medicalAnalyz

July 11, 2023

1 ANALYZ OF MEDICAL DATA

[1]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
```

[2]:
```
df = pd.read_csv("medical_examination.csv")
```

1.1 Data Summary

[3]:
```
df.head()
```

[3]:

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

	alco	active	cardio
0	0	1	0
1	0	1	1
2	0	0	1
3	0	1	1
4	0	0	0

[4]:
```
df.shape
```

[4]:
```
(70000, 13)
```

1.2 Adding overweight column based on height and weight variables

[5]:
```
df["overweight"] = ((df["weight"] / ((df["height"] / 100)**2)) > 25).astype(int)
df.head()
```

[5]:

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

	alco	active	cardio	overweight
0	0	1	0	0
1	0	1	1	1
2	0	0	1	0
3	0	1	1	1
4	0	0	0	0

1.3 Normalizing cholesterol and gluc columns

If value of the columns equals to 1 make the new value 0 otherwise make the value 1

[6]:
```
df[["cholesterol", "gluc"]] = df[["cholesterol", "gluc"]].apply(lambda x: x.
 ↪apply(lambda val: 0 if val == 1 else 1))
df
```

[6]:

	id	age	sex	height	weight	ap_hi	ap_lo	cholesterol	gluc	\
0	0	18393	2	168	62.0	110	80	0	0	
1	1	20228	1	156	85.0	140	90	1	0	
2	2	18857	1	165	64.0	130	70	1	0	
3	3	17623	2	169	82.0	150	100	0	0	
4	4	17474	1	156	56.0	100	60	0	0	
…	…	…	…	…	…	…	…	…	…	
69995	99993	19240	2	168	76.0	120	80	0	0	
69996	99995	22601	1	158	126.0	140	90	1	1	
69997	99996	19066	2	183	105.0	180	90	1	0	
69998	99998	22431	1	163	72.0	135	80	0	1	
69999	99999	20540	1	170	72.0	120	80	1	0	

	smoke	alco	active	cardio	overweight
0	0	0	1	0	0
1	0	0	1	1	1
2	0	0	0	1	0
3	0	0	1	1	1
4	0	0	0	0	0
…	…	…	…	…	…
69995	1	0	1	0	1
69996	0	0	1	1	1
69997	0	1	0	1	1
69998	0	0	0	1	1
69999	0	0	1	0	0

[70000 rows x 14 columns]

1.4 Converting data to long format for visualizing

[7]:
```
df_long = df.melt(id_vars='cardio',
                  value_vars=['active',  'alco', 'cholesterol', 'gluc',␣
 ↪'overweight', 'smoke'],
                  var_name='variable', value_name='value')
df_long.head()
```

[7]:

	cardio	variable	value
0	0	active	1
1	1	active	1
2	1	active	0
3	1	active	1
4	0	active	0

[8]:
```
df_cat = df_long.groupby(['cardio', 'variable', 'value'], as_index=False).size()
df_cat = df_cat.rename(columns={'size': 'total'})
df_cat.head()
```

[8]:

	cardio	variable	value	total
0	0	active	0	6378
1	0	active	1	28643
2	0	alco	0	33080
3	0	alco	1	1941
4	0	cholesterol	0	29330

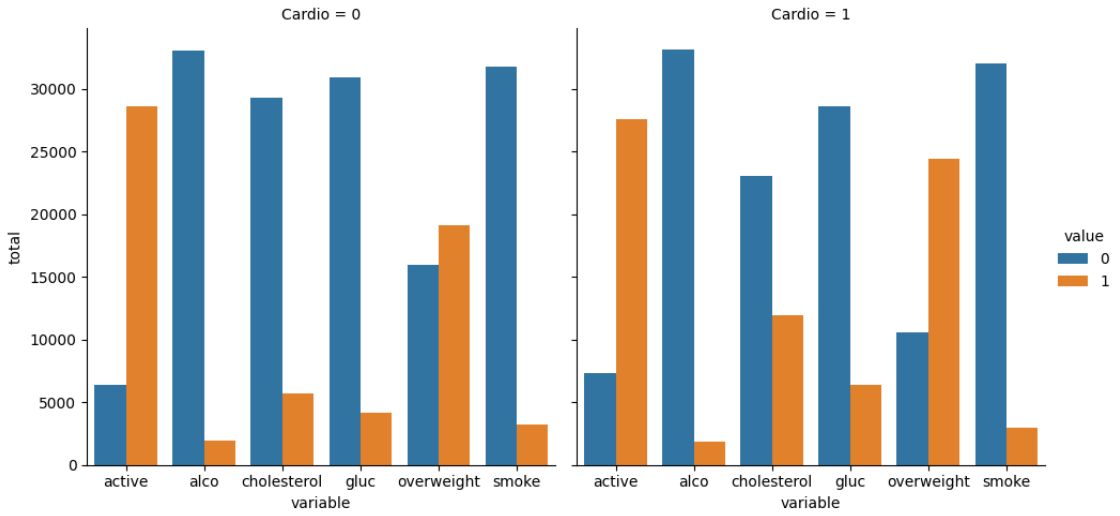
1.5 Visualizing long formatted data

active, alco, cholesterol, gluc, overweight, smoke values based on cardio

[9]:
```
g = sns.catplot(data=df_long, x='variable', hue='value', col='cardio',␣
 ↪kind='count')

g.set_axis_labels('variable', 'total')
g.set_titles('Cardio = {col_name}')
plt.show()
```

```
/home/berkeds/.local/lib/python3.10/site-packages/seaborn/axisgrid.py:118:
UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```



