

# Clash Royal Data Intern Test

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The Answers:

## 1. Brief description of datasets.

- This is a clean dataset with 3 tables without null, NaN values. There aren't duplicated values in **accounts\_table**, but duplicated values in **iap\_purchase** and **account\_session** tables because one user can buy multiple times and have many login sessions.
- The context of dataset is easy to understand and use. There are some outliers in **iap\_purchase** table because there are players who purchased a lot in game but the dataset still looks fine and reasonable.

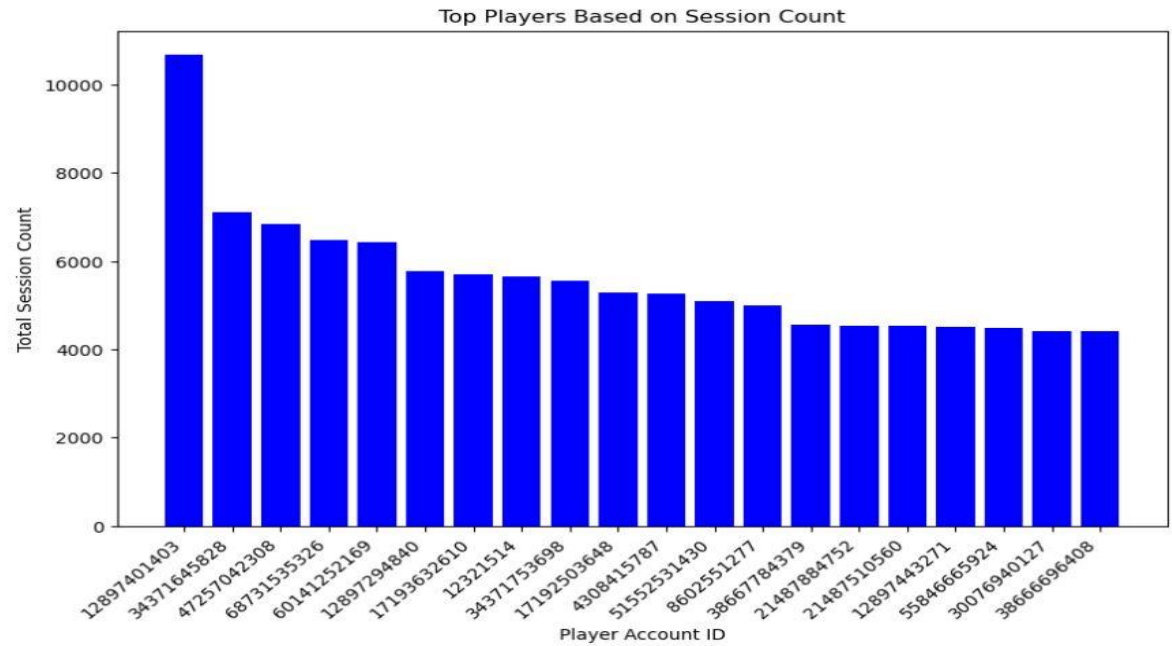
```
print(f"\n\tNumber of null, nan, duplicated values in account table: {check_null1}, {check_na1}, {check_na2}")
print(f"\n\tNumber of null, nan, duplicated values in iap_purchase table: {check_null2}, {check_na2}, {check_na3}")
print(f"\n\tNumber of null, nan, duplicated values in account_session table: {check_null3}, {check_na3}")
```

Number of null, nan, duplicated values in account table: 0, 0, 0

Number of null, nan, duplicated values in iap\_purchase table: 0, 0, 8360

Number of null, nan, duplicated values in account\_session table: 0, 0, 1586523

## 2. Analyse the Daily Active Users (DAU)

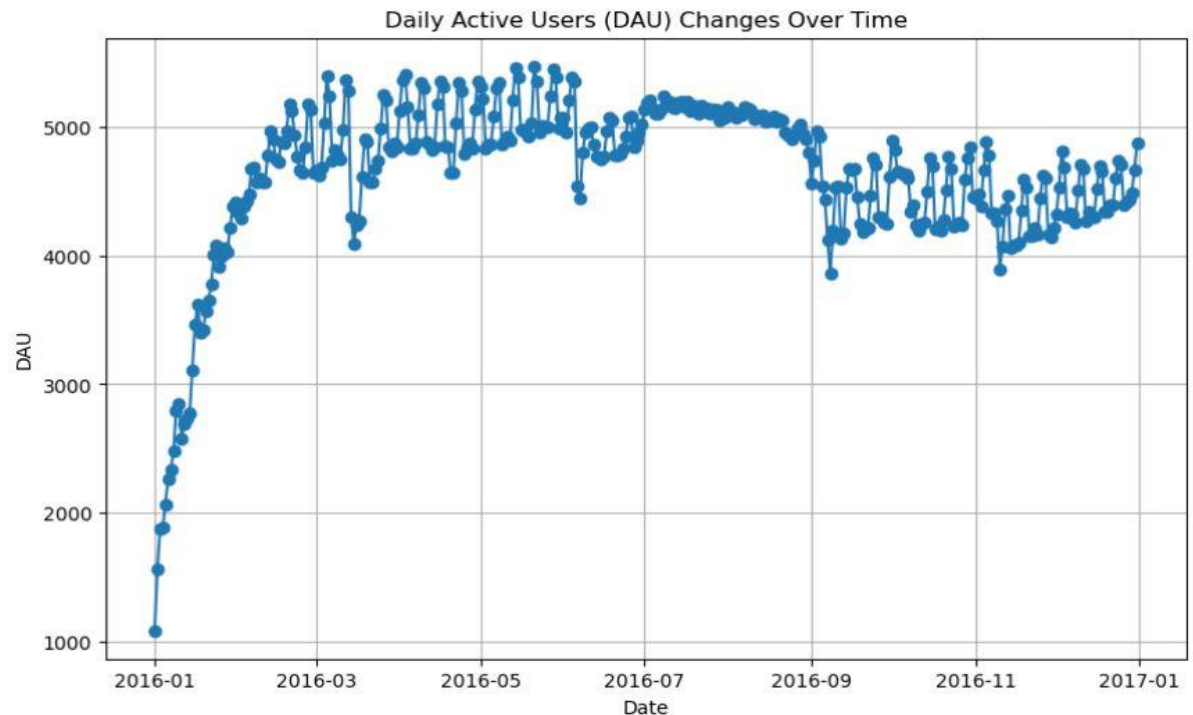


top\_players\_by\_sessions

	account_id	session_count	session_duration_sec	rank_session_count	rank_session_duration
1789	12897401403	10683	2427629	1.0	10.0
39708	34371645828	7100	3029838	2.0	4.0
67022	47257042308	6833	1848784	3.0	24.0
100490	68731535326	6486	1796640	4.0	30.0
86663	60141252169	6425	2077474	5.0	18.0
1603	12897294840	5776	1233836	6.0	98.0
16077	17193632610	5711	1679784	7.0	40.0
12	12321514	5653	2080382	8.0	17.0
39903	34371753698	5561	1839140	9.0	25.0
14237	17192503648	5295	2282602	10.0	13.0
61485	4308415787	5253	1874606	11.0	22.0
75466	51552531430	5099	1541287	12.0	49.0
106795	8602551277	4994	1265164	13.0	88.0
48341	38667784379	4566	3637620	14.0	1.0
21543	21487884752	4537	715439	15.0	435.0
20918	21487510560	4529	1500703	16.0	55.0
1862	12897443271	4521	1752562	17.0	33.0
80731	55846665924	4484	1951448	18.0	21.0
33536	30076940127	4417	2693955	19.0	6.0
46481	38666696408	4412	1137160	20.0	132.0

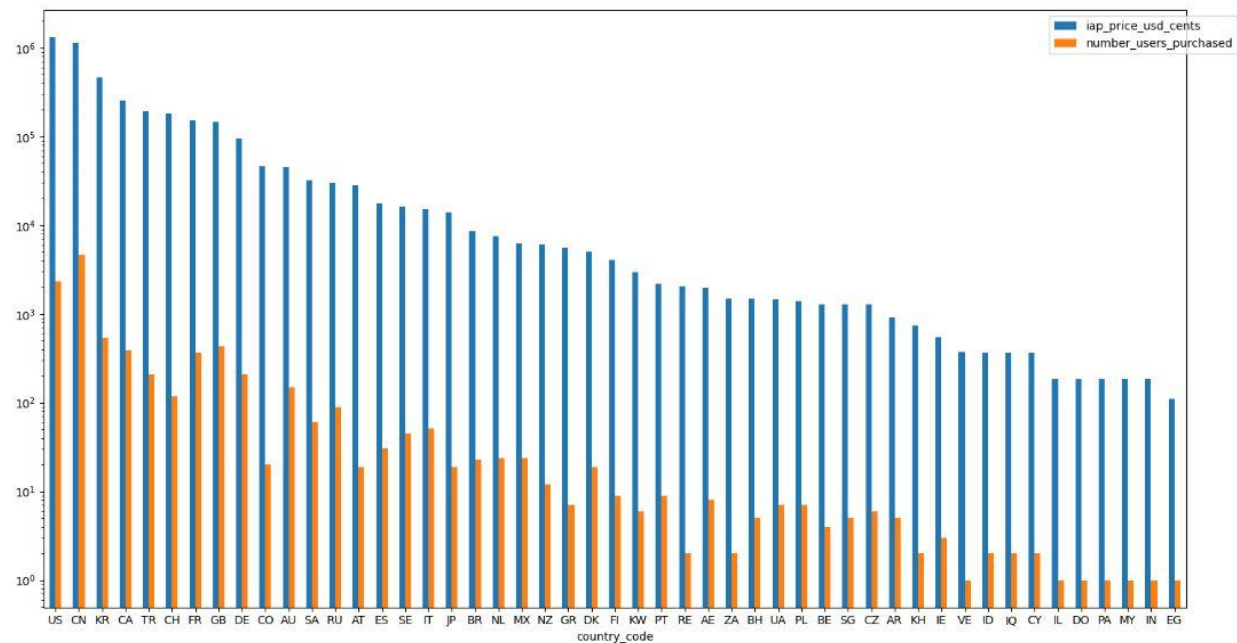
- The bar chart and table show that all top 20 players had more than 4000 sessions. The 1st one and 2nd one were all from KR with impressive sessions, more than 10000 for the

1st and 7100 for the second. But they were not use the game longest in their total sessions as you see in the **rank\_session\_duration** column.



- The lowest Daily Active Users (DAU) is 1000 at the beginning of the year 2016. The trend in DAU appears to be a significant increase from January-2016 to July-2016, followed by a little gradual decrease from July-2016 to January-2017. The highest DAU was more than 5000 from March-2016 to June-2016, however DAU fluctuated a lot around 5000 sessions in this time and then kept very stable in early July-2016.
- In the period between July-2016 to early September-2016, DAU was in decrease trend and dropped a little bit but it still kept stable above 5000 and there weren't much fluctuate like previous periods. We can say that the game was very popular at this time.
- From September-2016 to November-2016, active users's sessions dropped from its stable 5000 sessions. I think maybe this happened because the game released the event/update/something which made most players don't like and satisfy. DAU decreased a bit less than 4000 but then in increase fluctuation immediately after these times. This is the proof that maybe the game listened to players's complaints and fixed immediately.
- DAU kept increase trend between 4000-5000 sessions after the two lowest points under 4000 sessions and continued until the next year January 2017.
- In general, DAU in 2016 had a significant increment from early 2016 and kept stable around 4000-5000 sessions in the rest of year 2016.

### 3. Analyse sales:

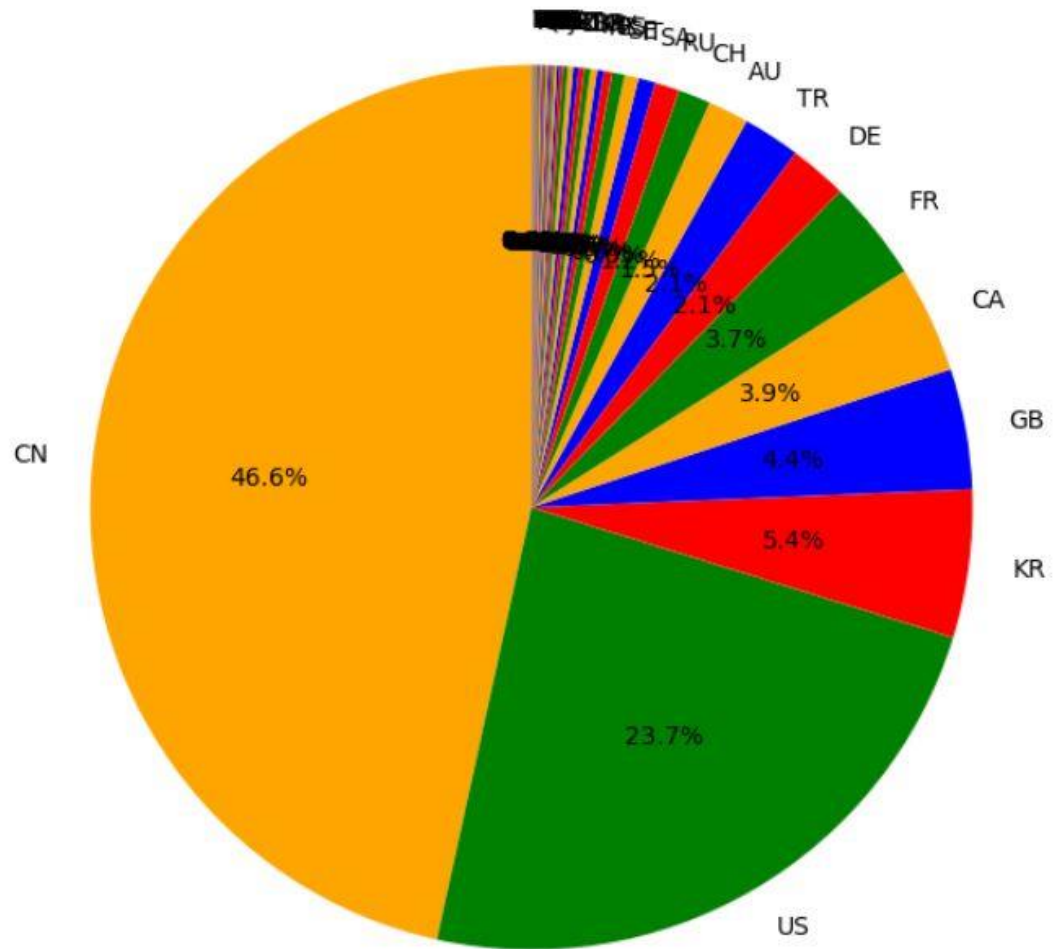


	country_code	iap_price_usd_cents	number_users_purchased
0	US	1314818	2345
1	CN	1136507	4610
2	KR	463518	536
3	CA	254506	387
4	TR	193339	208

