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**Факультет «Информатика и системы управления»
Кафедра ИУ5 «Системы обработки информации и управления»**

Отчет по лабораторной работе №1
по дисциплине «Методы машинного обучения»
по теме «Создание “истории о данных”»

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Задание.

Создать "историю о данных" в виде юпитер-ноутбука, с учетом следующих требований:

1. История должна содержать не менее 5 шагов (где 5 - рекомендуемое количество шагов). Каждый шаг содержит график и его текстовую интерпретацию.
2. На каждом шаге наряду с удачным итоговым графиком рекомендуется в юпитер-ноутбуке оставлять результаты предварительных "неудачных" графиков.
3. Не рекомендуется повторять виды графиков, желательно создать 5 графиков различных видов.
4. Выбор графиков должен быть обоснован использованием методологии data-to-viz. Рекомендуется учитывать типичные ошибки построения выбранного вида графика по методологии data-to-viz. Если методология Вами отвергается, то просьба обосновать Ваше решение по выбору графика.
5. История должна содержать итоговые выводы. В реальных "историях о данных" именно эти выводы представляют собой основную ценность для предприятия.

Лабораторная работа №1. Создание "истории о данных".

Загрузка необходимых библиотек.

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
sns.set(style="ticks")
```

Описание набора данных. Загрузка данных.

Context Dataset of Starcraft 2 games, played in different leagues/levels.

Content Screen movements aggregated into screen-fixations. -- Time is recorded in terms of timestamps in the StarCraft 2 replay file. When the game is played on 'faster', 1 real-time second is equivalent to roughly 88.5 timestamps.

Attribute Information:

GameID: Unique ID number for each game (integer)

LeagueIndex: Bronze, Silver, Gold, Platinum, Diamond, Master, GrandMaster, and Professional leagues coded 1-8 (Ordinal)

Age: Age of each player (integer)

HoursPerWeek: Reported hours spent playing per week (integer)

TotalHours: Reported total hours spent playing (integer)

APM: Action per minute (continuous)

SelectByHotkeys: Number of unit or building selections made using hotkeys per timestamp (continuous)

AssignToHotkeys: Number of units or buildings assigned to hotkeys per timestamp (continuous)

UniqueHotkeys: Number of unique hotkeys used per timestamp (continuous)

MinimapAttacks: Number of attack actions on minimap per timestamp (continuous)

MinimapRightClicks: number of right-clicks on minimap per timestamp (continuous)

NumberOfPACs: Number of PACs per timestamp (continuous)

GapBetweenPACs: Mean duration in milliseconds between PACs (continuous)

ActionLatency: Mean latency from the onset of a PACs to their first action in milliseconds (continuous)

ActionsInPAC: Mean number of actions within each PAC (continuous)

TotalMapExplored: The number of 24x24 game coordinate grids viewed by the player per timestamp (continuous)

WorkersMade: Number of SCVs, drones, and probes trained per timestamp (continuous)

UniqueUnitsMade: Unique units made per timestamp (continuous)

ComplexUnitsMade: Number of ghosts, infestors, and high templars trained per timestamp (continuous)

ComplexAbilitiesUsed: Abilities requiring specific targeting instructions used per timestamp (continuous)

```
data = pd.read_csv('starcraft_player_data.csv', sep=",") # Первые 5 строк
damacema
data = data.drop(['GameID'], axis=1)
data.head()
```

```
LeagueIndex Age HoursPerWeek TotalHours APM SelectByHotkeys \
0 5 27 10 3000 143.7180 0.003515 1 5 23 10 5000 129.2322 0.003304 2 4 30 10 200
69.9612 0.001101 3 3 19 20 400 107.6016 0.001034 4 3 32 10 500 122.8908 0.001136
```

```
AssignToHotkeys UniqueHotkeys MinimapAttacks MinimapRightClicks \
0 0.000220 7 0.000110 0.000392 1 0.000259 4 0.000294 0.000432 2 0.000336 4 0.000294
0.000461 3 0.000213 1 0.000053 0.000543 4 0.000327 2 0.000000 0.001329
```

```
NumberOfPACs GapBetweenPACs ActionLatency ActionsInPAC \ 0 0.004849
```

```
32.6677 40.8673 4.7508 1 0.004307 32.9194 42.3454 4.8434 2 0.002926 44.6475
75.3548 4.0430
3 0.003783 29.2203 53.7352 4.9155 4 0.002368 22.6885 62.0813 9.3740
```

