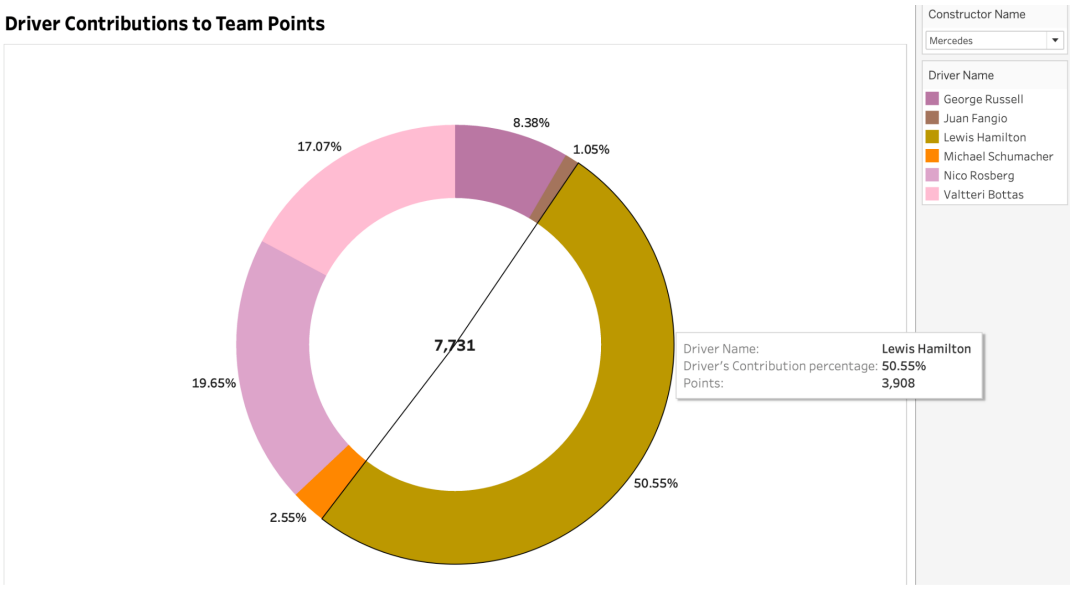
4. **Constructor Rankings Over Time**: Located in the Bottom Left corner of the dashboard. A line chart plotting the team's overall championship position season by season. This shows the rise and fall in competitiveness across years. It highlights trends of rise, dominance, or decline over time.

5. **Top 10 Most Successful Teams**: Located in the Bottom Right corner of the dashboard. A horizontal bar chart ranks the top constructors of all time based on total race wins, providing a broader historical context. It demonstrates the macro view of long-term success.

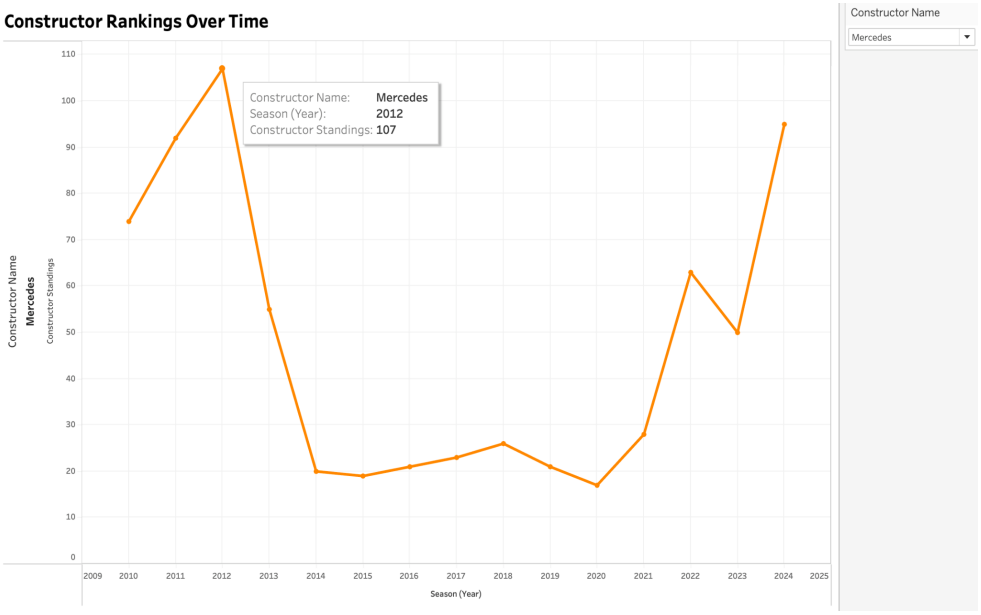
Discoveries from visualization

While exploring the data, two visualizations provided particularly valuable insights:

1. **Driver Contributions to Team Points:** This donut-shaped visualization unveiled clear disparities in how much each driver contributed to a constructor's total success. In the case of Mercedes, for instance, Lewis Hamilton accounted for more than 50% of the team's cumulative points, revealing how heavily the team leaned on a single driver for consistent results. This kind of insight helps assess driver-team dependency and highlights standout performers across different eras.



