# Analysis of different game modes popularity.

There are 6 different modes in the game.
The most popular mode is "2". Second popular is mode "0". Both they represent more then 87% of all games.
The most unpopular game modes are "3" and 7" with less than 1% popularity in sum.

Pie chart is the best way to visualize share of each game mode.

Game mode popularity

47% 40% 8% 4% 0% 1%

■ Mode 2   ■ Mode 0   ■ Mode 6   ■ Mode 1   ■ Mode 3   ■ Mode 7
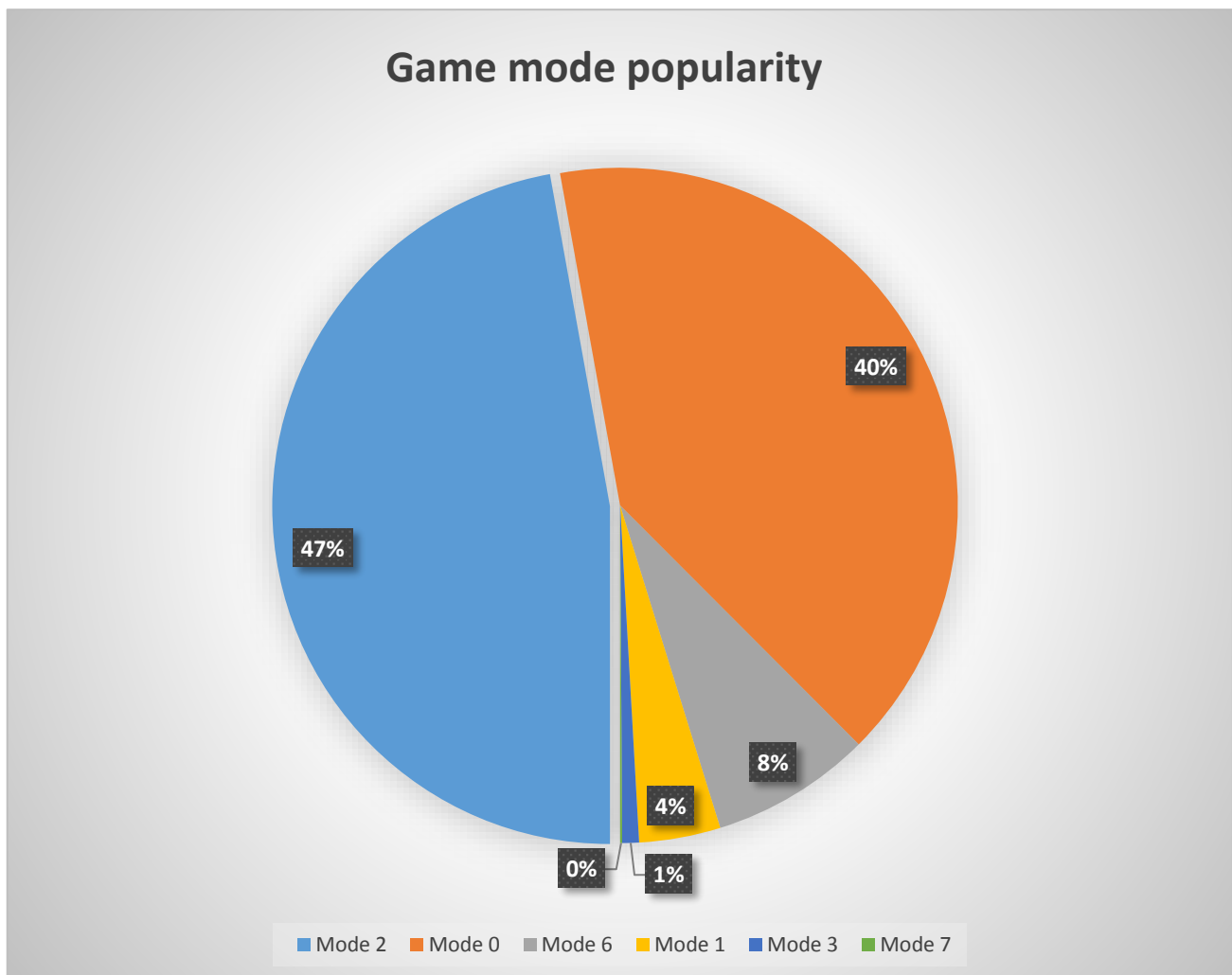
Analysis of efficiency of ships in battle.

During this task we will
a. Create new metric, check it's range, average and median values

b. Answer next questions using new metric:
  1. Who are the best and worst players, what are their results?
  2. What type of ship is more efficient?
  3. Ships of what countries are more efficient?
  4. How does efficiency depend on ship level?
  5. Ships of real users or bots are more efficent ?
  6. How does efficiency depend on game mode?

a. Let's create new metric which should represent efficency of ships in battle.
This metric depends on:
  - damage done to enemy ships
  - damage done to teammate's ships
  - number of enemy ships killed
  - number of enemy planes killed

So we will calculate it as:
efficiency = (damage - team_damage) * 100 / damage_median + ships_killed * 100 + planes_killed * 25

We will
 - add 100 points everytime player does median damage to enemies
 - substract 100 points everytime player does median damage to his teammates
 - add 100 points for each ship killed
 - add 25 points for each plane killed

Our metric efficiency is in range: **[-2043,12243]**
Average efficiency = **259,71**
Median efficiency = **175**
Median efficiency is lower than average. It means there are a lot of weak players in the game with very little efficiency.
We will use median value for analizing next data because our distribution is not normal.

## 1. Who are the best and worst players, what are their results?

efficiency	damage	team_damage	ships_killed	planes_killed
Top 3 best players with highest efficiency				
12223	0	320	0	489
10155	1056	0	0	406
9826	301387	0	10	288
Top 3 worst players with lowest efficiency				
2043	0	378600	0	0
1930	0	399374	0	9
1573	0	291600	0	0

We can see strange values having found extreme values of efficiency. Look at Insight 2 for explanation.

Now, group our data choosing 1 attribute to answer questions above.
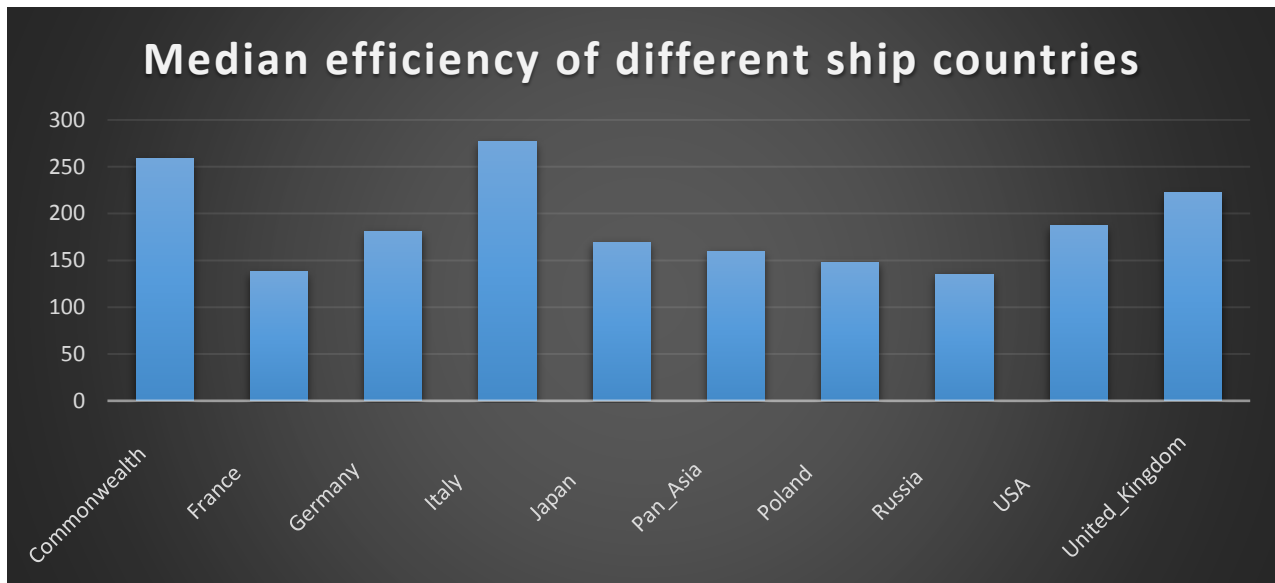Bar chart is the best way to visualize our data grouped by category.

2. What type of ship is more efficient?
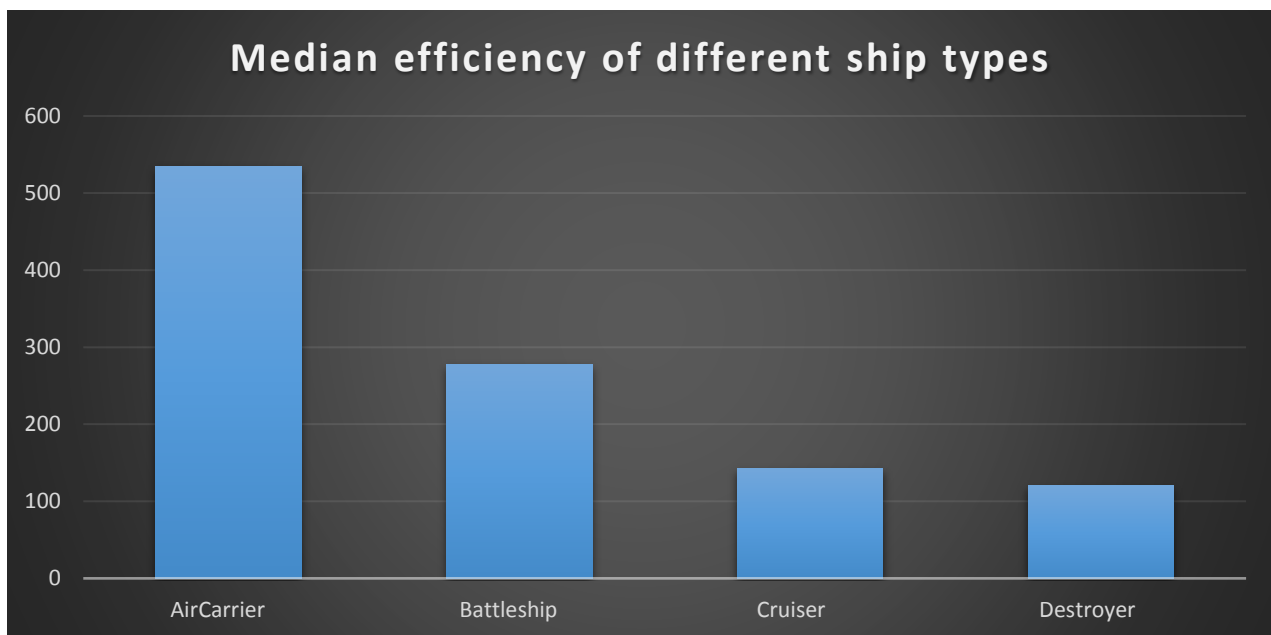
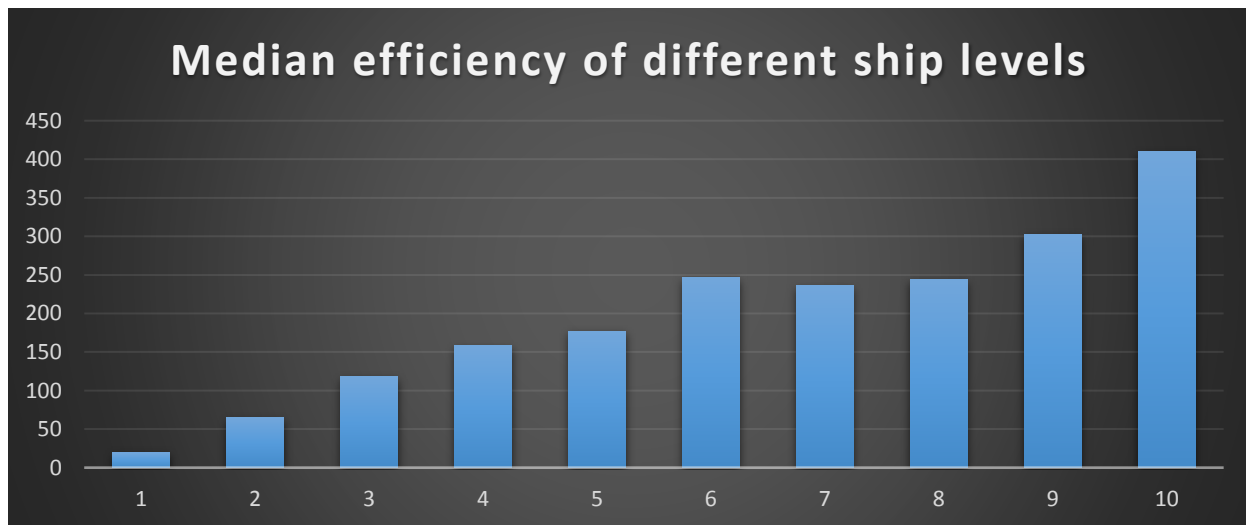
Ships with type "AirCarrier" have highest efficiency
Ships with type "Destroyer" have lowest efficiency
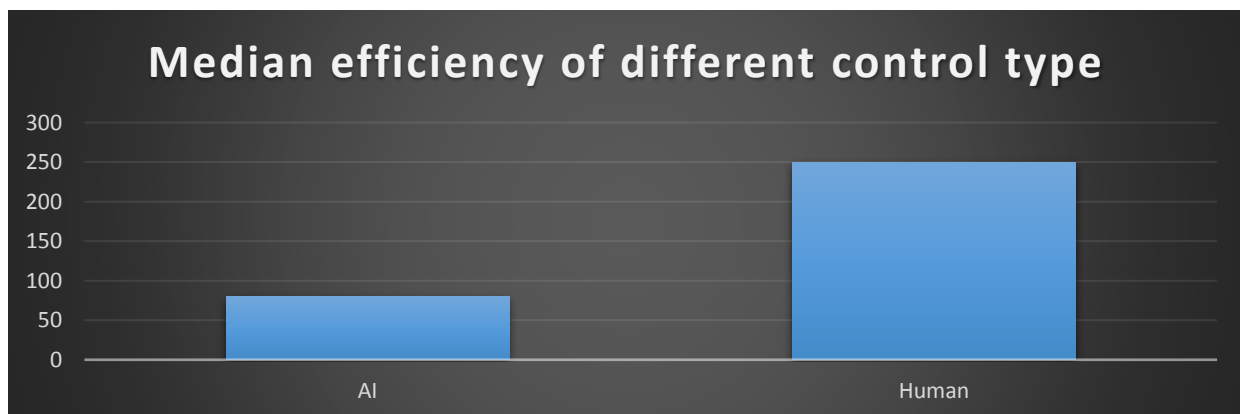
3. Ships of what countries are more efficient?

