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



## **Отчёт**

### **“Методы машинного обучения”**

#### **Лабораторная работа № 1**

#### **“Разведочный анализ данных. Исследование и визуализация данных”**

ИСПОЛНИТЕЛЬ:

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ПРЕПОДАВАТЕЛЬ:

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```
In [1]: import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
sns.set(style="ticks")
```

```
In [2]: data = pd.read_csv('auto.csv', sep=",")
```

```
In [3]: data.head()
```

Out[3]:

	symboling	normalized-losses	make	aspiration	num-of-doors	body-style	drive-wheels	engine-location	wheel-base	length	...
0	3	122	alfa-romero	std	two	convertible	rwd	front	88.6	0.811148	...
1	3	122	alfa-romero	std	two	convertible	rwd	front	88.6	0.811148	...
2	1	122	alfa-romero	std	two	hatchback	rwd	front	94.5	0.822681	...
3	2	164	audi	std	four	sedan	fwd	front	99.8	0.848630	...
4	2	164	audi	std	four	sedan	4wd	front	99.4	0.848630	...

5 rows × 29 columns



```
In [4]: data.shape
```

Out[4]: (201, 29)

```
In [5]: total_count = data.shape[0]
print('Всего строк: {}'.format(total_count))
```

Всего строк: 201

```
In [6]: data.columns
```

Out[6]: Index(['symboling', 'normalized-losses', 'make', 'aspiration', 'num-of-doors', 'body-style', 'drive-wheels', 'engine-location', 'wheel-base', 'length', 'width', 'height', 'curb-weight', 'engine-type', 'num-of-cylinders', 'engine-size', 'fuel-system', 'bore', 'stroke', 'compression-ratio', 'horsepower', 'peak-rpm', 'city-mpg', 'highway-mpg', 'price', 'city-L/100km', 'horsepower-binned', 'diesel', 'gas'], dtype='object')

In [7]: data.dtypes

Out[7]:

symboling

int64

normalized-losses

int64

make

object

aspiration

object

num-of-doors

object

body-style

object

drive-wheels

object

engine-location

object

wheel-base

float64

length

float64

width

float64

height

float64

curb-weight

int64

engine-type

object

num-of-cylinders

object

engine-size

int64

fuel-system

object

bore

float64

stroke

float64

compression-ratio

float64

horsepower

float64

peak-rpm

float64

city-mpg

int64

highway-mpg

int64

price

float64

city-L/100km

float64

horsepower-binned

object

diesel

int64

gas

int64

dtype: object

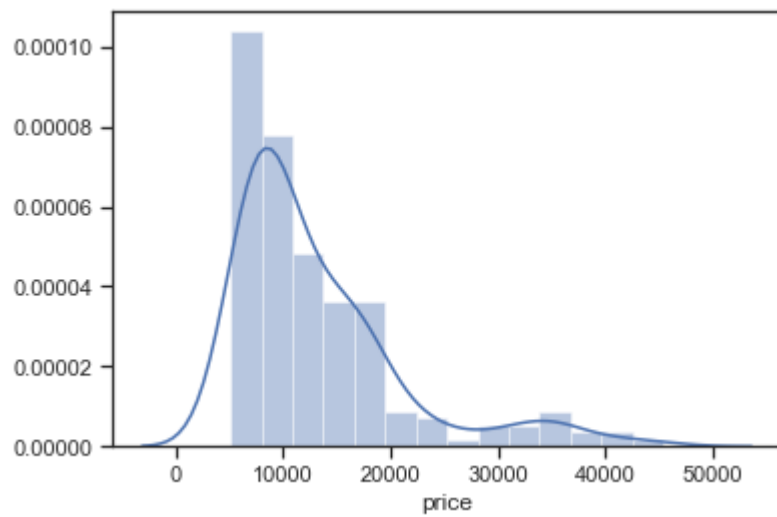
In [8]: data.describe()

Out[8]:

	symboling	normalized-losses	wheel-base	length	width	height	curb-weight	engine-size
count	201.000000	201.00000	201.000000	201.000000	201.000000	201.000000	201.000000	201.000000
mean	0.840796	122.00000	98.797015	0.837102	0.915126	53.766667	2555.666667	126.875622
std	1.254802	31.99625	6.066366	0.059213	0.029187	2.447822	517.296727	41.546834
min	-2.000000	65.00000	86.600000	0.678039	0.837500	47.800000	1488.000000	61.000000
25%	0.000000	101.00000	94.500000	0.801538	0.890278	52.000000	2169.000000	98.000000
50%	1.000000	122.00000	97.000000	0.832292	0.909722	54.100000	2414.000000	120.000000
75%	2.000000	137.00000	102.400000	0.881788	0.925000	55.500000	2926.000000	141.000000
max	3.000000	256.00000	120.900000	1.000000	1.000000	59.800000	4066.000000	326.000000

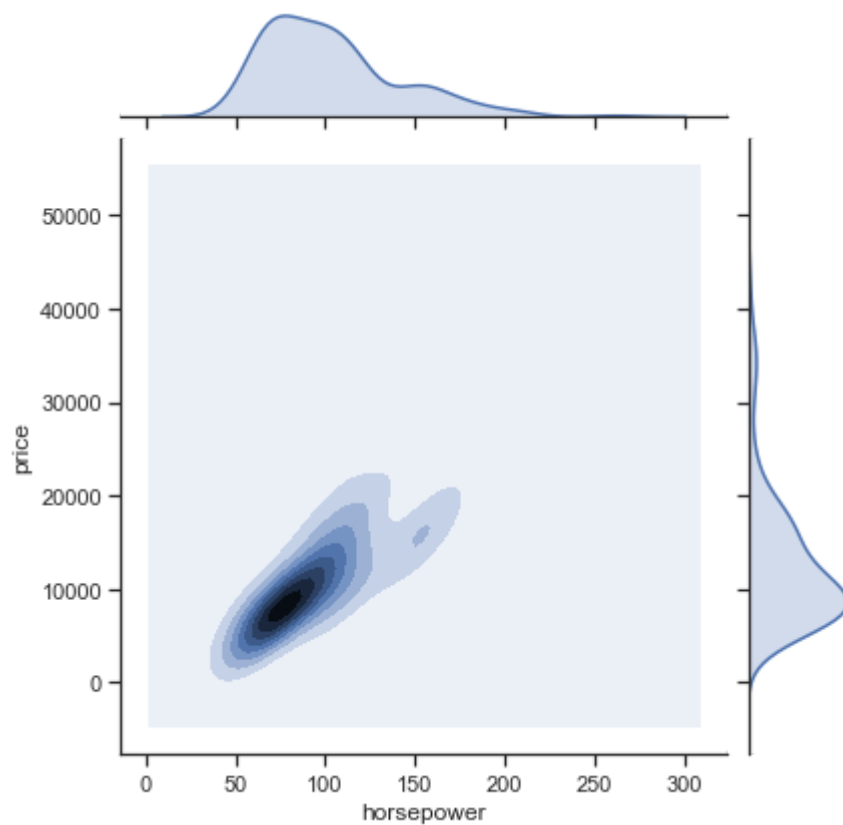
```
In [9]: sns.distplot(data['price'])
```

```
Out[9]: <matplotlib.axes._subplots.AxesSubplot at 0x2b5dce67208>
```

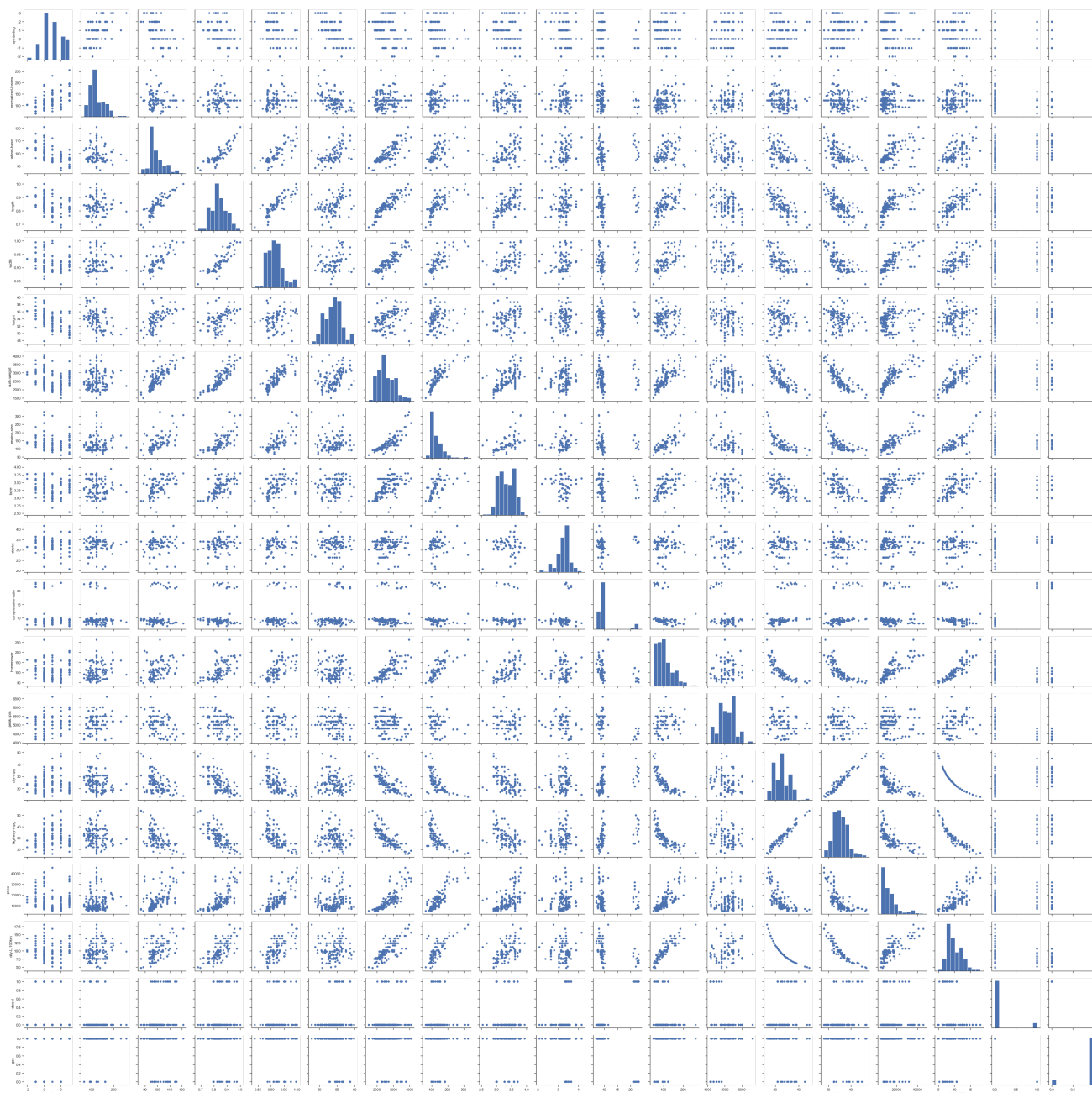


```
In [10]: sns.jointplot(x='horsepower', y='price', data=data, kind="kde")
```

```
Out[10]: <seaborn.axisgrid.JointGrid at 0x2b5deeaec0>
```



```
In [11]: import warnings
warnings.filterwarnings('ignore')
sns.pairplot(data, plot_kws=dict(linewidth=0));
```



```
In [12]: data.corr()
```

Out[12]:

	symboling	normalized-losses	wheel-base	length	width	height	curb-weight	engine-size	
symboling	1.000000	0.466264	-0.535987	-0.365404	-0.242423	-0.550160	-0.233118	-0.110581	-
normalized-losses	0.466264	1.000000	-0.056661	0.019424	0.086802	-0.373737	0.099404	0.112360	-
wheel-base	-0.535987	-0.056661	1.000000	0.876024	0.814507	0.590742	0.782097	0.572027	
length	-0.365404	0.019424	0.876024	1.000000	0.857170	0.492063	0.880665	0.685025	
width	-0.242423	0.086802	0.814507	0.857170	1.000000	0.306002	0.866201	0.729436	
height	-0.550160	-0.373737	0.590742	0.492063	0.306002	1.000000	0.307581	0.074694	
curb-weight	-0.233118	0.099404	0.782097	0.880665	0.866201	0.307581	1.000000	0.849072	
engine-size	-0.110581	0.112360	0.572027	0.685025	0.729436	0.074694	0.849072	1.000000	
bore	-0.140019	-0.029862	0.493244	0.608971	0.544885	0.180449	0.644060	0.572609	-
stroke	-0.008245	0.055563	0.158502	0.124139	0.188829	-0.062704	0.167562	0.209523	-
compression-ratio	-0.182196	-0.114713	0.250313	0.159733	0.189867	0.259737	0.156433	0.028889	
horsepower	0.075819	0.217299	0.371147	0.579821	0.615077	-0.087027	0.757976	0.822676	
peak-rpm	0.279740	0.239543	-0.360305	-0.285970	-0.245800	-0.309974	-0.279361	-0.256733	-
city-mpg	-0.035527	-0.225016	-0.470606	-0.665192	-0.633531	-0.049800	-0.749543	-0.650546	-
highway-mpg	0.036233	-0.181877	-0.543304	-0.698142	-0.680635	-0.104812	-0.794889	-0.679571	-
price	-0.082391	0.133999	0.584642	0.690628	0.751265	0.135486	0.834415	0.872335	
city-L/100km	0.066171	0.238567	0.476153	0.657373	0.673363	0.003811	0.785353	0.745059	
diesel	-0.196735	-0.101546	0.307237	0.211187	0.244356	0.281578	0.221046	0.070779	
gas	0.196735	0.101546	-0.307237	-0.211187	-0.244356	-0.281578	-0.221046	-0.070779	-



```
In [13]: sns.heatmap(data.corr())
```

Out[13]: <matplotlib.axes.\_subplots.AxesSubplot at 0x2b5e9f367b8>