2. **Constructor Rankings Over Time:** The line chart mapping team standings year by year revealed distinct performance trajectories. While teams like Red Bull and Mercedes displayed sustained dominance, others experienced sudden drops or brief spikes in ranking. These fluctuations provide strategic insight into constructor evolution, investment impact, and how rule changes or driver line-ups may have influenced performance over time.



Challenges and Solutions

1. **Data Quality & Cleaning:** Raw CSV files contained inconsistencies like "\N" placeholders, missing relationships, and mismatched keys. These were resolved through early preprocessing in Python using Pandas and NumPy, cleaning the data by removing duplicates, irrelevant columns, and standardizing null values.

2. **Complex Data Relationships:** Initial join operations in Tableau caused model disjointedness. Switching to relationships based on shared foreign keys (e.g., raceId, constructorId) helped reduce redundancy and preserve data integrity across sheets.

3. **KPI Calculation Issues:** Creating KPIs like "best performing driver" was challenging due to dynamic aggregation needs. FIXED Level of Detail (LOD) expressions and context filters were implemented to ensure accuracy in scoped metrics and filter logic between drivers and constructors.

4. **Row-Level Calculation Conflicts:** Tableau's limitations on referencing multiple upstream tables disrupted some filter interactions. This was mitigated by restructuring calculated fields to operate at the field level rather than row level, enhancing compatibility and performance.

5. **UI & Visual Design Balance:** Maintaining clarity without oversimplifying insights was a constant challenge. Strategic visualization choices, like using line charts instead of bump charts and donut charts instead of bars helped create a cleaner layout while ensuring analytical depth and interactivity remained intact.

Adjustments from the original plan

Initially, the plan was to use Tableau Prep Builder for data cleaning and table joins, assuming its visual interface would simplify the workflow. However, as the dataset required more detailed preprocessing, such as handling of null values, reformatting date and time fields, and dropping irrelevant attributes, the process was shifted to Python,

leveraging Pandas and NumPy for greater control and flexibility. Once the data was cleaned and structured, the joins were handled directly within Tableau Desktop using its data source modeling features, which allowed for smoother integration and easier field-level calculations. In addition to the tool shift, the project scope evolved as well, what began as a focus on tracking wins and standings grew into a broader analysis of driver contributions and historical team performance, ultimately leading to a more insightful and storytelling-oriented dashboard.

3. Race and Circuit Overview

Data Preparation and Integration

This dashboard explores the spatial and temporal distribution of Formula 1 races, focusing on circuits, countries, and seasonal trends from the dataset. The underlying data is sourced from two primary CSV files: races.csv and circuits.csv. It focuses on the importance and impact of qualifying performance in Formula 1. It examines how drivers and constructors fare in relation to their qualifying positions, nationalities, circuit characteristics, and consistency in position changes.

The core data source is races.csv, joined with four supporting datasets:

1. circuits.csv (joined via circuitId)
2. qualifying.csv (via raceId and driverId)
3. results.csv (via raceId and driverId)
4. status.csv (via statusId from results)

All joins were set up using Tableau's visual data model interface, primarily as left and inner joins to retain race records even when some related data was missing.

