Project 3

Finding relationships in baseball

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Project Summary

This project uses the data of baseball players and teams. It covers their salary, number of at bats, number of hits, and a corresponding year. SQL, pandas, and altair is used to make new tables and charts; which show calculations and comparisons.

Technical Details

Grand Question 1

Write an SQL query to create a new dataframe about baseball players who attended BYU-Idaho. The new table should contain five columns: playerID, schoolID, salary, and the yearID/teamID associated with each salary. Order the table by salary (highest to lowest) and print out the table in your report.

The table created shows there are 15 players who attended BYU-I. The salries range from 150,000 to 400,000.

	playerid	salary	teamid	yearid	schoolid
0	stephga01	150000	PHI	1997	idbyuid
1	stephga01	185000	PHI	1998	idbyuid
2	stephga01	215000	SLN	1999	idbyuid
3	lindsma01	380000	FLO	2007	idbyuid
4	lindsma01	395000	FLO	2008	idbyuid
5	lindsma01	410000	FLO	2009	idbyuid

	playerid	salary	teamid	yearid	schoolid
6	stephga01	550000	SLN	2000	idbyuid
7	stephga01	800000	SLN	2003	idbyuid
8	stephga01	900000	SLN	2002	idbyuid
9	stephga01	1025000	SLN	2001	idbyuid
10	lindsma01	1625000	HOU	2010	idbyuid
11	lindsma01	2300000	CHA	2013	idbyuid
12	lindsma01	2800000	COL	2011	idbyuid
13	lindsma01	3600000	BAL	2012	idbyuid
14	lindsma01	4000000	CHA	2014	idbyuid

Query Used:

```
SELECT DISTINCT salaries.playerid, salaries.salary, salaries.teamid, salaries.yearid, collegepla
FROM salaries AS sal
    JOIN collegeplaying AS cp ON sal.playerid = cp.playerid
 WHERE collegeplaying.schoolid = "idbyuid"
 ORDER BY salaries.salary
```

Grand Question 2

The following queries compute the batting average for each player. The batting average calulation is number of hits divided by the number of at-bats.

a) Write an SQL query that provides playerID, yearID, and batting average for players with at least 1 at bat that year. Sort the table from highest batting average to lowest, and then by playerid alphabetically. Show the top 5 results in your report.

Query Used:

```
SELECT batting.playerid, batting.yearid, (batting.h / batting.ab) AS batting_av
FROM batting
WHERE batting.ab >= 1
GROUP BY batting.playerid, batting.yearid
ORDER BY batting_av DESC, batting.playerid
LIMIT 5
```

Result:

	playerid	yearid	batting_av
0	abernte02	1960	1
1	abramge01	1923	1
2	acklefr01	1964	1
3	alanirj01	2019	1
4	alberan01	2017	1

b) Use the same query as above, but only include players with at least 10 at bats that year. Print the top 5 results.

Query Used:

```sql
SELECT batting.playerid, batting.yearid, (batting.h / batting.ab) AS batting_av
FROM batting
WHERE batting.ab >= 10
GROUP BY batting.playerid, batting.yearid
ORDER BY batting_av DESC, batting.playerid
LIMIT 5
```

Result:

	playerid	yearid	batting_av
0	nymanny01	1974	0.642857
1	carsoma01	2013	0.636364
2	altizda01	1910	0.6
3	silvech01	1948	0.571429
4	puccige01	1930	0.5625

c) Now calculate the batting average for players over their entire careers (all years combined). Only include players with at least 100 at bats, and print the top 5 results.

Query Used:

```
SELECT batting.playerid, (sum(batting.h) / sum(batting.ab)) AS batting_av
FROM batting
GROUP BY batting.playerid
HAVING sum(batting.ab) >= 100
ORDER BY batting_av DESC, batting.playerid
LIMIT 5
```

Result:

	playerid	batting_av
0	cobbty01	0.366299
1	barnero01	0.359682
2	hornsro01	0.358497
3	jacksjo01	0.355752
4	meyerle01	0.355509

Grand Question 3

Pick any two baseball teams and compare them using a metric of your choice (average salary, home runs, number of wins, etc). Write an SQL query to get the data you need, then make a graph in Altair to visualize the comparison.

The teams I choose to compare are the Seattle Mariners and Atlanta Braves. I compared the number of series wins and loses each team has.

Wins

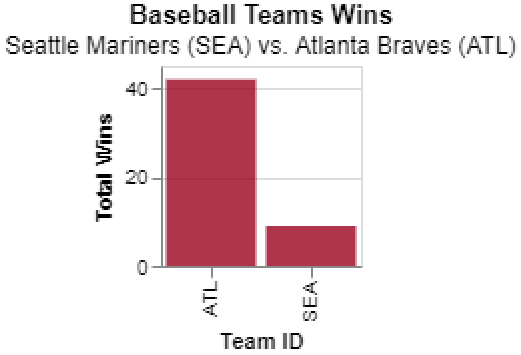
Wins Query:

```
SELECT SeriesPost.teamidwinner, SUM(SeriesPost.wins) AS total_wins
FROM SeriesPost
WHERE SeriesPost.teamidwinner = "ATL" OR SeriesPost.teamidwinner = "SEA"
GROUP BY SeriesPost.teamidwinner
ORDER BY SeriesPost.teamidwinner
```