[10]:
```
df.head()
```

[10]:

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

	alco	active	cardio	overweight
0	0	1	0	0
1	0	1	1	1
2	0	0	1	0
3	0	1	1	1
4	0	0	0	0

[11]:
```
df.shape
```

[11]: (70000, 14)

1.6 Normalizing Data with removing height and weight smaller than 2.5 percentile and greater than 97.5 percentile

[12]:
```
df.drop(df[df.ap_lo > df.ap_hi].index, inplace=True)
#(df['ap_lo'] <= df['ap_hi'])
df.shape
```

[12]: (68766, 14)

[13]:
```
df = df[df['height'] >= df['height'].quantile(0.025)]
df.shape
```

[13]:
```
(67260, 14)
```

[14]:
```
df = df[df['height'] <= df['height'].quantile(0.975)]
df.shape
```

[14]:
```
(65859, 14)
```

[15]:
```
df = df[(df['weight'] >= df['weight'].quantile(0.025)) & (df['weight'] <=␣
↪df['weight'].quantile(0.975))]
df.shape
```

[15]:
```
(62784, 14)
```

[16]:
```
df.head()
```

[16]:

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

	alco	active	cardio	overweight
0	0	1	0	0
1	0	1	1	1
2	0	0	1	0
3	0	1	1	1
4	0	0	0	0

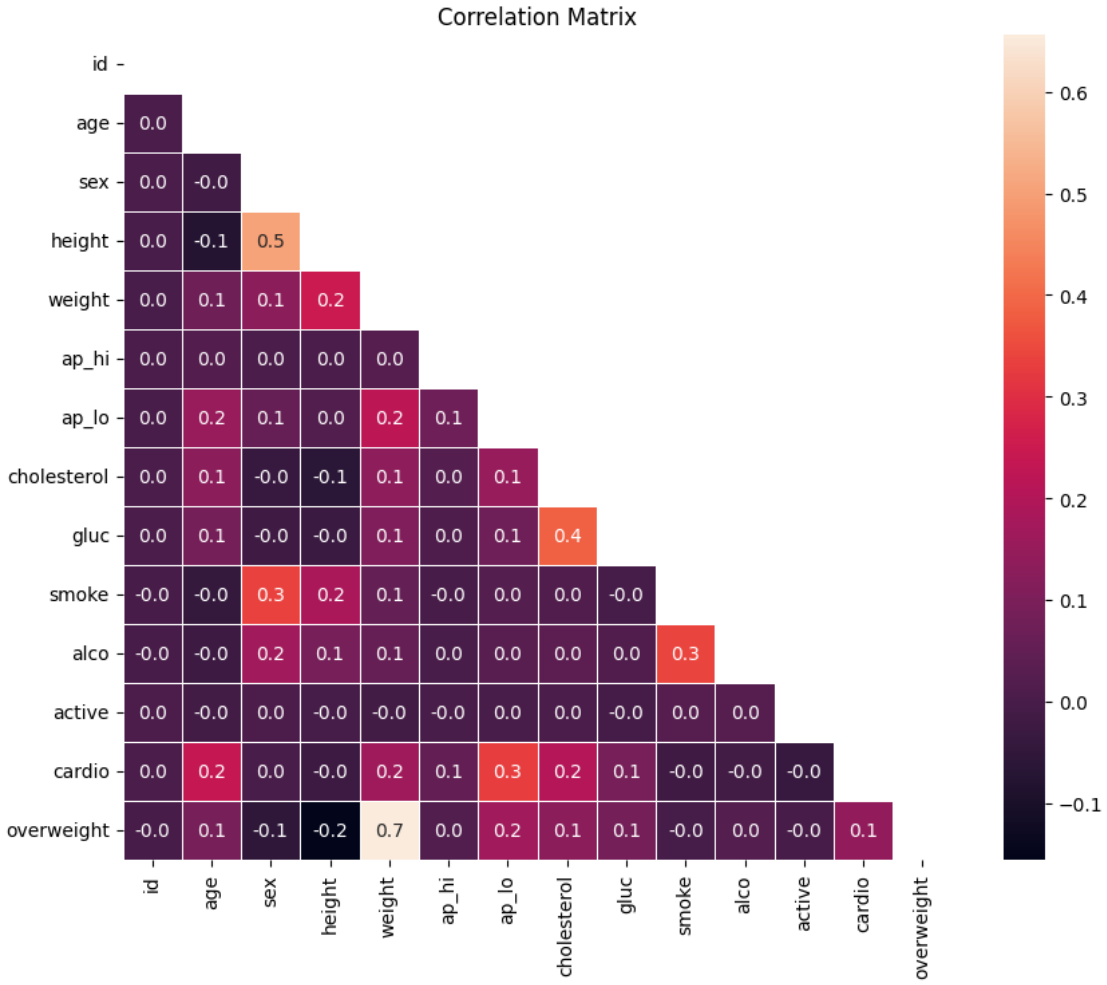
1.7 Correlation Matrix of the cleaned data

[17]:
```
corr= df.corr()
mask = np.triu(np.ones_like(corr, dtype=bool))

plt.figure(figsize=(10, 8))
sns.heatmap(corr, annot=True, fmt=".1f", linewidth=.5, mask=mask)

plt.title('Correlation Matrix')

plt.show()
```


Correlation Matrix
id
age
sex
height
weight
ap_hi
ap_lo
cholesterol
gluc
smoke
alco
active
cardio
overweight
0.6
0.5
0.4
0.3
0.2
0.1
0.0
−0.1

[ ]: