

# pupil\_survey

19 июня 2017 г.

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In [3]: import pandas as pd
import numpy as np
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In [4]: from pandas import Series
def customDescribe(x):
    data = [x.mean(), x.std(), x.min(), x.quantile(0.25), x.median(),
            x.quantile(0.75), x.max(), x.skew(), x.kurtosis(), x.mode().max(),
            x.isnull().sum()]
    names = ['mean', 'std', 'min', '25%', '50%', '75%', 'max',
            'skewness', 'kurtosis', 'mode', 'NAs']
    return Series(data, index=names)

names = pd.read_csv('columns.csv')
df = pd.read_csv('responses.csv')
music = df.iloc[:,2:18]
music.apply(customDescribe)
```

```
Out [4]:
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	Dance	Folk	Country	Classical music	Musical	Pop \
mean	3.113320	2.288557	2.123383	2.956132	2.761905	3.471698
std	1.170568	1.138916	1.076136	1.252570	1.260845	1.161400
min	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
25%	2.000000	1.000000	1.000000	2.000000	2.000000	3.000000
50%	3.000000	2.000000	2.000000	3.000000	3.000000	4.000000
75%	4.000000	3.000000	3.000000	4.000000	4.000000	4.000000
max	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
skewness	-0.045760	0.694783	0.795798	0.107357	0.219951	-0.383317
kurtosis	-0.803331	-0.216416	-0.037576	-0.969287	-0.928080	-0.704309
mode	3.000000	2.000000	2.000000	3.000000	3.000000	4.000000
NAs	4.000000	5.000000	5.000000	7.000000	2.000000	3.000000

  

	Rock	Metal or	Hardrock	Punk	Hiphop, Rap	Reggae, Ska \
mean	3.761952		2.361470	2.456088	2.910537	2.769691
std	1.184861		1.372995	1.301105	1.375677	1.214434
min	1.000000		1.000000	1.000000	1.000000	1.000000
25%	3.000000		1.000000	1.000000	2.000000	2.000000
50%	4.000000		2.000000	2.000000	3.000000	3.000000
75%	5.000000		3.000000	3.000000	4.000000	4.000000
max	5.000000		5.000000	5.000000	5.000000	5.000000

skewness	-0.702586	0.604915	0.441427	0.037217	0.156497
kurtosis	-0.419187	-0.934732	-0.959379	-1.250059	-0.900509
mode	5.000000	1.000000	1.000000	4.000000	3.000000
NAs	6.000000	3.000000	8.000000	4.000000	7.000000

	Swing, Jazz	Rock n roll	Alternative	Latino	Techno, Trance
mean	2.759960	3.141575	2.828514	2.842315	2.338983
std	1.257936	1.237269	1.347173	1.327902	1.324099
min	1.000000	1.000000	1.000000	1.000000	1.000000
25%	2.000000	2.000000	2.000000	2.000000	1.000000
50%	3.000000	3.000000	3.000000	3.000000	2.000000
75%	4.000000	4.000000	4.000000	4.000000	3.000000
max	5.000000	5.000000	5.000000	5.000000	5.000000
skewness	0.146457	-0.108936	0.162211	0.188489	0.569644
kurtosis	-0.997739	-0.917436	-1.129404	-1.099347	-0.906037
mode	3.000000	3.000000	3.000000	2.000000	1.000000
NAs	6.000000	7.000000	7.000000	8.000000	7.000000

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In [5]: music = music.dropna()
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In [9]: import seaborn as sns
import matplotlib.pyplot as plt
plt_dict = {}

for i in range(0, len(music.columns)):
    plt_dict.update({i: music.columns[i]})

fig, ax = plt.subplots(4, 4, figsize=(15, 15), sharey=True, sharex=True)
x = [1, 2, 3, 4, 5]
initial = 0

for i in range(4):
    for j in range(4):
        y = music[plt_dict[initial]].value_counts().to_dict()
        ax[i, j].bar(y.keys(), y.values())
        ax[i, j].set_ylabel('')
        ax[i, j].set_xlabel('')
        ax[i, j].set_xticklabels(labels=np.arange(0, 6), fontsize=10)
        ax[i, j].set_yticklabels(labels=np.arange(0, 601, 100), fontsize=10)
        ax[i, j].set_title(plt_dict[initial], fontsize=10)
        ax[i, j].set_xlim(.5, 6)
        ax[i, j].set_ylim(0, 600)
        initial += 1

plt.show()
```



```
In [14]: from scipy.stats.mstats import normaltest
import scipy
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normaltest(music).pvalue
```

```
Out[14]: array([ 1.73933578e-018,  9.70589103e-015,  9.08852599e-018,
                  3.03938325e-039,  1.85007144e-036,  1.81645640e-017,
                  1.15204030e-016,  6.09948269e-042,  3.13553153e-039,
                  2.84113677e-210,  7.36973614e-024,  2.01589772e-045,
                  2.74815258e-029,  1.90506599e-087,  1.42014654e-076,
                  2.82482142e-037])
```

```
In [ ]: import seaborn as sns
import matplotlib.pyplot as plt
```

```
corr = music.corr() #попарная корреляция Пирсона
sns.heatmap(corr,
             xticklabels=corr.columns.values,
             yticklabels=corr.columns.values,
             vmax=.8, square=True)
plt.show()
```

```
In [ ]: import numpy as np
import matplotlib
import matplotlib.pyplot as plt
from sklearn.model_selection import cross_val_score
from sklearn.decomposition import FactorAnalysis

n_features = len(music.columns)
n_components = np.arange(0, 4)
fa_scores = []
fa = FactorAnalysis()
fa.fit(music)
for n in n_components:
    fa.n_components = n
    fa_scores.append(np.mean(cross_val_score(fa, music)))
n_components_fa = n_components[np.argmax(fa_scores)]
print('Количество факторов: ', n_components_fa)

In [ ]: factor = FactorAnalysis(n_components=3)
factor.fit(music)
print ((pd.DataFrame(factor.components_, columns=music.columns)).transpose())
```