Heart Disease

CEP

Group Members

- MUHAMMAD TALLAH QURESHI 160996
- AHSAN AHMAD 160980
- Muhammad Hassaan Khan 170947

Introduction

Disease:
We work through baiyese
Libraries:

- Pandas
- Seaborn
- Urllib
- Pgmpy

Use of Library:

Pandas:

Pandas is used to read out data set from format that is suitable for our model.

Seaborn:

Seaborn is used to visualise our data.

Urllib:

Urllib is used to open urls which help us feed our data set to the model.

Pgmpy:

Pgmpy allows us to work with graphical data.

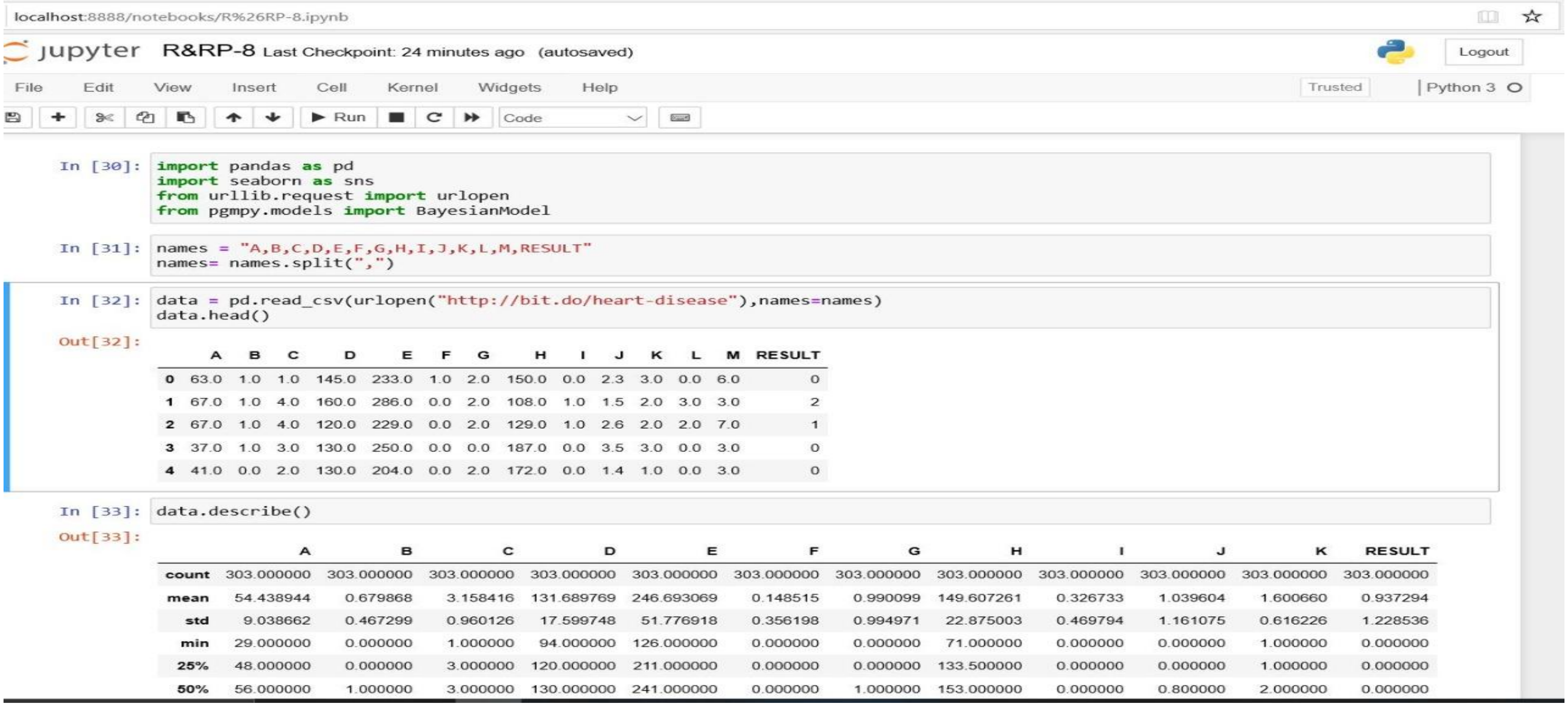
Graph:

We use the heat graph which help visualise our data.