Italy's ships have highest efficiency.
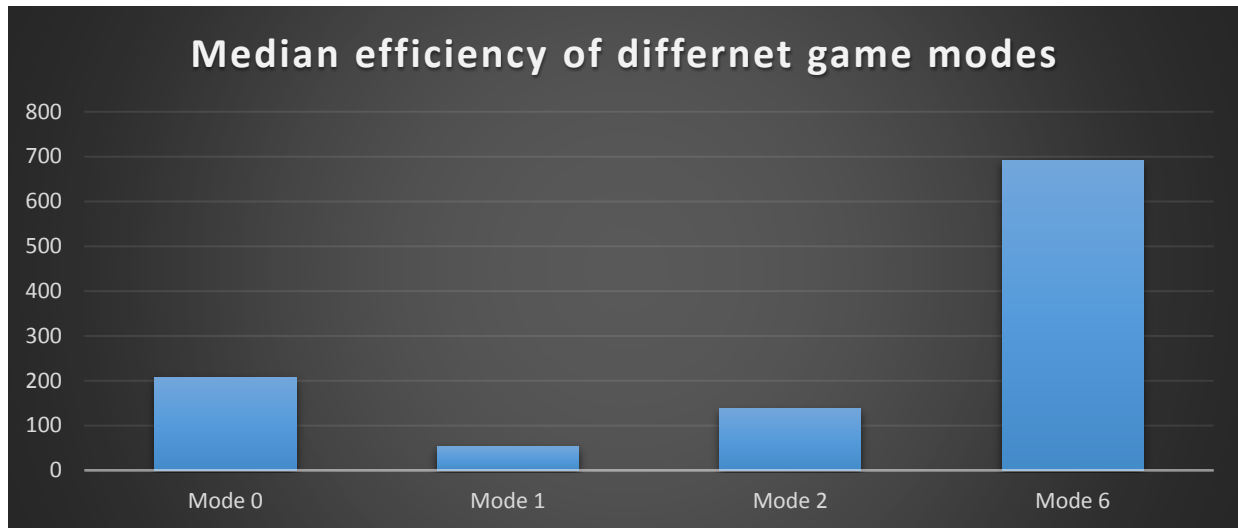
4. How efficiency depends on ship level?

The higher the level of the ship is, the higher it's efficiency

5. Ships of real users or bots are more efficent ?

6. How does efficiency depend on game mode?

As we can see not so poplular mode "6" has the most fierce battles with highest efficiency.

Insights

Insight 1:

Efficiency of 6-th level ships is greater than ships with level 7 and 8.
It means players have some advantage choosing ships of 6-th level instead of levels 7 and 8.
It's good to know why this happens.

Insight 2 :

There are 2 players with highest efficiency who didn't deal damage to enemies or almost didn't but they killed a lot of planes. How is it possible to destroy plains not dealing damage to them?

Insight 3 :

Efficency of ships controlled by humans is much higher then efficiency of ships controlled by AI.
Changing bots' algorithms to increase their efficiency may be a good idea because beating stronger bots should give more interest to players.

It would be good to analize next things:

1. There is no relations between "catalog_items" and other tables. It's interesting to know when this items could be used in the game and how battle efficiency depends on them.
2. How efficency depends on battle's duration?
3. It would be good to write this report in Jupiter Nootbook to include python code.