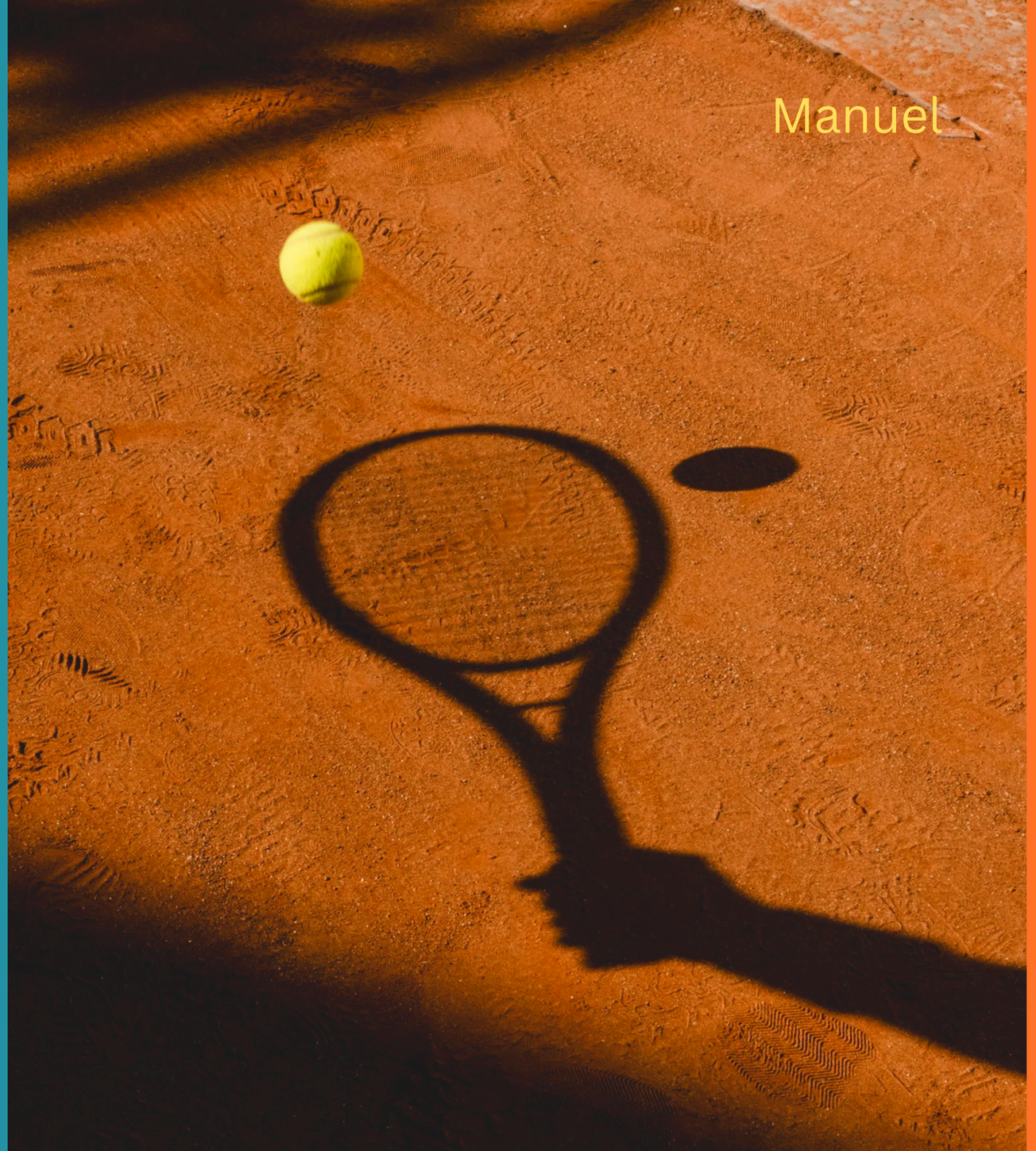
TENNIS DATA ANALYTICS



Manuel

Presentation

OVERVIEW

- 01 - Introduction to the business problem and the objectives of the project

02 - Brief description of the dataset and its sources

03 - Statement of the business question and the expected outcomes

INTRODUCTION TO THE BUSINESS PROBLEM

1. Which factors have the greatest impact on a player's chances of winning a match?
2. How do these factors change depending on the surface of the court, the level of the tournament, and other factors?
3. Are there any interactions between factors that have a significant impact on match outcomes?
4. How can players and coaches use this information to improve their performance?

