In [ ]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
```

Importing the data used in the analysis

In [ ]:
```
data_path='medical_examination.csv'
df=pd.read_csv(data_path)
print(df.info())
df.head()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 70000 entries, 0 to 69999
Data columns (total 13 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   id           70000 non-null  int64  
 1   age          70000 non-null  int64  
 2   sex          70000 non-null  int64  
 3   height       70000 non-null  int64  
 4   weight       70000 non-null  float64
 5   ap_hi        70000 non-null  int64  
 6   ap_lo        70000 non-null  int64  
 7   cholesterol  70000 non-null  int64  
 8   gluc         70000 non-null  int64  
 9   smoke        70000 non-null  int64  
 10  alco         70000 non-null  int64  
 11  active       70000 non-null  int64  
 12  cardio       70000 non-null  int64  
dtypes: float64(1), int64(12)
memory usage: 6.9 MB
None
```

Out[ ]:

	id	age	sex	height	weight	ap_hi	ap_lo	cholesterol	gluc	smoke	alco	active	cardio
0	0	18393	2	168	62.0	110	80	1	1	0	0	1	0
1	1	20228	1	156	85.0	140	90	3	1	0	0	1	1
2	2	18857	1	165	64.0	130	70	3	1	0	0	0	1
3	3	17623	2	169	82.0	150	100	1	1	0	0	1	1
4	4	17474	1	156	56.0	100	60	1	1	0	0	0	0

Creating the overweight column

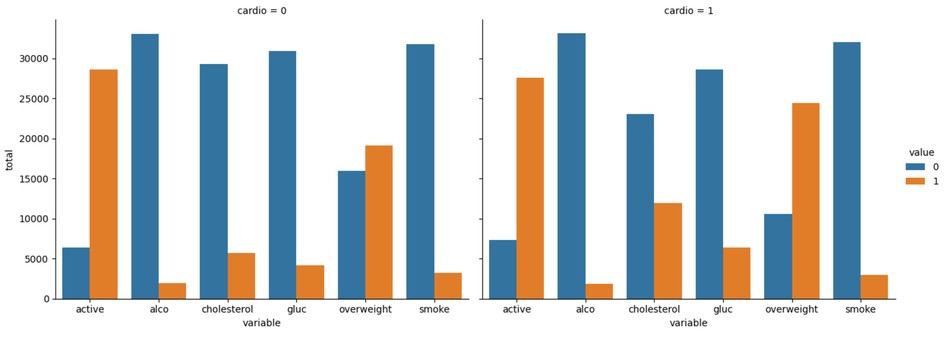
In [ ]:
```
#df['overweight']=((df['weight']/(df['height']/100)**2) >25).replace({True: 1, False: 0})
df['overweight']=((df['weight']/(df['height']/100)**2) >25)*1
```

Normalizing the data by making 0 always good and 1 always bad

In [ ]:
```
df['cholesterol']=(df['cholesterol']>1)*1
df['gluc']= (df['gluc']>1)*1
```

Grouping and Plotting cholesterol, gluc, smoke, alco, active and overweight variables by cardio levels

In [ ]:
```
var_to_plot=['cholesterol', 'gluc', 'smoke', 'alco', 'active', 'overweight']
df_cat = pd.melt(df,id_vars='cardio',value_vars=var_to_plot)
df_cat['total']=1
df_cat = df_cat.groupby(['cardio', 'variable', 'value'],as_index=False).count()
chart=sns.catplot(data=df_cat,x='variable',y='total',hue='value',kind='bar',col='cardio',aspect=8/6)
fig = chart.fig
fig.savefig('catplot.png')
```



Data Cleaning: Keep only the records of patients with heights, weights between the 2.5th and 97.5th percentiles and with diastolic pressure less than systolic.