Wins Table:

	teamidwinner	total_wins
0	ATL	42

	teamidwinner	total_wins
1	SEA	9



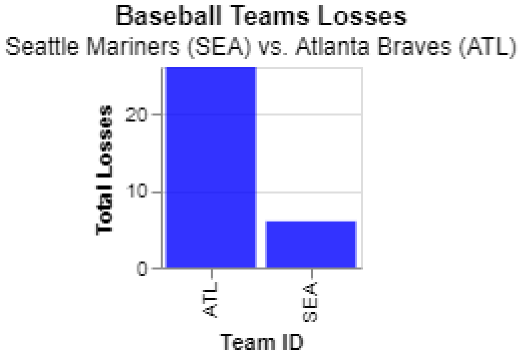
Losses

Losses Query:

```sql
SELECT SeriesPost.teamidloser, SUM(SeriesPost.losses) AS total_losses
FROM SeriesPost
WHERE SeriesPost.teamidloser = "ATL" OR SeriesPost.teamidloser = "SEA"
GROUP BY SeriesPost.teamidloser
ORDER BY SeriesPost.teamidloser
```

Losses Table:

	teamidloser	total_losses
0	ATL	26
1	SEA	6



Appendix A

```
# %% [markdown]
# # Project 3

# %%
import datadotworld as dw
import pandas as pd
import altair as alt
import numpy as np

# %% [markdown]
# ## Question 1

# %% [markdown]
# ### byui id: "idbyuid"

# %%
byui_players = dw.query('byuidss/cse-250-baseball-database',
'''
SELECT DISTINCT salaries.playerid, salaries.salary, salaries.teamid, salaries.yearid, collegepla
FROM salaries AS sal
    JOIN collegeplaying AS cp ON sal.playerid = cp.playerid
 WHERE collegeplaying.schoolid = "idbyuid"
 ORDER BY salaries.salary
''')
q1_table = byui_players.dataframe
print(q1_table.to_markdown())

# %%
(alt.Chart(q1_table)
    .mark_bar(color='#98AC5D', opacity=0.8)
    .encode(x = alt.X('salary', axis=alt.Axis(title='Salary')),
        y = alt.Y('playerid', axis=alt.Axis(title='Player ID'))
        )
    .properties(
        title = {'text': 'BYU-I Baseball Players Salaries'}
    )
)

# %% [markdown]
# ## Question 2

# %% [markdown]
# ### q2a

# %%
q2a = dw.query('byuidss/cse-250-baseball-database',
'''
SELECT batting.playerid, batting.yearid, (batting.h / batting.ab) AS batting_av
FROM batting
WHERE batting.ab >= 1
```

```
GROUP BY batting.playerid, batting.yearid
ORDER BY batting_av DESC, batting.playerid
LIMIT 5
''')
print(q2a.dataframe.to_markdown())


# %% [markdown]
# ### q2b

# %%
q2b = dw.query('byuidss/cse-250-baseball-database',
'''
SELECT batting.playerid, batting.yearid, (batting.h / batting.ab) AS batting_av
FROM batting
WHERE batting.ab >= 10
GROUP BY batting.playerid, batting.yearid
ORDER BY batting_av DESC, batting.playerid
LIMIT 5
''')
print(q2b.dataframe.to_markdown())

# %% [markdown]
# ### q2c

# %%
q2c = dw.query('byuidss/cse-250-baseball-database',
'''
SELECT batting.playerid, (sum(batting.h) / sum(batting.ab)) AS batting_av
FROM batting
GROUP BY batting.playerid
HAVING sum(batting.ab) >= 100
ORDER BY batting_av DESC, batting.playerid
LIMIT 5
''')
print(q2c.dataframe.to_markdown())

# %% [markdown]
# ## Question 3

# %% [markdown]
# ### Seattle Mariners (SEA) vs. Atlanta Braves (ATL)

# %%
q3_query = dw.query('byuidss/cse-250-baseball-database',
'''
SELECT SeriesPost.teamidwinner, SUM(SeriesPost.wins) AS total_wins
FROM SeriesPost
WHERE SeriesPost.teamidwinner = "ATL" OR SeriesPost.teamidwinner = "SEA"
GROUP BY SeriesPost.teamidwinner
ORDER BY SeriesPost.teamidwinner
```

```
''')
q3_table = q3_query.dataframe
print(q3_table.to_markdown())
#  SUM(SeriesPost.losses) AS total_losses, SUM(SeriesPost.ties) AS total_ties

# %%
q3_query2 = dw.query('byuidss/cse-250-baseball-database',
'''
SELECT SeriesPost.teamidloser, SUM(SeriesPost.losses) AS total_losses
FROM SeriesPost
WHERE SeriesPost.teamidloser = "ATL" OR SeriesPost.teamidloser = "SEA"
GROUP BY SeriesPost.teamidloser
ORDER BY SeriesPost.teamidloser
''')
q3_table2 = q3_query2.dataframe
print(q3_table2.to_markdown())

# %%
(alt.Chart(q3_table)
    .mark_bar(color="#9a031e", opacity=0.8)
    .encode(x = alt.X('teamidwinner', axis=alt.Axis(title='Team ID')),
        y = alt.Y('total_wins', axis=alt.Axis(title='Total Wins'))
        )
    .properties(
        height = 100,
        width = 100,
        title = {'text': 'Baseball Teams Wins', 'subtitle': 'Seattle Mariners (SEA) vs. Atlanta
    )
)

# %%
(alt.Chart(q3_table2)
    .mark_bar(color="blue", opacity=0.8)
    .encode(x = alt.X('teamidloser', axis=alt.Axis(title='Team ID')),
        y = alt.Y('total_losses', axis=alt.Axis(title='Total Losses'))
        )
    .properties(
        height = 100,
        width = 100,
        title = {'text': 'Baseball Teams Losses', 'subtitle': 'Seattle Mariners (SEA) vs. Atlant
    )
)
```