# Рубежный контроль №2

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### Тема: Методы построения моделей машинного обучения.

### Вариант №7

Датасет: https://www.kaggle.com/mohansacharya/graduate-admissions (файл **Admission_Predict_Ver1.1.csv**)

In [5]:

```
import numpy as np
import pandas as pd
from sklearn.datasets import *
from sklearn.model_selection import train_test_split
import seaborn as sns
import matplotlib.pyplot as plt

from operator import itemgetter
import matplotlib.ticker as ticker
import math

from sklearn.metrics import accuracy_score, balanced_accuracy_score
from sklearn.metrics import plot_confusion_matrix
from sklearn.metrics import precision_score, recall_score, f1_score, classification_repor
t
from sklearn.metrics import confusion_matrix
from sklearn.metrics import mean_absolute_error, mean_squared_error, mean_squared_log_err
or, median_absolute_error, r2_score
from sklearn.metrics import roc_curve, roc_auc_score


from sklearn.neighbors import KNeighborsRegressor, KNeighborsClassifier
from sklearn.ensemble import GradientBoostingClassifier, GradientBoostingRegressor
from sklearn.model_selection import cross_val_score, cross_validate
from sklearn.model_selection import KFold, RepeatedKFold, LeaveOneOut, LeavePOut, Shuffle
Split, StratifiedKFold



from sklearn.preprocessing import MinMaxScaler, StandardScaler, Normalizer

from sklearn.model_selection import GridSearchCV, RandomizedSearchCV
from sklearn.model_selection import learning_curve, validation_curve

from sklearn.metrics import confusion_matrix
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import SGDRegressor
from sklearn.linear_model import SGDClassifier
from typing import Dict, Tuple
from scipy import stats
from sklearn.svm import SVC, NuSVC, LinearSVC, OneClassSVM, SVR, NuSVR, LinearSVR
from sklearn.tree import DecisionTreeClassifier, DecisionTreeRegressor, export_graphviz

%matplotlib inline
sns.set(style="ticks")
```

## Выборка датасета и ее разделение на тестовую и обучающую

In [6]:

```
data=pd.read_csv("sample_data/Admission_Predict_Ver1.1.csv")
```

In [18]:

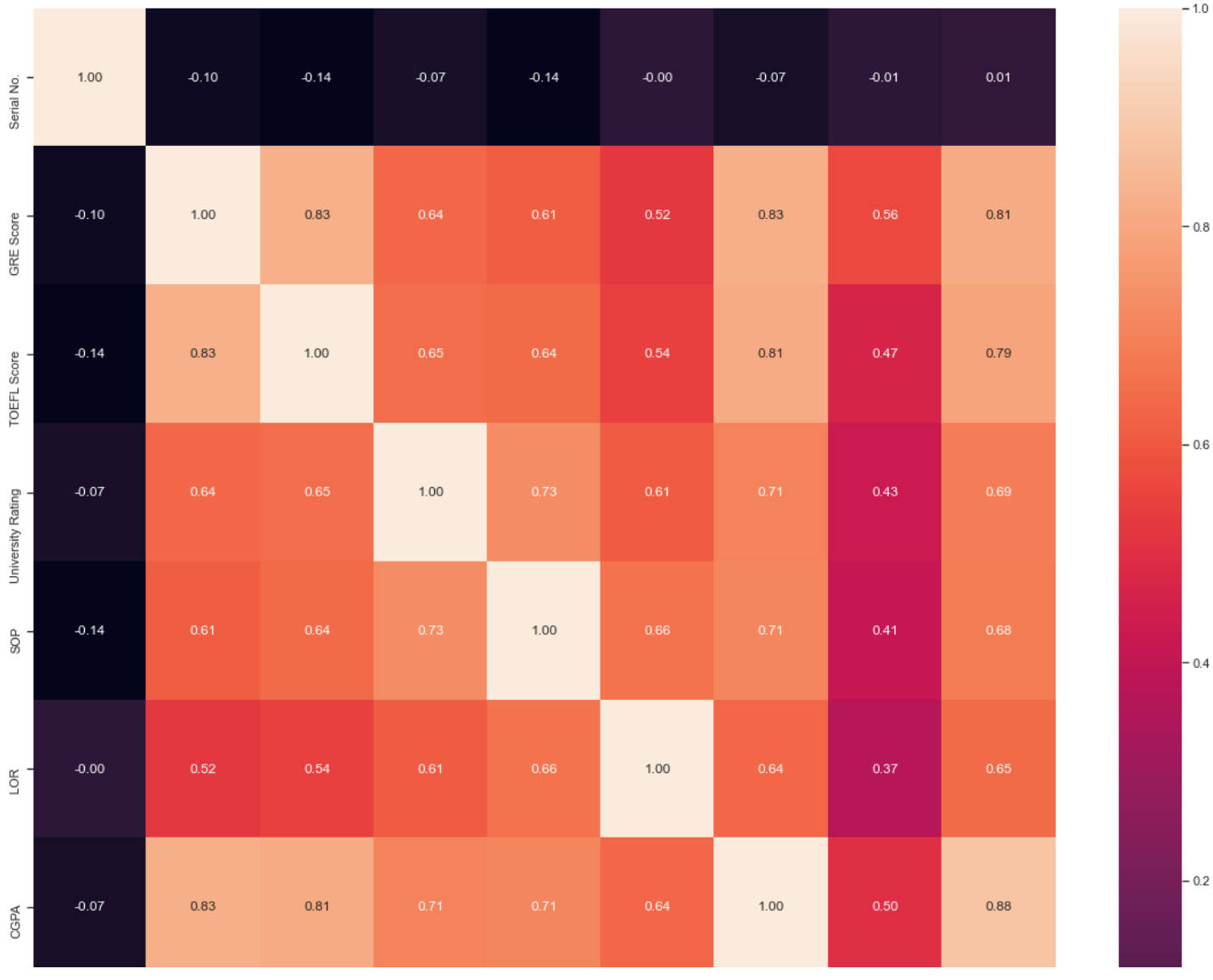
```
data.head(10)
```

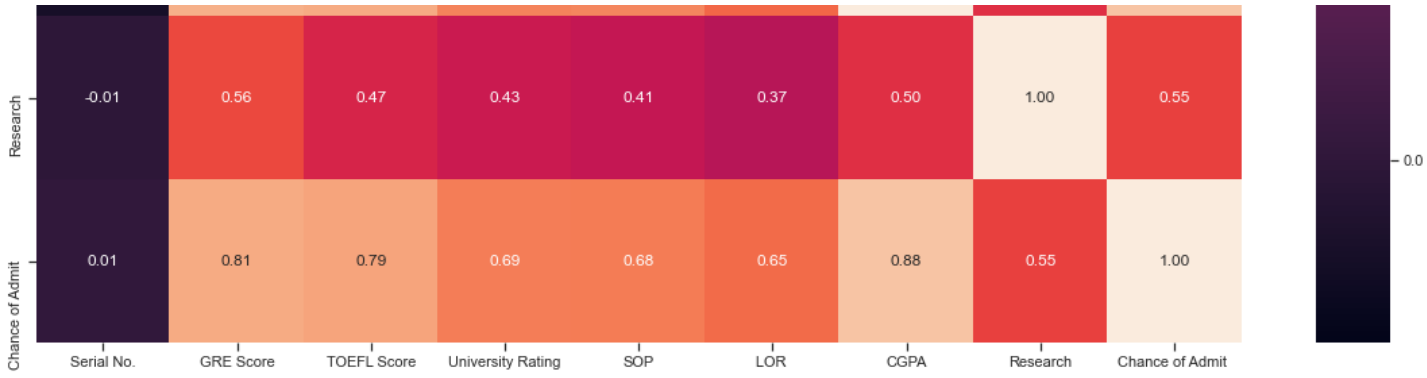
Out[18]:

| | Serial No. | GRE Score | TOEFL Score | University Rating | SOP | LOR | CGPA | Research | Chance of Admit |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 337 | 118 | 4 | 4.5 | 4.5 | 9.65 | 1 | 0.92 |
| **1** | 2 | 324 | 107 | 4 | 4.0 | 4.5 | 8.87 | 1 | 0.76 |
| **2** | 3 | 316 | 104 | 3 | 3.0 | 3.5 | 8.00 | 1 | 0.72 |
| **3** | 4 | 322 | 110 | 3 | 3.5 | 2.5 | 8.67 | 1 | 0.80 |
| **4** | 5 | 314 | 103 | 2 | 2.0 | 3.0 | 8.21 | 0 | 0.65 |
| **5** | 6 | 330 | 115 | 5 | 4.5 | 3.0 | 9.34 | 1 | 0.90 |
| **6** | 7 | 321 | 109 | 3 | 3.0 | 4.0 | 8.20 | 1 | 0.75 |
| **7** | 8 | 308 | 101 | 2 | 3.0 | 4.0 | 7.90 | 0 | 0.68 |
| **8** | 9 | 302 | 102 | 1 | 2.0 | 1.5 | 8.00 | 0 | 0.50 |
| **9** | 10 | 323 | 108 | 3 | 3.5 | 3.0 | 8.60 | 0 | 0.45 |

In [19]:

```
plt.figure(figsize=(20,20))
g = sns.heatmap(data.corr(), annot=True, fmt='.2f')
```






In [10]:

```
data_X = data.drop(columns='Chance of Admit ')
data_Y = data['Chance of Admit ']
data_X_train, data_X_test, data_Y_train, data_Y_test = train_test_split \
(data_X, data_Y, test_size = 0.3, random_state = 1)
```

# Обучение и тестирование моделей

## Обучение и тестирование машины опорных векторов

In [20]:

```
model_svr = LinearSVR(C=1.0, max_iter=10000)
model_svr.fit(data_X_train, data_Y_train)
```

```
C:\Users\User\anaconda3\lib\site-packages\sklearn\svm\_base.py:976: ConvergenceWarning: L
iblinear failed to converge, increase the number of iterations.
  warnings.warn("Liblinear failed to converge, increase "
```

Out[20]:

```
LinearSVR(max_iter=10000)
```

In [21]:

```
Chance_of_Admit1 = model_svr.predict(data_X_test)
mean_squared_error(data_Y_test, Chance_of_Admit1), mean_absolute_error(data_Y_test, Chanc
e_of_Admit1)
```

Out[21]:

```
(0.00765204553096764, 0.0701535886054262)
```

## Обучение и тестирование градиентного бустинга

In [17]:

```
# Важность признаков
gr_boost = GradientBoostingRegressor(random_state=1)
gr_boost.fit(data_X_train, data_Y_train)
Chance_of_Admit2 = gr_boost.predict(data_X_test)
mean_squared_error(data_Y_test, Chance_of_Admit2), mean_absolute_error(data_Y_test, Chanc
e_of_Admit2)
```

Out[17]:

```
(0.0028758822798431536, 0.036214972892178315)
```

# Выводы

В РК были использованы метрики **MAE, MSE MAE** и **MSE** помогают определить точность регрессии **-** среднее

отклонение и дисперсию.

Метод градиентного бустинга показал себя гораздо лучше в сравнении с методом опорных векторов. Высокая эффективность градиентного бустинга в данном примере обуславливается тем, что выбранный датасет содержит много сложных зависимостей.