In [ ]:
```
height_filter=((df['height'] >= df['height'].quantile(0.025)) & (df['height'] <= df['height'].quantile(0.975)))
weight_filter=((df['weight'] >= df['weight'].quantile(0.025)) & (df['weight'] <= df['weight'].quantile(0.975)))
diastolic_systolic=(df['ap_lo'] <= df['ap_hi'])
df_heat=df.loc[height_filter & weight_filter & diastolic_systolic]
df_heat.head()
```

Out[ ]:

	id	age	sex	height	weight	ap_hi	ap_lo	cholesterol	gluc	smoke	alco	active	cardio	overweight
0	0	18393	2	168	62.0	110	80	0	0	0	0	1	0	0
1	1	20228	1	156	85.0	140	90	1	0	0	0	1	1	1
2	2	18857	1	165	64.0	130	70	1	0	0	0	0	1	0
3	3	17623	2	169	82.0	150	100	0	0	0	0	1	1	1
4	4	17474	1	156	56.0	100	60	0	0	0	0	0	0	0

Calculate the correlation matrix

In [ ]:
```
corr = df_heat.corr()
corr
```

Out[ ]:

	id	age	sex	height	weight	ap_hi	ap_lo	cholesterol	gluc	smoke	alco	active	cardio	overweight
id	1.000000	0.002507	0.003426	0.000326	0.000149	0.003492	0.000484	0.003719	0.002289	-0.002732	-0.000708	0.005891	0.003900	-0.000679
age	0.002507	1.000000	-0.018132	-0.076932	0.070168	0.018689	0.153508	0.129996	0.086990	-0.044371	-0.026970	-0.011445	0.240241	0.089573
sex	0.003426	-0.018132	1.000000	0.505785	0.129979	0.005063	0.059947	-0.037605	-0.021357	0.337436	0.168637	0.007864	0.002320	-0.052930
height	0.000326	-0.076932	0.505785	1.000000	0.251503	0.004586	0.017922	-0.063522	-0.030469	0.187830	0.089785	-0.005661	-0.024102	-0.149570
weight	0.000149	0.070168	0.129979	0.251503	1.000000	0.027030	0.227922	0.135981	0.107072	0.056533	0.059917	-0.014430	0.170042	0.655926
ap_hi	0.003492	0.018689	0.005063	0.004586	0.027030	1.000000	0.072803	0.022807	0.011111	-0.001928	0.000769	-0.000222	0.050556	0.017327
ap_lo	0.000484	0.153508	0.059947	0.017922	0.227922	0.072803	1.000000	0.150362	0.074840	0.023275	0.033042	0.001569	0.327181	0.172212
cholesterol	0.003719	0.129996	-0.037605	-0.063522	0.135981	0.022807	0.150362	1.000000	0.383743	0.012680	0.038446	0.002494	0.203467	0.127986
gluc	0.002289	0.086990	-0.021357	-0.030469	0.107072	0.011111	0.074840	0.383743	1.000000	-0.004157	0.014297	-0.010145	0.088445	0.088109
smoke	-0.002732	-0.044371	0.337436	0.187830	0.056533	-0.001928	0.023275	0.012680	-0.004157	1.000000	0.341200	0.026940	-0.020345	-0.003274
alco	-0.000708	-0.026970	0.168637	0.089785	0.059917	0.000769	0.033042	0.038446	0.014297	0.341200	1.000000	0.025847	-0.011088	0.025056
active	0.005891	-0.011445	0.007864	-0.005661	-0.014430	-0.000222	0.001569	0.002494	-0.010145	0.026940	0.025847	1.000000	-0.037339	-0.003387
cardio	0.003900	0.240241	0.002320	-0.024102	0.170042	0.050556	0.327181	0.203467	0.088445	-0.020345	-0.011088	-0.037339	1.000000	0.143168
overweight	-0.000679	0.089573	-0.052930	-0.149570	0.655926	0.017327	0.172212	0.127986	0.088109	-0.003274	0.025056	-0.003387	0.143168	1.000000

Generate a mask for the upper triangle

In [ ]:
```
mask = np.triu(np.ones_like(corr, dtype=bool))
```

Plot the correlation matrix using seaborn

In [ ]:
```
fig, ax = plt.subplots()
sns.heatmap(data=corr, vmin = -0.12, vmax = 0.3, center=0, annot=True, annot_kws={'size':8}, cbar_kws={"shrink": 0.6},
            fmt=".1f", linewidths=0.5, mask=mask)
fig.savefig('heatmap.png')
```