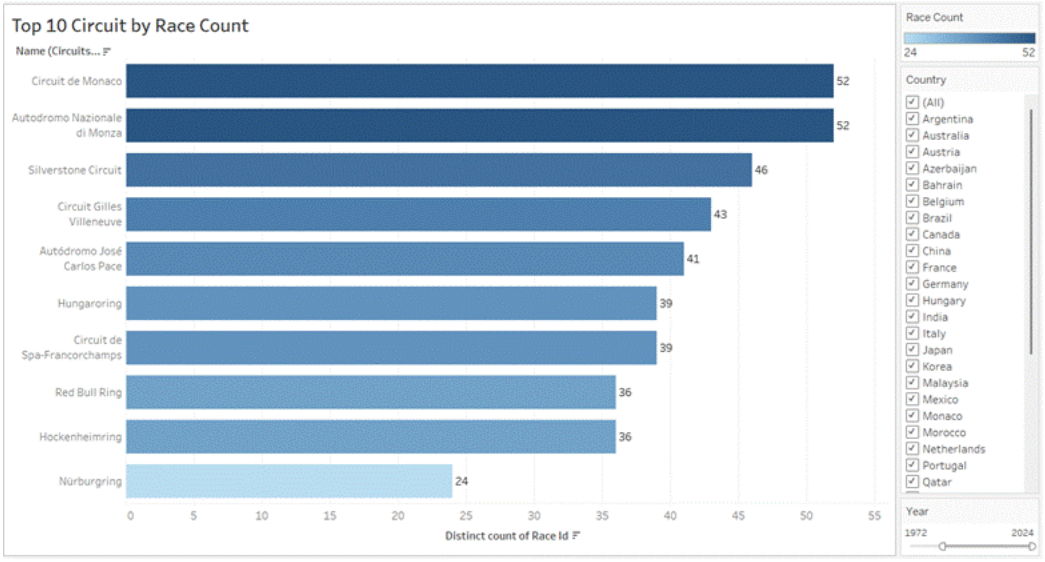
Fields were renamed for clarity and consistency. Geographic roles were assigned to circuit coordinates .Null values (such as missing sprint date,fp1 date or quali date) were handled using IFNULL() logic, often replacing them with "Unknown" or excluding them from specific charts to preserve accuracy**.**

Analysis of the Dashboard

This dashboard comprises four primary visualizations that reveal trends and patterns in the geographical spread and frequency of Formula 1 races and circuits.

1. Top 10 Circuits by Race Count

This visualization highlights which circuits have hosted the most Formula 1 races, with Monza and Monaco each hosting 52 races, followed closely by Silverstone with 46. These numbers underscore the historical and ongoing significance of these iconic tracks in F1 history. The chart also includes interactive filters for Country and Year, enabling deeper analysis of circuit dominance over specific time periods or regions. Overall, it emphasizes the legacy of classic circuits and facilitates circuit-centric exploration of F1 race trends.



2. Races by Country

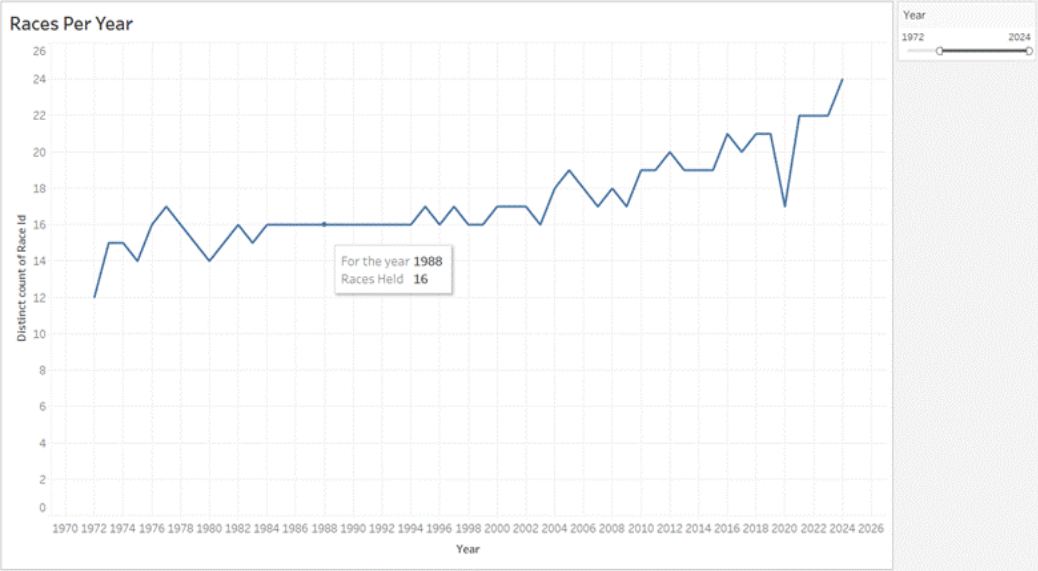
This map visualizes the global distribution of Formula 1 races, with darker shading indicating countries that have hosted more events—such as the UK, Italy, Germany, and the USA. A Year filter allows users to explore how the sport has expanded internationally over time. The map not only highlights F1's Eurocentric origins but also points to emerging markets like Saudi Arabia and Qatar, offering insights into the evolving geographic footprint of the sport.