01 DATASET DESCRIPTION

some columns not relevant for analyzing the key factors in match success: 11

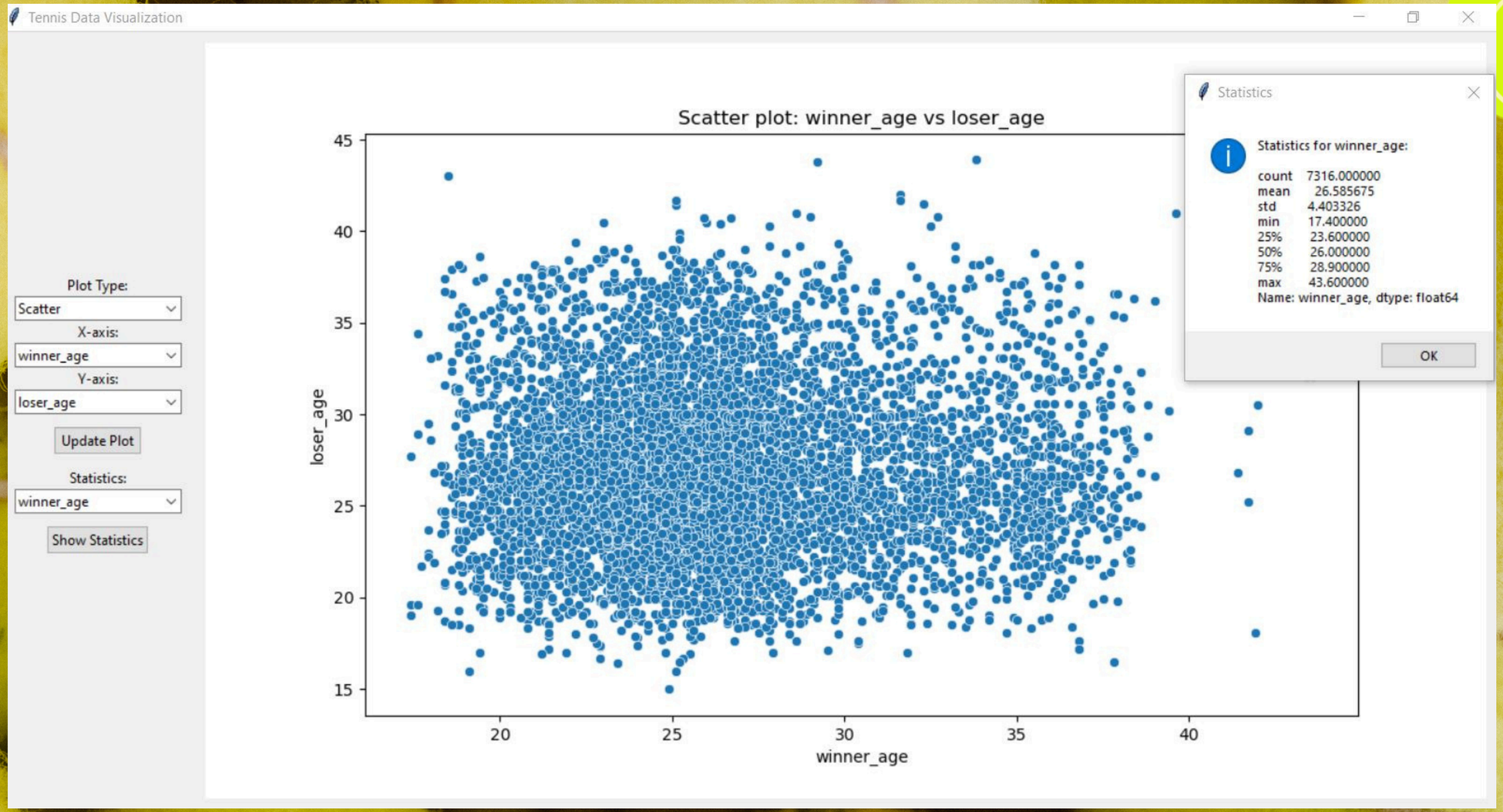
focus on columns that provide information about the players' performance during the match, such as their serve & return statistics