Data set

- Our dataset is saved in .CSV format. We will be using Python for this task and will use pandas, numpy, seaborn, . This model will help us do our prediction for Heart patients

Program


localhost:8888/notebooks/R%26RP-8.ipynb
jupyter R&RP-8 Last Checkpoint: 24 minutes ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 ○
Run
Code

```
In [30]: import pandas as pd
         import seaborn as sns
         from urllib.request import urlopen
         from pgmpy.models import BayesianModel
```

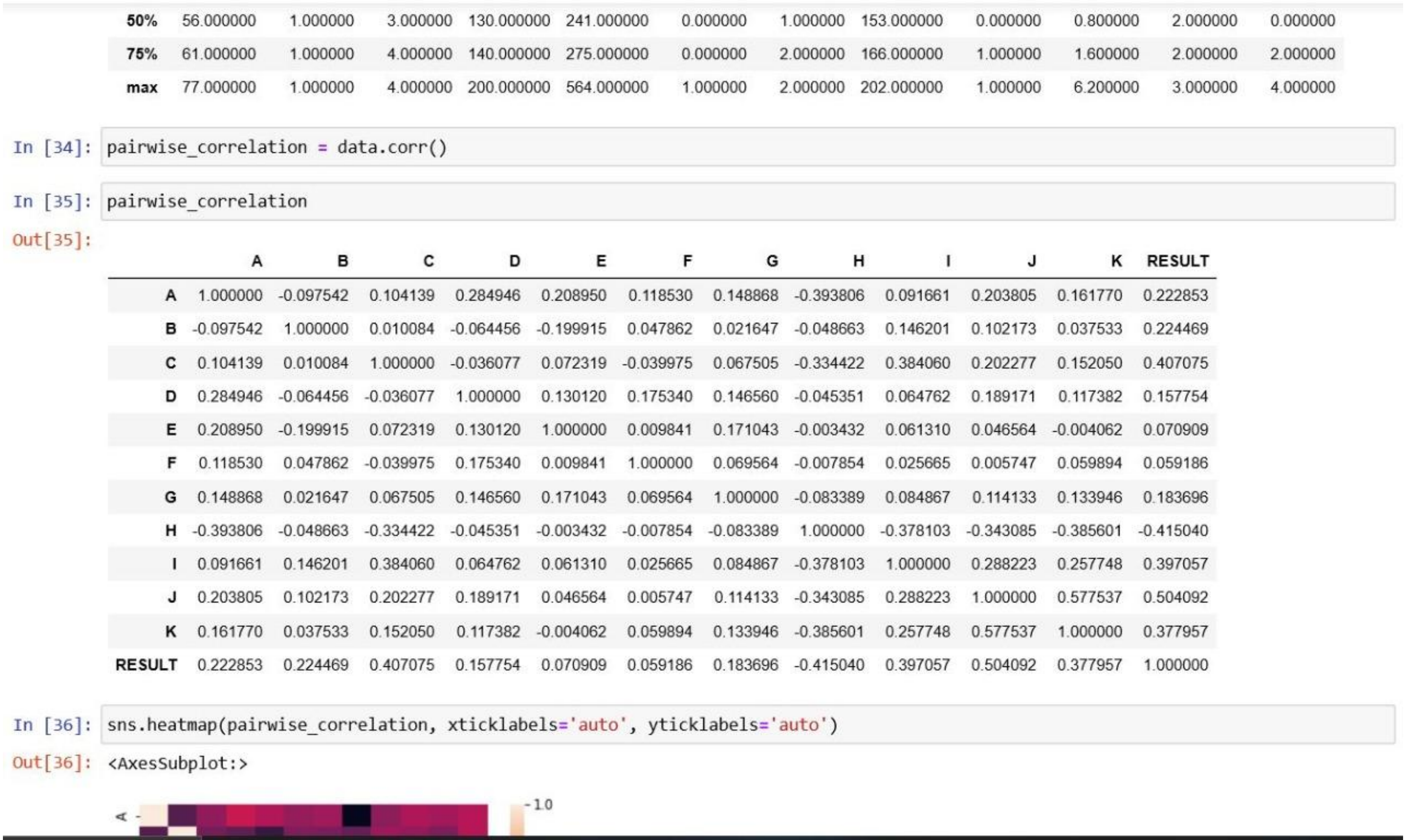
```
In [31]: names = "A,B,C,D,E,F,G,H,I,J,K,L,M,RESULT"
         names= names.split(",")
```

```
In [32]: data = pd.read_csv(urlopen("http://bit.do/heart-disease"),names=names)
         data.head()
```

```
Out[32]:
      A    B    C      D      E    F    G      H    I    J    K    L    M  RESULT
0  63.0  1.0  1.0  145.0  233.0  1.0  2.0  150.0  0.0  2.3  3.0  0.0  6.0       0
1  67.0  1.0  4.0  160.0  286.0  0.0  2.0  108.0  1.0  1.5  2.0  3.0  3.0       2
2  67.0  1.0  4.0  120.0  229.0  0.0  2.0  129.0  1.0  2.6  2.0  2.0  7.0       1
3  37.0  1.0  3.0  130.0  250.0  0.0  0.0  187.0  0.0  3.5  3.0  0.0  3.0       0
4  41.0  0.0  2.0  130.0  204.0  0.0  2.0  172.0  0.0  1.4  1.0  0.0  3.0       0
```

```
In [33]: data.describe()
```

```
Out[33]:
                A           B           C           D           E           F           G           H           I           J           K      RESULT
count  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000
mean    54.438944    0.679868    3.158416  131.689769  246.693069    0.148515    0.990099  149.607261    0.326733    1.039604    1.600660    0.937294
std      9.038662    0.467299    0.960126   17.599748   51.776918    0.356198    0.994971   22.875003    0.469794    1.161075    0.616226    1.228536
min     29.000000    0.000000    1.000000   94.000000  126.000000    0.000000    0.000000   71.000000    0.000000    0.000000    1.000000    0.000000
25%     48.000000    0.000000    3.000000  120.000000  211.000000    0.000000    0.000000  133.500000    0.000000    0.000000    1.000000    0.000000
50%     56.000000    1.000000    3.000000  130.000000  241.000000    0.000000    1.000000  153.000000    0.000000    0.800000    2.000000    0.000000
```



50%	56.000000	1.000000	3.000000	130.000000	241.000000	0.000000	1.000000	153.000000	0.000000	0.800000	2.000000	0.000000
75%	61.000000	1.000000	4.000000	140.000000	275.000000	0.000000	2.000000	166.000000	1.000000	1.600000	2.000000	2.000000
max	77.000000	1.000000	4.000000	200.000000	564.000000	1.000000	2.000000	202.000000	1.000000	6.200000	3.000000	4.000000

```
In [34]: pairwise_correlation = data.corr()
```

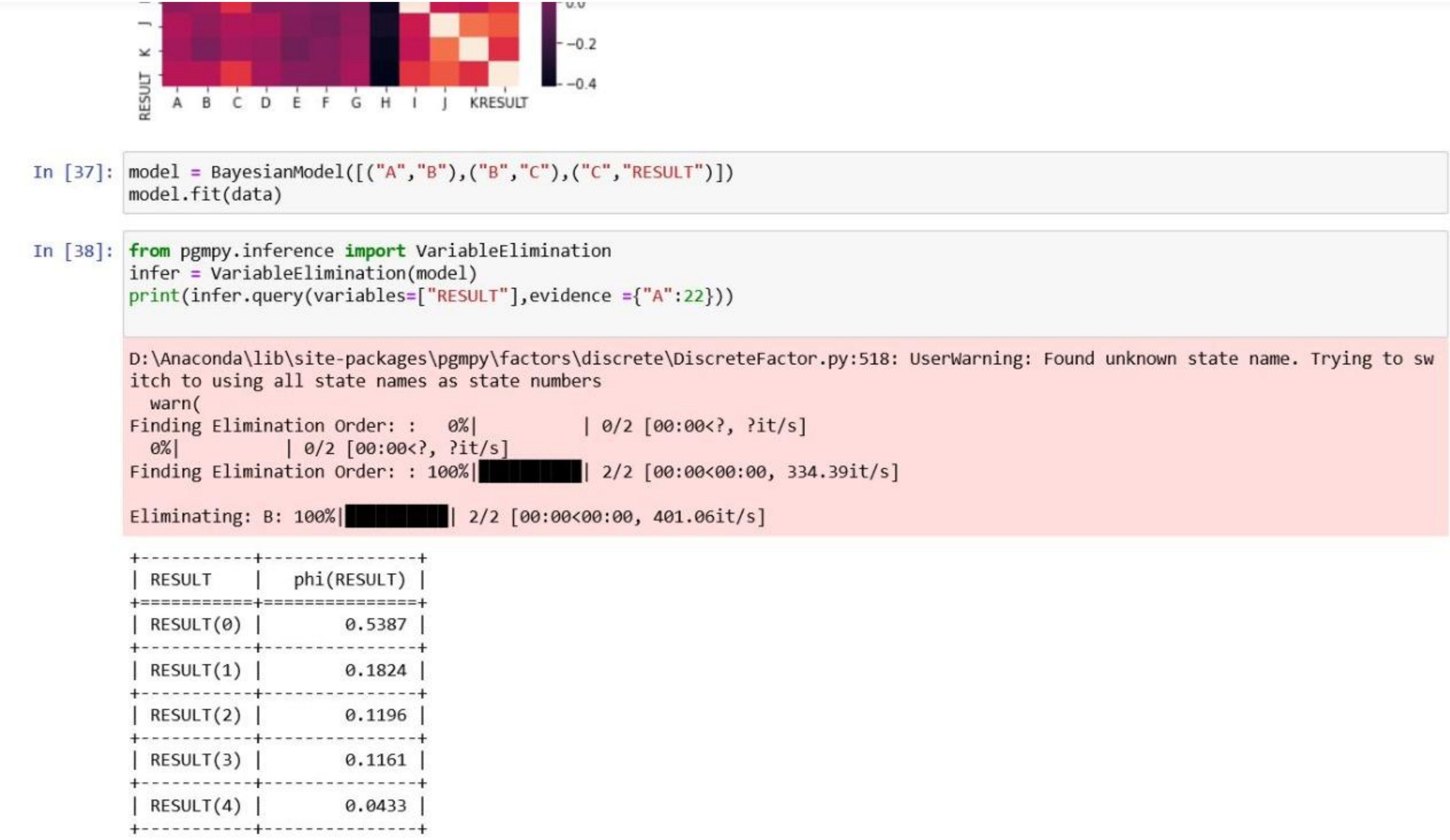
```
In [35]: pairwise_correlation
```

Out[35]:

	A	B	C	D	E	F	G	H	I	J	K	RESULT
A	1.000000	-0.097542	0.104139	0.284946	0.208950	0.118530	0.148868	-0.393806	0.091661	0.203805	0.161770	0.222853
B	-0.097542	1.000000	0.010084	-0.064456	-0.199915	0.047862	0.021647	-0.048663	0.146201	0.102173	0.037533	0.224469
C	0.104139	0.010084	1.000000	-0.036077	0.072319	-0.039975	0.067505	-0.334422	0.384060	0.202277	0.152050	0.407075
D	0.284946	-0.064456	-0.036077	1.000000	0.130120	0.175340	0.146560	-0.045351	0.064762	0.189171	0.117382	0.157754
E	0.208950	-0.199915	0.072319	0.130120	1.000000	0.009841	0.171043	-0.003432	0.061310	0.046564	-0.004062	0.070909