3. Percentage of DNS (Did Not Finish) Failure Reasons (Pie Chart)

This chart presents the percentage breakdown of race failures by categorized statuses such as Engine issues, Collisions, Accidents, and multi-lap retirements like “+1 Lap” or “+2 Laps.” It highlights the most frequent causes of race retirements, whether mechanical or incident-related. With interactive filters for Status, Country, and Year, users can conduct detailed analyses—such as identifying whether collisions are more prevalent on certain street circuits. Overall, the visualization provides valuable insights into how factors like car reliability, driver behavior, and track conditions influence race outcomes.

4. Average Number of Races Per Year (Line Chart)

This visualization illustrates the evolution of the number of Formula 1 races per season from 1950 to 2024, showcasing the sport’s steady growth—from fewer than 10 races in the early 1950s to over 23 in recent years. It clearly captures key milestones, including the sharp dip during the COVID-affected 2020 season and the rapid recovery that followed. With built-in filters by country, users can explore how different regions have contributed to F1's global expansion over time.



Discoveries from visualization

1. **Legacy Circuits Dominate**: Monza, Monaco, and Silverstone consistently rank as the most used tracks, reinforcing their historical value.
2. **Global Expansion**: While the sport originated in Europe, recent years show a strong push into Asia, the Middle East, and the Americas.
3. **Common Failure Reasons**: Engine failures and collisions are among the most frequent DNF causes, particularly in high-speed or complex circuits.
4. **Year-on-Year Growth**: The chart of races per year demonstrates how F1 has evolved from a niche sport into a global entertainment giant.
5. **Circuit-Country Relationship**: Some countries (like Italy and Germany) feature multiple high-usage circuits, while others rely on a single venue.

Challenges and Solutions

1. Selecting the correct data sources: The original dataset contained 14 CSV files, from which only 5 were used. Selecting the appropriate datasets demanded a careful evaluation of their relevance to the dashboard's goals, ensuring that only the most impactful sources were used.
2. Aggregations like COUNTD(Race ID) and COUNTD(Circuit Name) were used for distinct counts to avoid duplication from join expansions. Joining multiple datasets (like races.csv, results.csv) caused duplicate rows, inflating counts—resolved using COUNTD to ensure unique values for Race ID and Circuit Name.
3. Filters like Country or Year sometimes did not impact KPI sheets as expected, especially when the sheet's primary data source wasn't directly tied to the filter context; this was resolved by setting the filters to apply to all using this data source.

Adjustments from the original plan

1. Filter-Responsive KPIs Added: Initially, KPIs like "Average Races per Year" and "Total Circuit Count" were planned as static labels. Later, they were converted to dynamic metrics that update based on Year and Country filters for more meaningful interaction.

2. Simplified Layout for Clarity: Some visualizations (like average races or total circuits) were originally intended as detailed charts but were reduced to clean text KPIs for better readability and space optimization.

3. Map and Pie Chart Enhancements: Switched to filled maps instead of symbol maps to highlight countries by race frequency. Also changed the DNS reasons from a bar to a pie chart for better visual distribution.

4. Tooltip and Label Improvements: Added tooltips and percentage labels across visualizations to make insights more accessible without overwhelming the viewer.

5. Joined Additional Files Only Where Needed: Instead of joining all 14 available CSVs, selected only the relevant 5 based on dashboard objectives to keep the model clean and performant.

4. Dashboard Overview: F1 Qualifying Insights

This dashboard was designed to explore the relationship between qualifying performance and final race outcomes in Formula 1. It leverages data from five major CSV datasets: qualifying.cs27v, results.csv, races.csv, drivers.csv, and constructors.csv. These files were integrated and analyzed using Tableau Desktop, where key calculated fields were created for in-depth performance metrics.

Data Integration and Preparation

1. Joining relevant datasets by driverId, raceId, and constructorId.
2. Cleaning and filtering null values in fields such as qualifying position and position order.
3. Converting qualifying session times (e.g., Q1, Q2) into numerical seconds for aggregation.
4. Creating calculated fields like Position Change, AvgQualifyingPosition, PoleToWinProbability, and fixed-LD values for ranking and KPIs.

Analysis of the Dashboard

The dashboard includes 5 visuals and 2 KPIs designed to answer strategic questions about race performance, driver improvement, constructor consistency, and nationality dominance.