= = tourney level

surface

HERE IS A COMPLETE AND FUNCTIONAL PYTHON APPLICATION TO UNDERSTAND THE DISTRIBUTION & CORRELATION BETWEEN VARIABLES

02 E.D.A ?



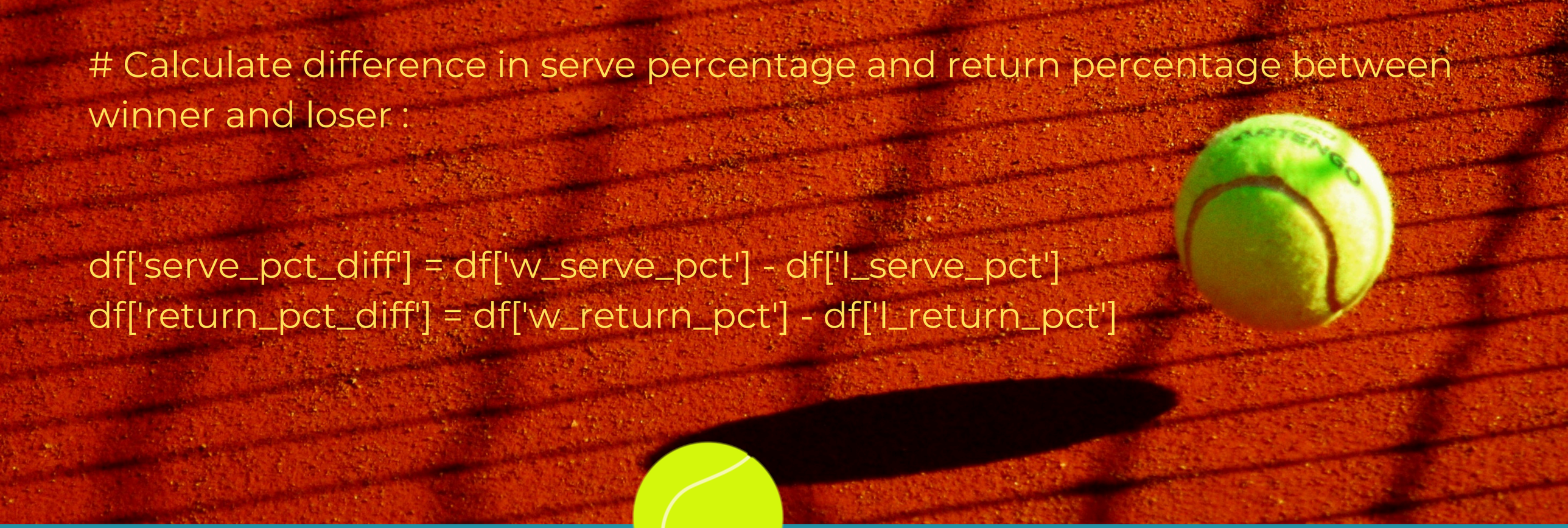
03 KPI

- SELECTION OF RELEVANT KPIS TO MEASURE THE PERFORMANCE OF PLAYERS AND THE SUCCESS OF MATCHES

- CALCULATION OF KPIS FOR EACH PLAYER AND MATCH IN THE DATASET
- ANALYSIS OF THE RELATIONSHIP BETWEEN KPIS AND MATCH SUCCESS
-

Calculate difference in serve percentage and return percentage between winner and loser :

```
df['serve_pct_diff'] = df['w_serve_pct'] - df['l_serve_pct']
df['return_pct_diff'] = df['w_return_pct'] - df['l_return_pct']
```

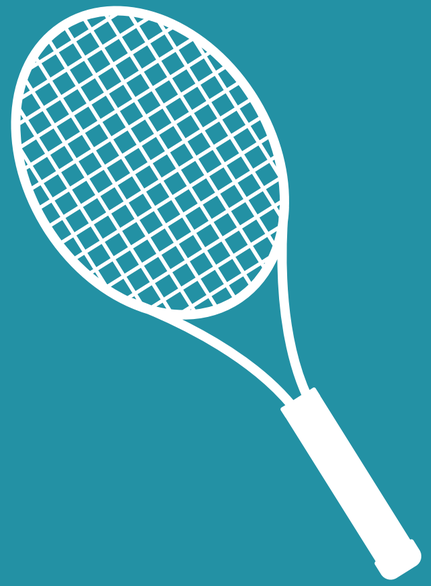


03- KPI CALCULATION

04 HYPOTHESIS TESTING

- FORMULATION OF HYPOTHESES BASED ON THE EDA AND KPI ANALYSIS
- SELECTION OF APPROPRIATE STATISTICAL TESTS TO TEST THE HYPOTHESES
- INTERPRETATION OF THE RESULTS AND EVALUATION OF THE EVIDENCE IN SUPPORT OF THE HYPOTHESES

04 -HYPOTHESIS TESTING



1. **Hypothesis 1: Higher-ranked players have a higher serve percentage.**
   - **Null Hypothesis (H0): There is no difference in serve percentage between higher-ranked and lower-ranked players.**
   - **Alternative Hypothesis (H1): Higher-ranked players have a higher serve percentage than lower-ranked players.**

04 HYPOTHESIS TESTING

```
# Right or Left - who is better?
```

```
# Is more advantageous right player that left hand or the inverse ?
# calculate the win percentage of right-handed players against left-handed players in a tennis match
descriptive statistics for EDA.
```

```
# counts the number of rows in the df where the 'winner_hand' column is 'R' (right-handed)
# and the 'loser_hand' column is 'L' (left-handed).
#giving the number of matches won by right-handed players against left-handed players.
R = len(atp_combined_df[(atp_combined_df.winner_hand == 'R') & (atp_combined_df.loser_hand == 'L')])
#Similar to the previous line, but here for left-handed players against right-handed one.
L = len(atp_combined_df[(atp_combined_df.winner_hand == 'L') & (atp_combined_df.loser_hand == 'R')])
# The win percentage is calculated as the number of matches won by right-handed players (R)
# divided by the total number of matches played between right-handed and left-handed players (R + L),
# multiplied by 100 to get the percentage and finally round the percentage to 2 decimal places.
if R + L > 0:
    percentage = round(100 * np.true_divide(R, R + L), 2)
    print(f'The right hand player has a {percentage}% chance of winning against a left hand player')
else:
    print("No data available for right-handed vs left-handed matches")
```

```
The right hand player has a 53.16% chance of winning against a left hand player
```

Do players from certain countries (ioc) have a higher win rate on specific surfaces?

```python
# Calculate win rates for each country (ioc) on each surface
win_rates = atp_combined_df.groupby(['winner_ioc', 'surface']).size().unstack(fill_value=0)
win_rates = win_rates.div(win_rates.sum(axis=1), axis=0)

# Perform one-way ANOVA for win rates on different surfaces
surfaces = ['Hard', 'Clay', 'Grass']
surface_rates = [win_rates[surface].dropna() for surface in surfaces]

f_statistic, p_value = stats.f_oneway(*surface_rates)

print("One-way ANOVA for IOC win rates on different surfaces:")
print(f"F-statistic: {f_statistic}")
print(f"p-value: {p_value}")
```

```
One-way ANOVA for IOC win rates on different surfaces:
F-statistic: 76.21237917973812
p-value: 3.248305491186151e-26
```

04 HYPOTHESIS TESTING

Is the winner's age different significantly between hard court and clay court?

04 HYPOTHESIS TESTING

```
import pandas as pd
import numpy as np
from scipy import stats
# Filtering for hard and clay court matches
hard_court_ages = atp_combined_df[atp_combined_df['surface'] == 'Hard']['winner_age']
clay_court_ages = atp_combined_df[atp_combined_df['surface'] == 'Clay']['winner_age']
# Performing independent t-test
t_statistic, p_value = stats.ttest_ind(hard_court_ages, clay_court_ages)
print(f"T-statistic: {t_statistic}")
print(f"P-value: {p_value}")
# Interpret results
alpha = 0.05 #significance level
if p_value < alpha:
    print("Reject the null hypothesis. There's a significant difference in winner's age between courts.")
else:
    print("Fail to reject the null hypothesis.There is no significant difference in winner's age between courts."
```



```
T-statistic: -0.9017391454891465
P-value: 0.36722808135030427
Fail to reject the null hypothesis.There is no significant difference in winner's age between courts.
```

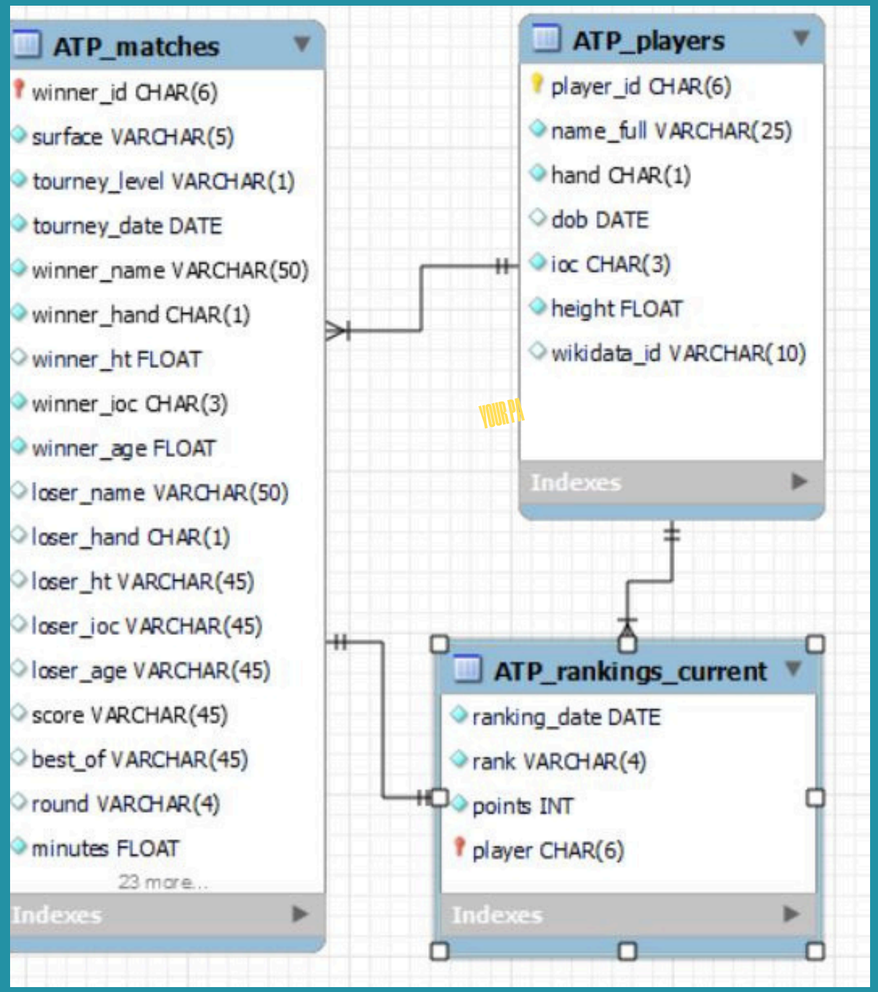
Is there a correlation between winner player height and number of aces?

```
# The Pearson correlation test examines the relationship between a player's height and the number of aces
# A positive correlation coefficient indicates that taller players tend to serve more aces.
# If the p-value is less than 0.05, this relationship is significant.
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy.stats as st

# Calculate correlation coefficient and p-value
corr_coef, p_value = stats.pearsonr(atp_combined_df['winner_ht'], atp_combined_df['w_ace'])

print("Correlation between winner's height and aces:")
print(f"Correlation coefficient: {corr_coef}")
print(f"p-value: {p_value}")
```

04 HYPOTHESIS TESTING


```
Correlation between winner's height and aces:
Correlation coefficient: 0.4059381885830049
p-value: 1.65709931533351097e-288
```

5 SQL PART


ATP_matches
winner_id CHAR(6)
surface VARCHAR(5)
tourney_level VARCHAR(1)
tourney_date DATE
winner_name VARCHAR(50)
winner_hand CHAR(1)
winner_ht FLOAT
winner_ioc CHAR(3)
winner_age FLOAT
loser_name VARCHAR(50)
loser_hand CHAR(1)
loser_ht VARCHAR(45)
loser_ioc VARCHAR(45)
loser_age VARCHAR(45)
score VARCHAR(45)
best_of VARCHAR(45)
round VARCHAR(4)
minutes FLOAT
23 more...
Indexes
ATP_players
player_id CHAR(6)
name_full VARCHAR(25)
hand CHAR(1)
dob DATE
ioc CHAR(3)
height FLOAT
wikidata_id VARCHAR(10)
Indexes
ATP_rankings_current
ranking_date DATE
rank VARCHAR(4)
points INT
player CHAR(6)
Indexes

5 SQL PART

```
SELECT
  CASE
    WHEN winner_age < 20 THEN 'Under 20'
    WHEN winner_age BETWEEN 20 AND 25 THEN '20-25'
    WHEN winner_age BETWEEN 26 AND 30 THEN '26-30'
    WHEN winner_age BETWEEN 31 AND 35 THEN '31-35'
    ELSE 'Over 35'
  END AS age_group,
  COUNT(*) AS winner_count
FROM
  atp_matches
GROUP BY
  age_group
ORDER BY
  CASE age_group
    WHEN 'Under 20' THEN 1
    WHEN '20-25' THEN 2
    WHEN '26-30' THEN 3
    WHEN '31-35' THEN 4
    ELSE 5
  END;
```

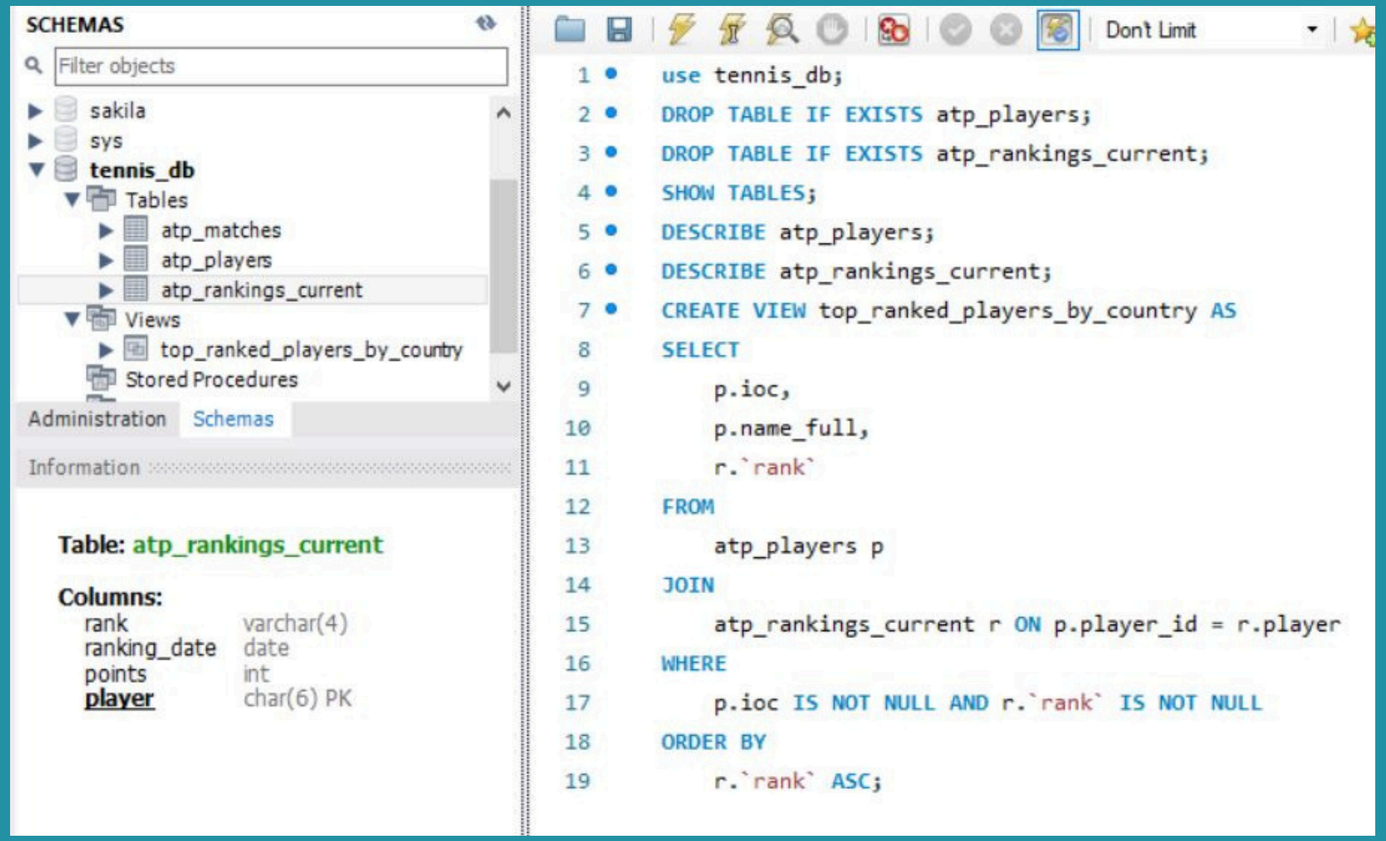
Result Grid | Filter Rows:

age_group	winner_count
Under 20	42
20-25	522
26-30	261
31-35	174
Over 35	236

Result Grid | Filter Rows:

age_group	loser_count
Under 20	25
20-25	414
26-30	349
31-35	215
Over 35	232

5 SQL PART



Creating a v**iew for**

top_ranked_players_by_country

5 SQL PART

```sql
SELECT
    p.name_full,
    COUNT(*) AS grand_slam_wins
FROM
    atp_players p
JOIN
    atp_matches m ON p.player_id = m.winner_id
WHERE
    m.tourney_level = 'G'
GROUP BY
    p.name_full
ORDER BY
    grand_slam_wins DESC;
```

5 SQL PART

```sql
-- Players with the largest improvement in Ranking
CREATE VIEW players_with_largest_ranking_improvement AS
SELECT
    p.name_full,
    MAX(r1.`rank`) - MIN(r2.`rank`) AS ranking_improvement
FROM
    atp_players p
JOIN
    atp_rankings_current r1 ON p.player_id = r1.player
JOIN
    atp_rankings_current r2 ON p.player_id = r2.player
WHERE
    r1.ranking_date < r2.ranking_date
GROUP BY
    p.name_full
ORDER BY
    ranking_improvement DESC;
```

5 SQL PART

```sql
-- Average ranking of players at different tournaments
SELECT
    p.name_full,
    AVG(CASE WHEN m.tourney_name = 'Australian Open' THEN r.`rank` END) AS australian_open_rank,
    AVG(CASE WHEN m.tourney_name = 'Roland Garros' THEN r.`rank` END) AS french_open_rank,
    AVG(CASE WHEN m.tourney_name = 'Wimbledon' THEN r.`rank` END) AS wimbledon_rank,
    AVG(CASE WHEN m.tourney_name = 'US Open' THEN r.`rank` END) AS us_open_rank
FROM
    atp_players p
JOIN
    atp_matches m ON p.player_id = m.winner_id
JOIN
    atp_rankings_current r ON p.player_id = r.player
WHERE
    m.tourney_name IN ('Australian Open', 'Roland Garros', 'Wimbledon', 'US Open')
GROUP BY
    p.name_full;
```

6- CREATE AN API USING A WEB FRAMEWORK : FLASK IN PYTHON

YOUR PA

3 API ENDPOINTS CREATION

1. /TOP_PLAYERS: RETURNS THE TOP 10 PLAYERS
2. BASED ON THE NUMBER OF MATCHES WON.

1. /SURFACE_STATS: PROVIDES AVERAGE
2. STATISTICS
3. FOR EACH PLAYING SURFACE

1. /PLAYER_STATS/<PLAYER_NAME>: GIVES
2. DETAILED
3. STATS FOR A SPECIFIC PLAYER.

API USE

INSTALL PANDAS & FLASK LIBRARIES

SAVE THE SCRIPT AS TENNIS_API.PY IN THE SAME DIRECTORY AS YOUR CSV AND RUN IT.

THE API WILL BE ACCESSIBLE AT HTTP://LOCALHOST:5000.

6- CREATE AN API USING A WEB FRAMEWORK : FLASK IN PYTHON

3 API ENDPOINTS TEST

1. **TOP PLAYERS:**
   HTTP://LOCALHOST:5000/TOP_PLAYERS
2.

1. **SURFACE STATS:**
   HTTP://LOCALHOST:5000/SURFACE_STATS
2.

PLAYER STATS: HTTP://LOCALHOST:5000/
PLAYER_STATS/FELIX AUGER ALIASSIME

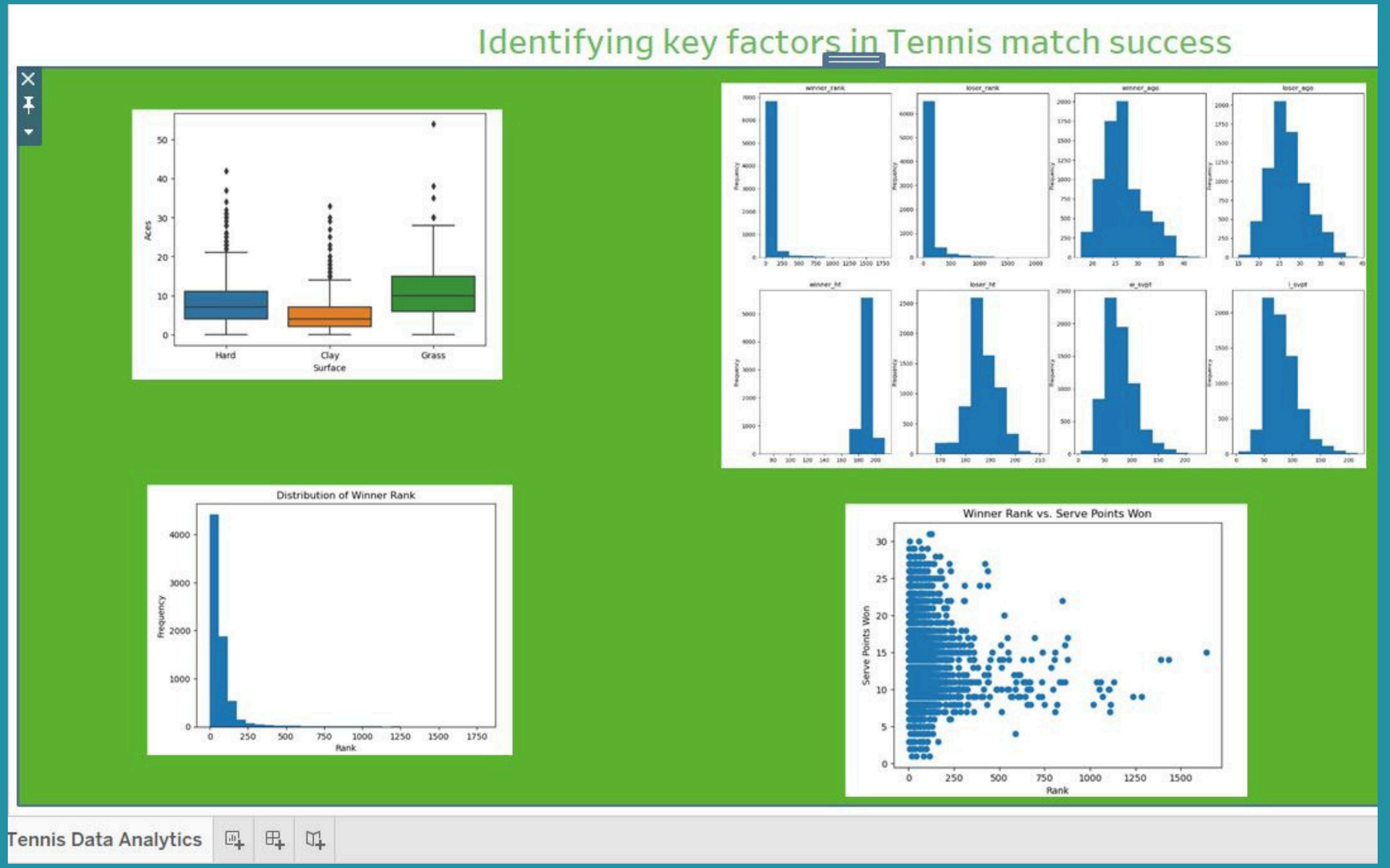
6- CREATE AN API USING A WEB FRAMEWORK : FLASK IN PYTHON

```python
from flask import Flask, jsonify
import pandas as pd

app = Flask(__name__)

# Load the CSV data
df = pd.read_csv('atp_matches_combined_cleaned.csv')

@app.route('/top_players', methods=['GET'])
def top_players():
    top_10 = df.groupby('winner_name').size().sort_values(ascending=False).head(10)
    return jsonify(top_10.to_dict())
```

6- CREATE AN API USING A WEB FRAMEWORK : FLASK IN PYTHON

```python
@app.route('/surface_stats', methods=['GET'])
def surface_stats():
    surface_stats = df.groupby('surface').agg({
        'minutes': 'mean',
        'w_ace': 'mean',
        'l_ace': 'mean'
    }).round(2)
    return jsonify(surface_stats.to_dict())

@app.route('/player_stats/<player_name>', methods=['GET'])
def player_stats(player_name):
    player_data = df[df['winner_name'] == player_name].agg({
        'w_ace': 'mean',
        'w_df': 'mean',
        'w_svpt': 'mean',
        'w_1stWon': 'mean',
        'w_2ndWon': 'mean'
    }).round(2)
    return jsonify(player_data.to_dict())

if __name__ == '__main__':
    app.run(debug=True)
```

7 - TABLEAU DASHBOARD



THANK YOU FOR LISTENING

MANUEL