```
TotalMapExplored WorkersMade UniqueUnitsMade ComplexUnitsMade \ 0 28 0.001397 6 0.0
1 22 0.001194 5 0.0 2 22 0.000745 6 0.0 3 19 0.000426 7 0.0 4 15 0.001174 4 0.0
```

```
ComplexAbilitiesUsed
```

```
0 0.000000
1 0.000208
2 0.000189
3 0.000384
4 0.000019
```

```
data.dtypes
```

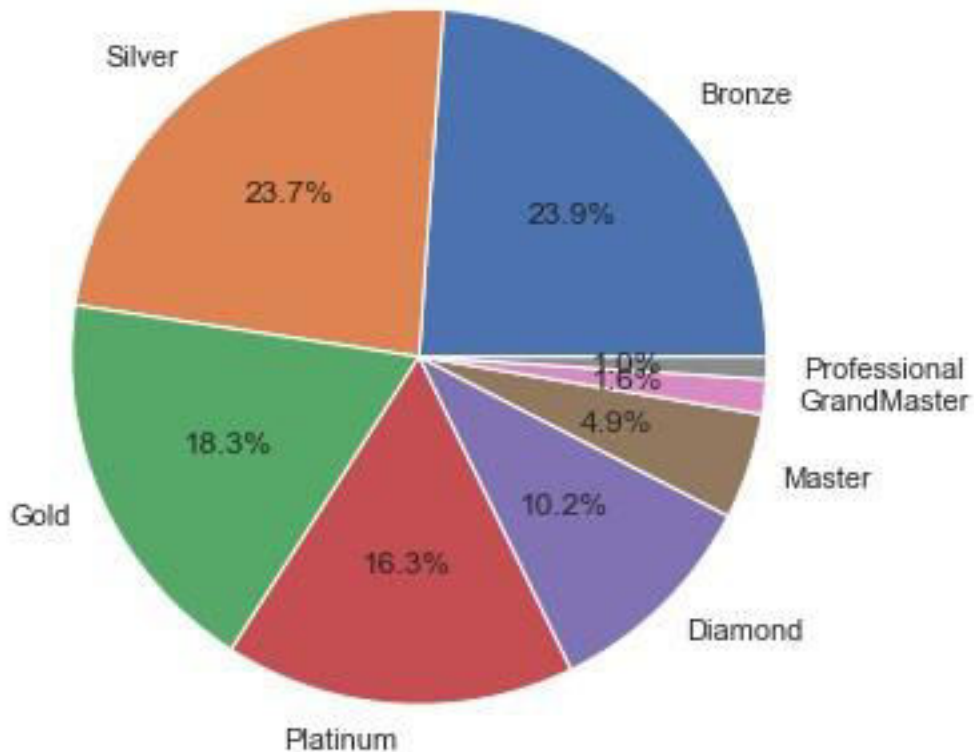
```
LeagueIndex int64
Age object
HoursPerWeek object
TotalHours object
APM float64
SelectByHotkeys float64
AssignToHotkeys float64
UniqueHotkeys int64
MinimapAttacks float64
MinimapRightClicks float64
NumberOfPACs float64
GapBetweenPACs float64
ActionLatency float64
ActionsInPAC float64
TotalMapExplored int64
WorkersMade float64
UniqueUnitsMade int64
ComplexUnitsMade float64
ComplexAbilitiesUsed float64
dtype: object
```

```
plt.figure(figsize=(6,6))
```

```
plt.pie(data['LeagueIndex'].value_counts(),labels=['Bronze', 'Silver', 'Gold', 'Platinum',
'Diamond', 'Master', 'GrandMaster', 'Professional'], autopct='%1.1f%%')
```

```
([<matplotlib.patches.Wedge at 0x1c464144580>,
<matplotlib.patches.Wedge at 0x1c464144c70>,
<matplotlib.patches.Wedge at 0x1c4643a8340>,
<matplotlib.patches.Wedge at 0x1c4643a89d0>,
<matplotlib.patches.Wedge at 0x1c4643b50a0>,
<matplotlib.patches.Wedge at 0x1c4643b5730>,
<matplotlib.patches.Wedge at 0x1c4643b5dc0>,
<matplotlib.patches.Wedge at 0x1c4643c2490>],
[Text(0.8045083504569398, 0.7501775216874028, 'Bronze'), Text(-
0.6882236115228018, 0.8581073712202407, 'Silver'), Text(-1.0018407647429992, -
0.45421920049593084, 'Gold'), Text(-0.06459903035833876, -1.0981015277636046,
'Platinum'), Text(0.7689506830637547, -0.7865842911066717, 'Diamond'),
Text(1.0437779190648944, -0.3471709314913321, 'Master'),
Text(1.0926494802731535, -0.12695319318082604, 'GrandMaster'),
```