1. **Driver with Most Pole Positions**

   This KPI highlights the driver with the most pole positions in Formula 1 history, showcasing Lewis Hamilton as the standout leader. It serves as a key performance indicator of consistent one-lap excellence across different eras of the sport. This insight is valuable for understanding long-term dominance in qualifying sessions, as well as a driver's ability to secure clean air and maintain track control.

2. **Constructor with Best Avg Qualifying Position**

   This KPI identifies the constructor with the lowest average qualifying position, with "Simtek" emerging as the leading result—potentially due to exceptional performance in a limited number of entries or an outlier scenario. The outcome may vary depending on filter settings. This metric is useful for assessing which team consistently secured strong grid positions, reflecting qualifying efficiency and performance reliability.

3. **Pie Chart: Pole Positions by Nationality**

   This pie chart maps the global distribution of pole positions by country, revealing dominance by British and German drivers, with significant contributions from nations like Japan, Austria, and Colombia. It highlights how national investments in motorsport influence success. This view is valuable for comparing driver development programs across countries and anticipating emerging talent pipelines.

4. **Avg Qualifying Position vs Total Points Scored by Driver**

   This scatter plot analyzes the relationship between average starting grid position and total championship points. It reveals a general negative correlation, indicating that drivers who qualify better tend to score more points. However, notable outliers with

lower starting positions but high point totals suggest strong race-day performance, helping analysts identify drivers who consistently outperform their grid placement.

5. **Bar Chart: Driver's Average Position Changes – Top 5**
   This visualization highlights drivers who consistently gained the most positions from the start to the finish of a race. Jean-Marc Gounon and David Brabham emerge as standouts, averaging gains of 3–6 places per race. Such insights are useful for recognizing drivers with exceptional overtaking ability and strong in-race adaptability.

6. **Bar Chart: Driver's Average Position Changes – Bottom 5**
   This chart identifies drivers who consistently lost positions during races, with Roland Ratzenberger and Nigel Mansell among the most affected. These trends may signal issues such as mechanical unreliability, strategic missteps, or performance inconsistencies. Such data helps teams diagnose root causes of underperformance and refine race strategies.

7. **Bubble Chart: Pole-to-Win Probability by Circuit Over Years**
   This visualization highlights circuits where securing pole position most often leads to race victory, with tracks like Monaco and Hungary showing the highest conversion rates. Larger, darker bubbles indicate stronger pole-to-win probabilities. These insights are vital for race engineers when determining whether to prioritize qualifying performance or focus on race-day strategy.

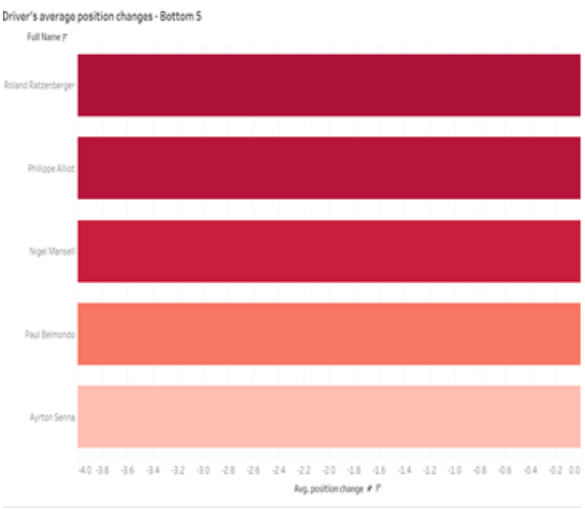
Discoveries from Visualization

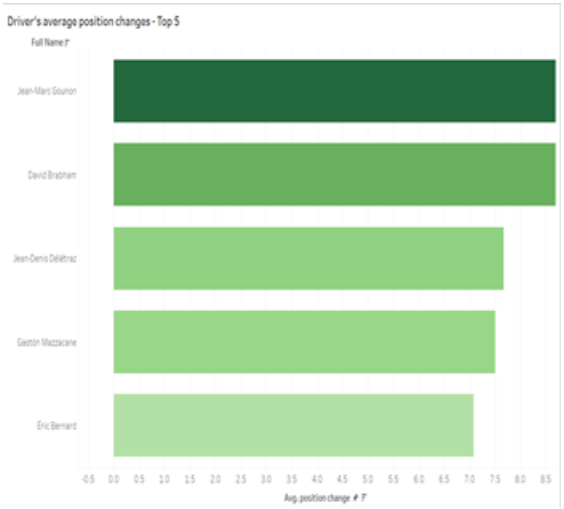
1. **Pole Conversion Circuits**
   Tracks like Monaco, Hungary, and Singapore show a high pole-to-win rate due to limited overtaking zones. The bubble chart confirms these circuits reward qualifying performance. In contrast, circuits like Spa and Baku show lower conversion, emphasizing race strategy and overtaking.