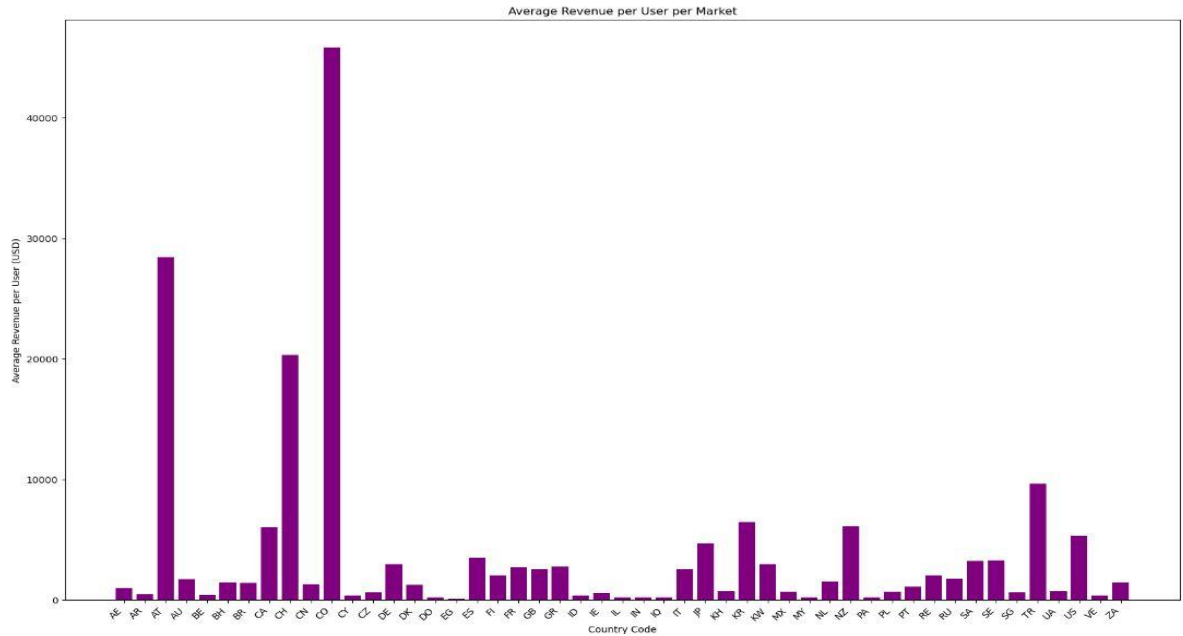
- Based on the chart and table, US and CN were two dominant markets in 2016.
- US players purchased more than CN players in total - more than 11k\$ in total (**iap\_price\_usd\_cents** / 100), but the number players of CN (4610) who purchased in game more than twice times to the number players of US (2345) who purchased in game.
- KR and CA were two smaller markets but look like the game was still interested in these two countries. At least the total purchases amount is approximately 7k\$ in these both countries and attracted nearly 1000 players in total who bought in game.
- Compare with the Top player sessions bar chart above that prove the game was also very popular in KR with many frequently players in 2016, although the biggest markets were US and CN.

- In general, in 2016, CN won the race in total number users purchased in game, US won the race total money purchased, and KR had many players who played the best frequently sessions.

Percentage players by countries



- The pie chart also shows that CN players transactions (~50%) was more than US transactions (23.7%) twice times. In other countries, number of players who purchased in game is nearly ~30% in total.



Country Code: AT  
 Total Revenue: 28471  
 Total Users: 1  
 Number Purchases by Countries: 19  
 Total Sessions by Countries: 3178  
 Avg Revenue per User per Market: 28471.0

Country Code: CH  
 Total Revenue: 182774  
 Total Users: 9  
 Number Purchases by Countries: 117  
 Total Sessions by Countries: 2992  
 Avg Revenue per User per Market: 20308.222222222223

Country Code: CN  
 Total Revenue: 1136507  
 Total Users: 874  
 Number Purchases by Countries: 4610  
 Total Sessions by Countries: 674662  
 Avg Revenue per User per Market: 1300.3512585812357

Country Code: CO  
 Total Revenue: 45860  
 Total Users: 1  
 Number Purchases by Countries: 20  
 Total Sessions by Countries: 7358  
 Avg Revenue per User per Market: 45860.0

Country Code: KR  
 Total Revenue: 463518  
 Total Users: 72  
 Number Purchases by Countries: 536  
 Total Sessions by Countries: 57718  
 Avg Revenue per User per Market: 6437.75

Country Code: US  
 Total Revenue: 1314818  
 Total Users: 248  
 Number Purchases by Countries: 2345  
 Total Sessions by Countries: 177093  
 Avg Revenue per User per Market: 5301.685483870968

- CO, AT, and CH were 3 countries that had the avg. purchased per users very high although US and CN were bigger markets. This is because CO country had only 1 player but purchased 458.6\$ in 20 times, AT was the same with only 1 player but purchased 284.71\$ in 19 times, and CH had 9 players and purchased 1827.74\$ in total 117 times.
- Average revenue per user per market doesn't seem helpful much because in this case but it still can show and emphasize the next potential markets after CN, US, KR, and CA.
- The game should focus on advertising in those potential countries to boost the total number players in each country. Also the game should have many interested events/functions/updates which support free players not just pay players, and attract them to buy with small and cheap bundles/packages (0.99\$, 1.99\$, 4.99\$). Try to listen to players's complaints and fix asap on discord/telegram/game groups if those ideas are not break meta of the game.
- I am one player who addicted in mobile game online and I also purchase packages in game, I tend to prefer the game which listen to player's opinions. I think that is the key successful not only just in game industry but every fields.