```
Text(1.0994231286952005, -0.03561999564930912, 'Professional']],
[Text(0.4388227366128762, 0.40918773910221967, '23.9%'), Text(-
0.37539469719425544, 0.4680585661201312, '23.7%'), Text(-0.5464585989507268, -
0.24775592754323497, '18.3%'), Text(-0.03523583474091205, -0.5989644696892388,
'16.3%'), Text(0.4194276453075025, -0.4290459769672754, '10.2%'),
Text(0.5693334103990332, -0.18936596263163566, '4.9%'),
Text(0.5959906256035381, -0.06924719628045056, '1.6%'),
Text(0.5996853429246547, -0.019429088535986794, '1.0%'))]
```



```
mean = 0
count = 0
for i in range(len(data['HoursPerWeek'])):
    if (data['HoursPerWeek'][i] != '?'):
        mean += int(data['HoursPerWeek'][i])
        count += 1
mean = mean / count
print(mean)
for i in range(len(data['HoursPerWeek'])):
    try:
        data['HoursPerWeek'][i] = int(data['HoursPerWeek'][i])
    except:
        data['HoursPerWeek'][i] = mean
#print(data['HoursPerWeek'])
sns.distplot(data['HoursPerWeek'])
```

15.910751722072478

<ipython-input-5-8b6b9db67a72>:11: SettingWithCopyWarning: A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:

https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
data['HoursPerWeek'][i]= int(data['HoursPerWeek'][i]) <ipython-input-5-8b6b9db67a72>:12: SettingWithCopyWarning: A value is trying to be set on a copy of a slice from a DataFrame
```

See the caveats in the documentation:

https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

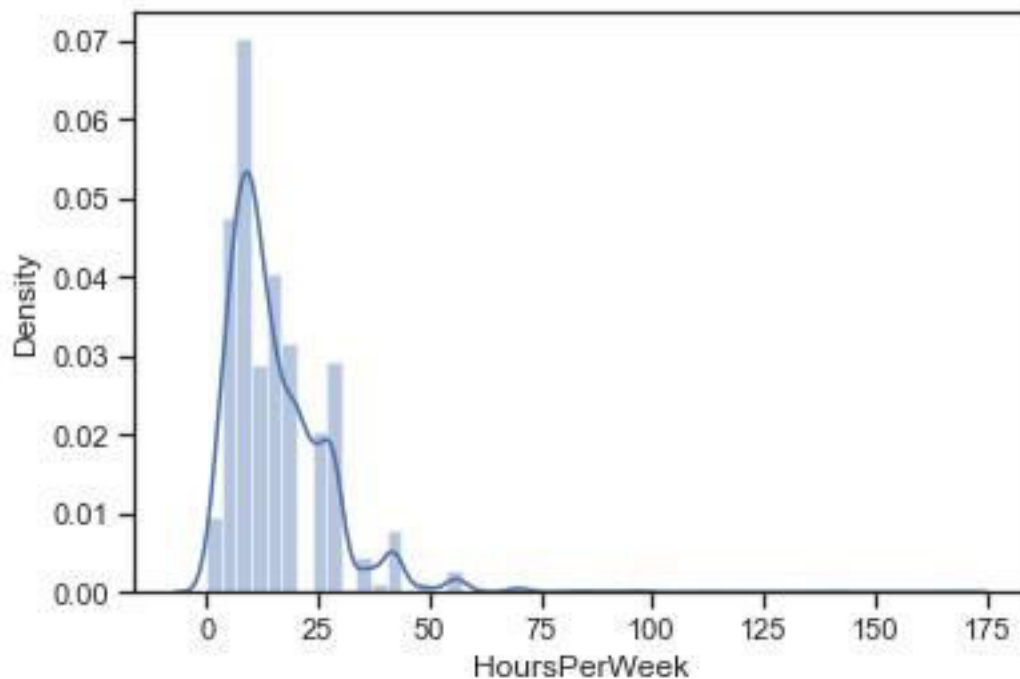
```
except: data['HoursPerWeek'][i]=mean
```

C:\Users\User\anaconda3\lib\site-packages\seaborn\

distributions.py:2551: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).

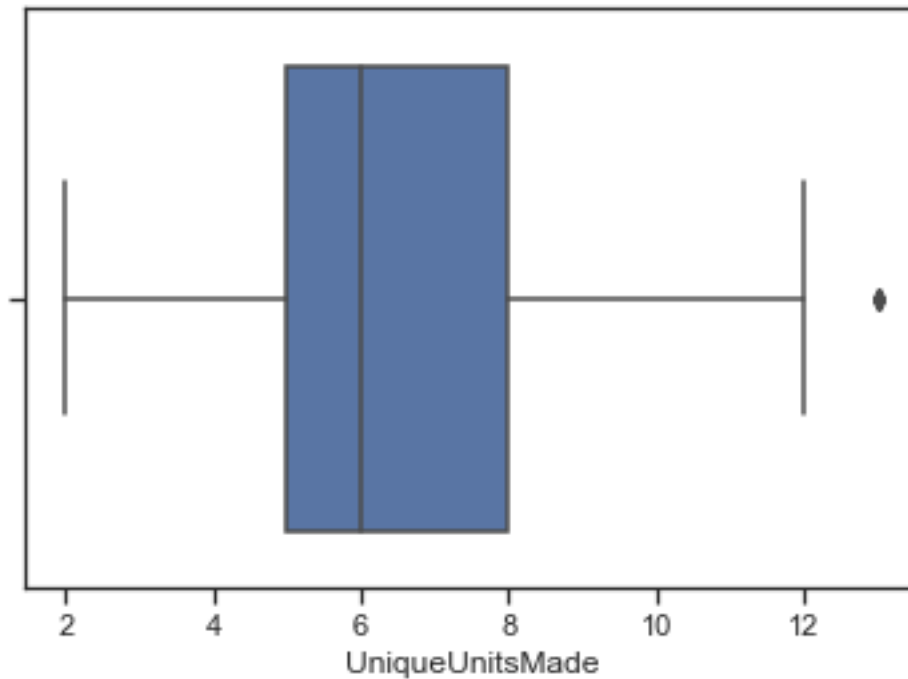
warnings.warn(msg, FutureWarning)

<AxesSubplot:xlabel='HoursPerWeek', ylabel='Density'>



```
sns.boxplot(x=data['UniqueUnitsMade'])
```

<AxesSubplot:xlabel='UniqueUnitsMade'>



```
labels=['Bronze', 'Silver', 'Gold', 'Platinum', 'Diamond', 'Master', 'GrandMaster', 'Professional']
for i in range(len(data['LeagueIndex'])):
    data['LeagueIndex'][i]=labels[data['LeagueIndex'][i]-1]
sns.kdeplot(data=data, x="APM", hue="LeagueIndex",
hue_order=labels,cut=0, fill=True, common_norm=False, alpha=0.4)
```

<ipython-input-7-743ad4758516>:3: SettingWithCopyWarning: A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:

https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

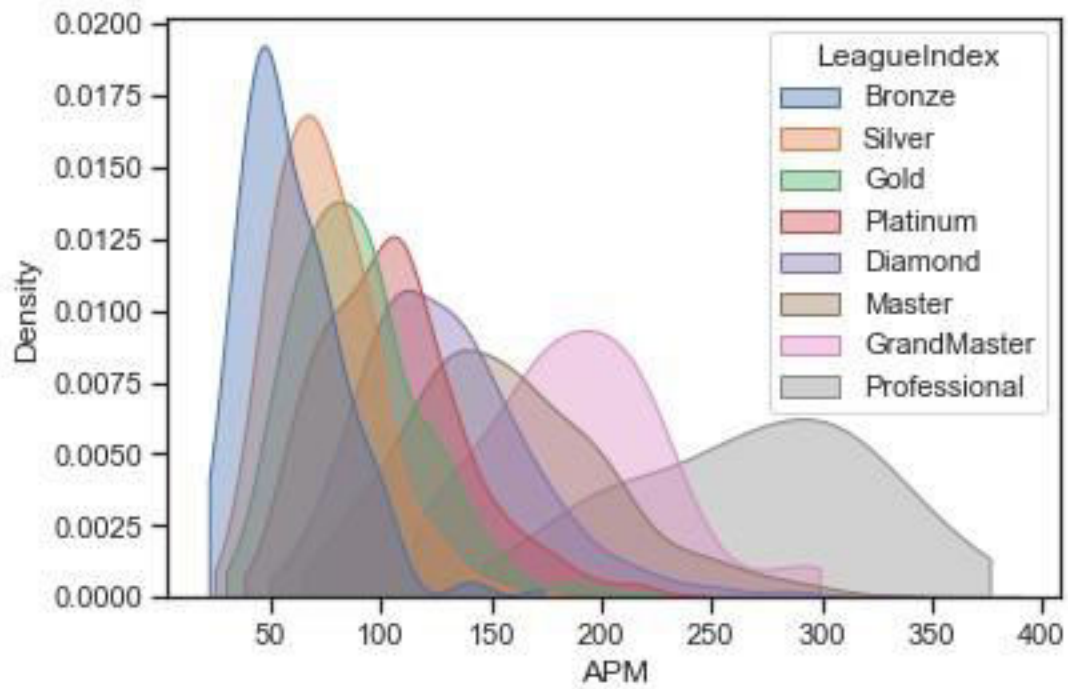
data['LeagueIndex'][i]=labels[data['LeagueIndex'][i]-1] C:\Users\User\anaconda3\lib\site-packages\pandas\core\indexing.py:670: SettingWithCopyWarning: A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:

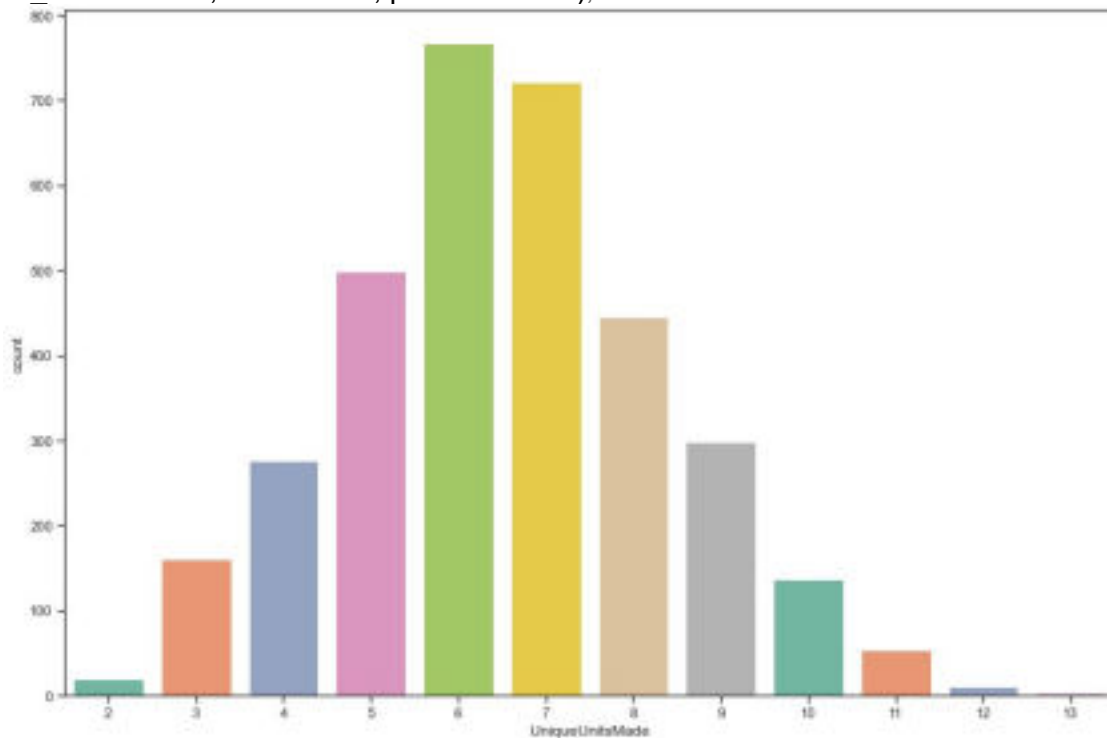
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