2. **Race Gainers** The Top 5 Average Position Change bar chart shows drivers like Jean-Marc Gounon and David Brabham consistently gaining 5+ positions. This suggests exceptional race pace or ability to recover from poor grid starts.

3. **Drivers Losing Out**

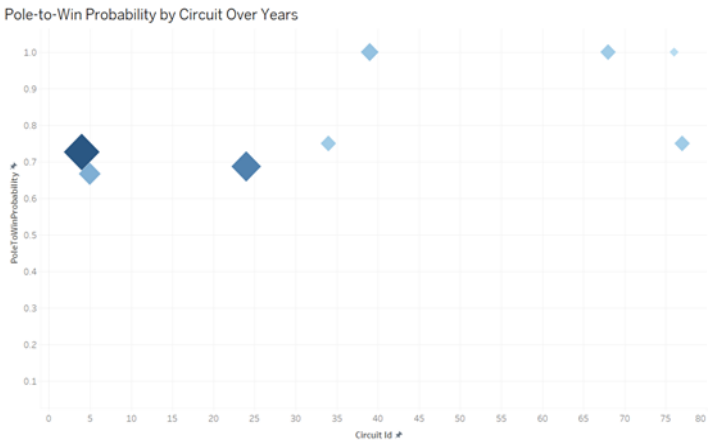
   Drivers such as Nigel Mansell and Roland Ratzenberger appear in the Bottom 5, regularly dropping positions. This points to potential reliability issues, poor strategy, or race-day inconsistencies.





4. **Constructors Vary by Era**

   When filtered by year and constructor, the line chart reveals shifts in dominance: Ferrari in the early 2000s, Red Bull in the early 2010s, and Mercedes during the hybrid era. These trends align with technical innovation and regulation changes.



5. Outliers in Scatter Plot

The scatter plot shows that although drivers with better average qualifying positions tend to score more points, some outliers (like Pérez or Button) still deliver high points from mid-grid starts — highlighting strategic excellence.

Challenges and Solutions

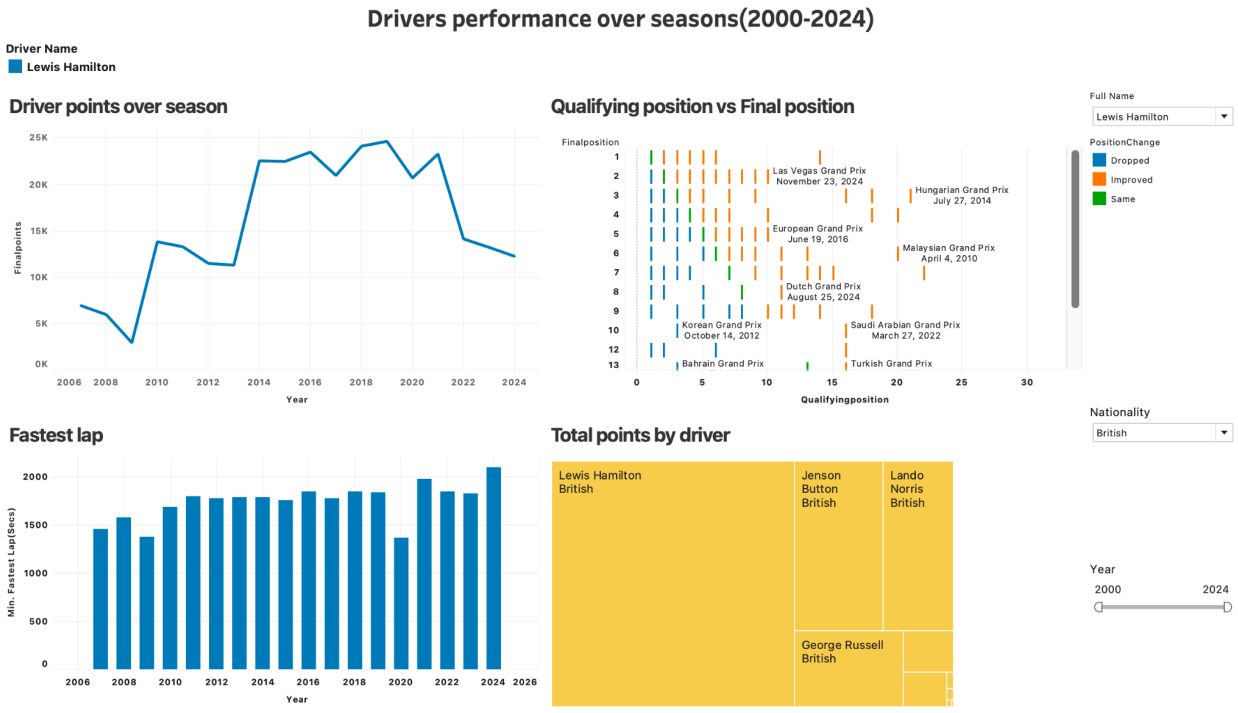
1. Originally intended to build the dashboard around pit stop strategies using the pit_stops.csv dataset. However, due to a lack of meaningful variation and limited visual diversity in the available pit stop data, the focus was shifted to qualifying performance, which offered richer insights and more dynamic visualizations.
2. KPI Logic Error: The “Best Constructor” showed unexpected results . Fixed by checking data granularity and excluding constructors with low entry count
3. Hidden Axis in Bubbles: Bubble chart had no X-axis by default. Solution: Convert circuit ID to continuous, and enable axis headers.
4. Color Conflicts in Bar Charts: Red and green bars clashed with filters. Used diverging color scale to distinguish gains from losses.
5. Disconnected Filters: Driver and constructor filters didn’t update all views. Resolved using dashboard filter actions and applying to all sheets.

Adjustments from Original Plan

1. Initially planned for comparison across multiple drivers, but this cluttered charts. Shifted to top 5 / bottom 5 summaries for clarity.
2. Intended to include fastest qualifying laps, but dataset issues with formatting led to pivoting toward position change analysis instead.
3. Replaced the original "wins per season" bar chart with bubble chart for better insight into circuit-level race strategy.

This dashboard offers data-driven, filter-responsive insights into the strategic world of Formula 1 qualifying performance across drivers, teams, and race venues.

Final Product



Constructor (Team) Success

Constructor Name: Mercedes

Mercedes

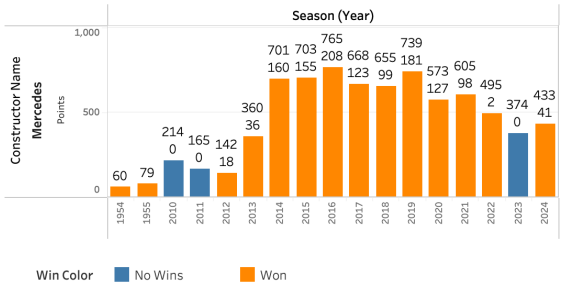
Total Wins: **1,248**

Total Points: **7,731**

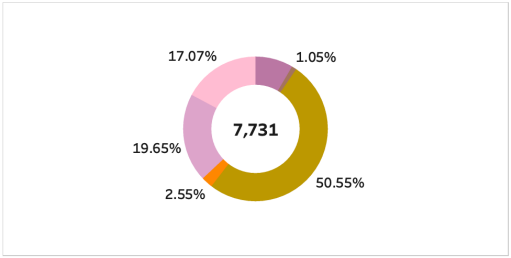
Best Performing Driver: **Lewis Hamilton**

Driver Name: George Russell, Juan Fangio, Lewis Hamilton, Michael Schumacher, Nico Rosberg, Valtteri Bottas