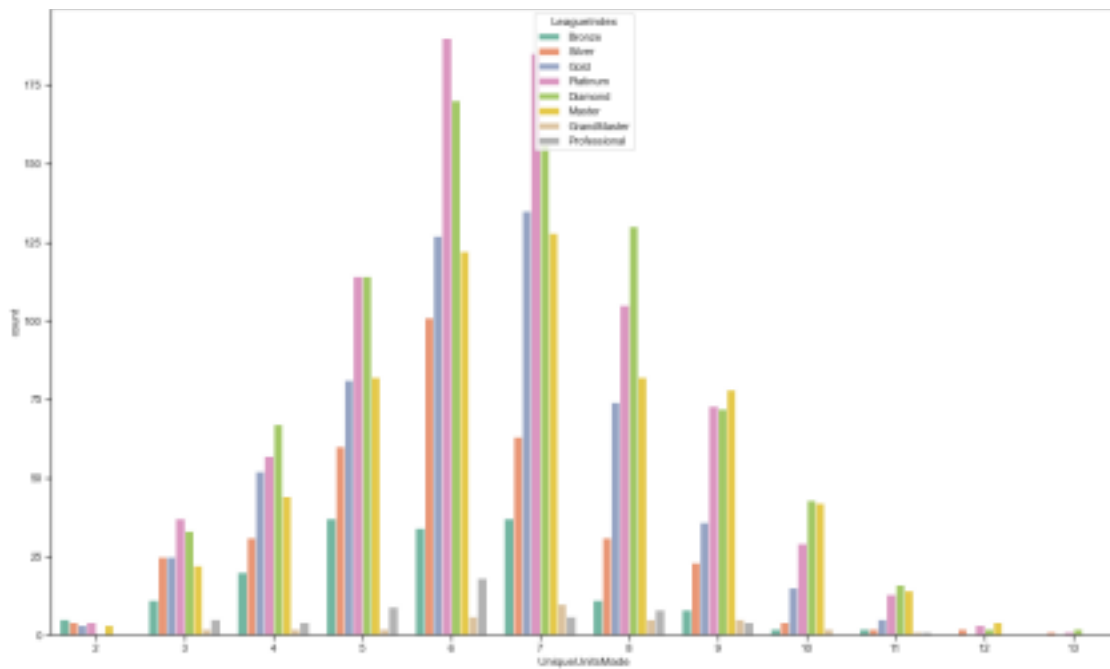
iloc._setitem_with_indexer(indexer, value)

<AxesSubplot:xlabel='APM', ylabel='Density'>

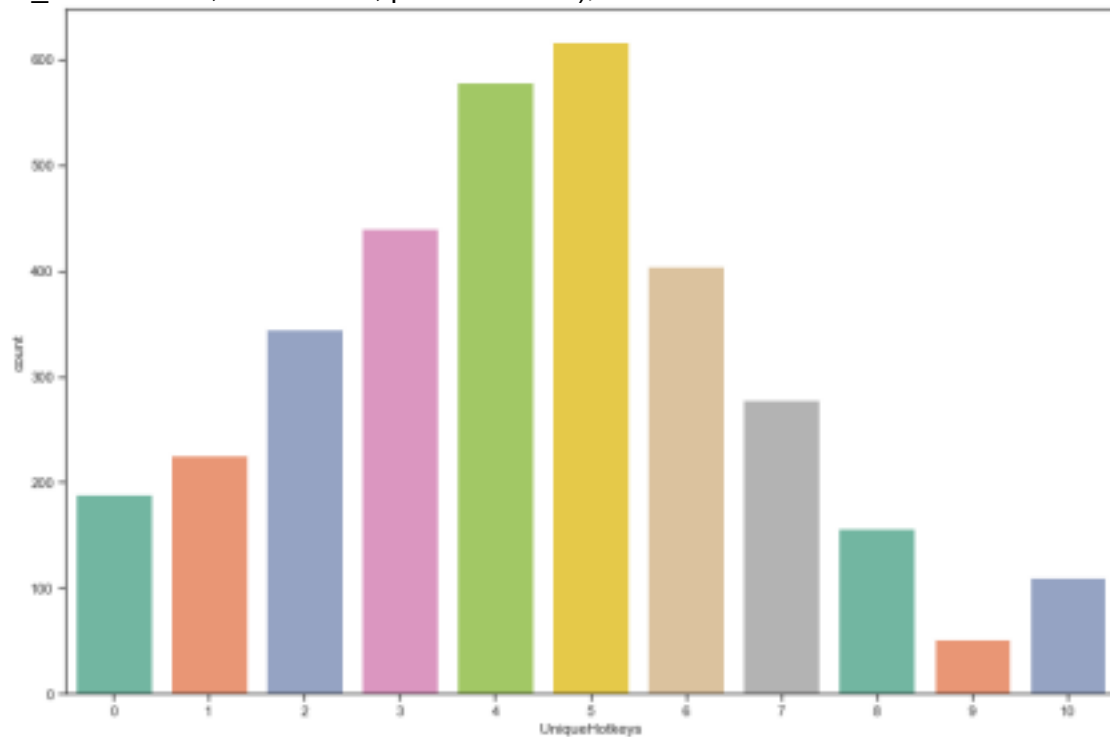


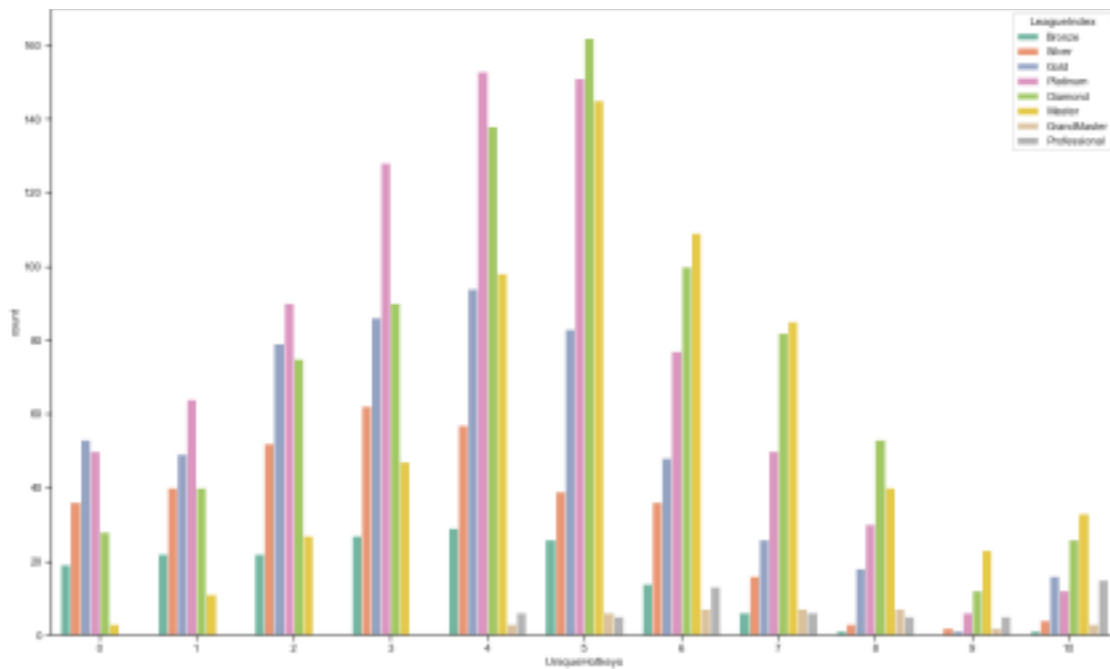
```
fig, axes = plt.subplots(figsize = (15, 10))
sns.countplot(x = 'UniqueUnitsMade', data = data, palette="Set2"); fig, axes =
plt.subplots(figsize = (20, 12))
sns.countplot(x = 'UniqueUnitsMade', hue="LeagueIndex",
hue_order=labels, data = data, palette="Set2");
```





```
fig, axes = plt.subplots(figsize = (15, 10))
sns.countplot(x = 'UniqueHotKeys', data = data, palette="Set2"); fig, axes =
plt.subplots(figsize = (20, 12))
sns.countplot(x = 'UniqueHotKeys', hue="LeagueIndex",
hue_order=labels, data = data, palette="Set2");
```





```

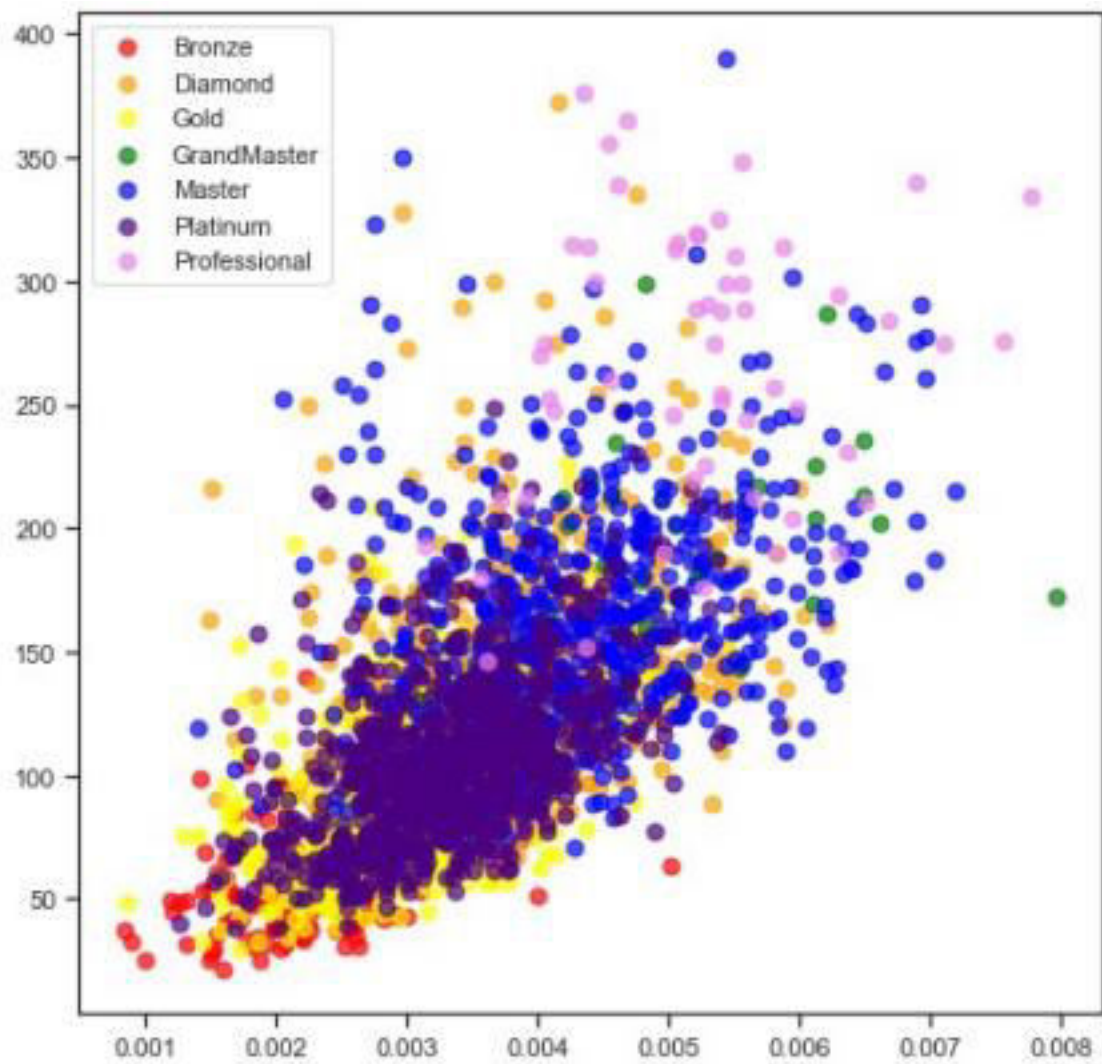
import numpy as np
import matplotlib.pyplot as plt
FLIPPER_LENGTH = data["NumberOfPACs"].values
BILL_LENGTH = data["APM"].values

SPECIES = data["LeagueIndex"].values
SPECIES_ = np.unique(SPECIES)
COLORS = ["#ff0000", "#ffa500", "#ffff00", "#008000", "#0000ff", "#4b0082", "#ee82ee"]
]

fig, ax = plt.subplots(figsize=(8,8))
for species, color in zip(SPECIES_, COLORS):
    idxs = np.where(SPECIES == species)
    # No legend will be generated if we don't pass label=species
    ax.scatter(
        FLIPPER_LENGTH[idxs], BILL_LENGTH[idxs], label=species, s=50, color=color,
        alpha=0.7
    )

ax.legend();

```



```
corr_matrix = data.corr()  
sns.heatmap(data.corr(), annot=True)  
sns.set(rc = {'figure.figsize':(30,30)})
```