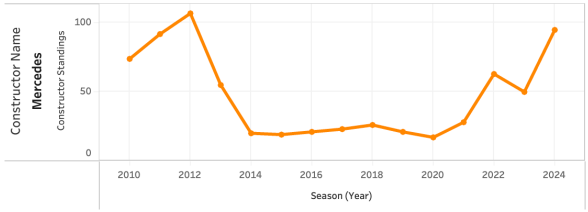
Points & Wins per Season



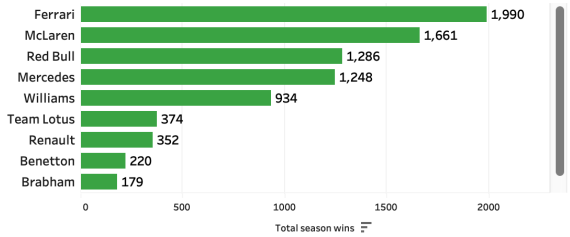
Driver Contributions to Team Points



Constructor Rankings Over Time



Top 10 Most Successful Teams of All Time



F1 Race Insights

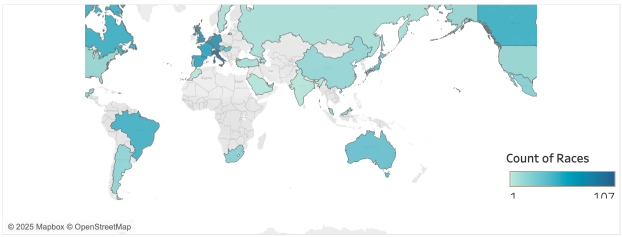
Avg Races per Year
15

Total Circuit Count
77

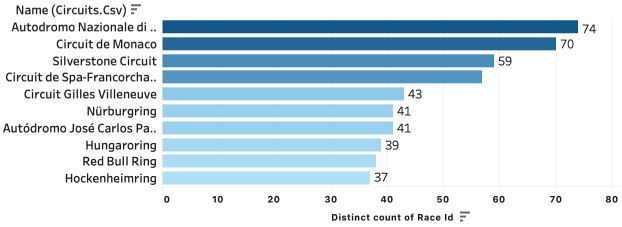
Country: (All)

Year: 1950 – 2024

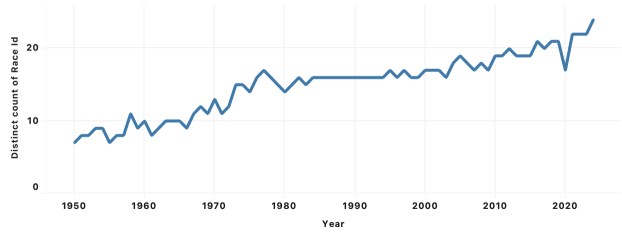
Races by Country



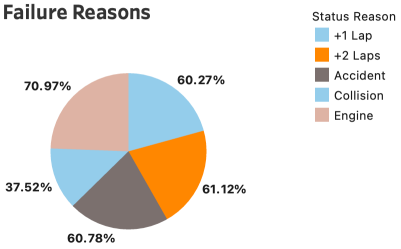
Top 10 Circuit by Race Count



Races Per Year



Percentage of DNS Failure Reasons



F1 Qualifying Insights

Driver with most Pole Positions
Lewis Hamilton

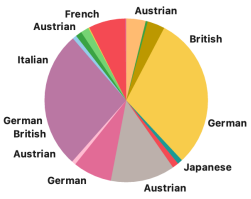
Constructor with Best Avg Qualifying Position
simtek

Constructor Name: (All)

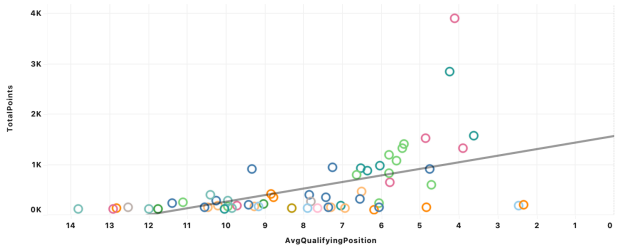
Nationality: (All)

Year: 1994 – 2024

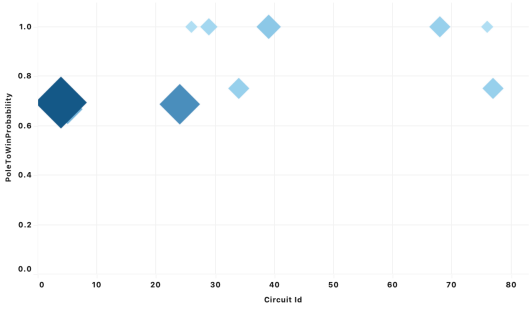
Pole Positions by Nationality



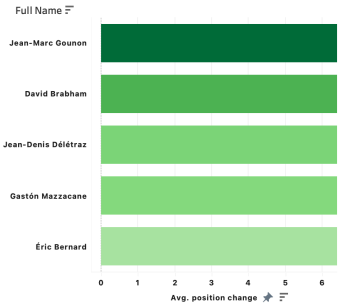
Qualifying Strength vs Points Scored by Driver



Pole-to-Win Probability by Circuit Over Years



Driver's average position changes - Top 5



Driver's average position changes - Bottom 5