F	0.118530	0.047862	-0.039975	0.175340	0.009841	1.000000	0.069564	-0.007854	0.025665	0.005747	0.059894	0.059186
G	0.148868	0.021647	0.067505	0.146560	0.171043	0.069564	1.000000	-0.083389	0.084867	0.114133	0.133946	0.183696
H	-0.393806	-0.048663	-0.334422	-0.045351	-0.003432	-0.007854	-0.083389	1.000000	-0.378103	-0.343085	-0.385601	-0.415040
I	0.091661	0.146201	0.384060	0.064762	0.061310	0.025665	0.084867	-0.378103	1.000000	0.288223	0.257748	0.397057
J	0.203805	0.102173	0.202277	0.189171	0.046564	0.005747	0.114133	-0.343085	0.288223	1.000000	0.577537	0.504092
K	0.161770	0.037533	0.152050	0.117382	-0.004062	0.059894	0.133946	-0.385601	0.257748	0.577537	1.000000	0.377957
RESULT	0.222853	0.224469	0.407075	0.157754	0.070909	0.059186	0.183696	-0.415040	0.397057	0.504092	0.377957	1.000000

```
In [36]: sns.heatmap(pairwise_correlation, xticklabels='auto', yticklabels='auto')
```

```
Out[36]: <AxesSubplot:>
```



```
In [37]: model = BayesianModel([("A","B"),("B","C"),("C","RESULT")])
         model.fit(data)
```

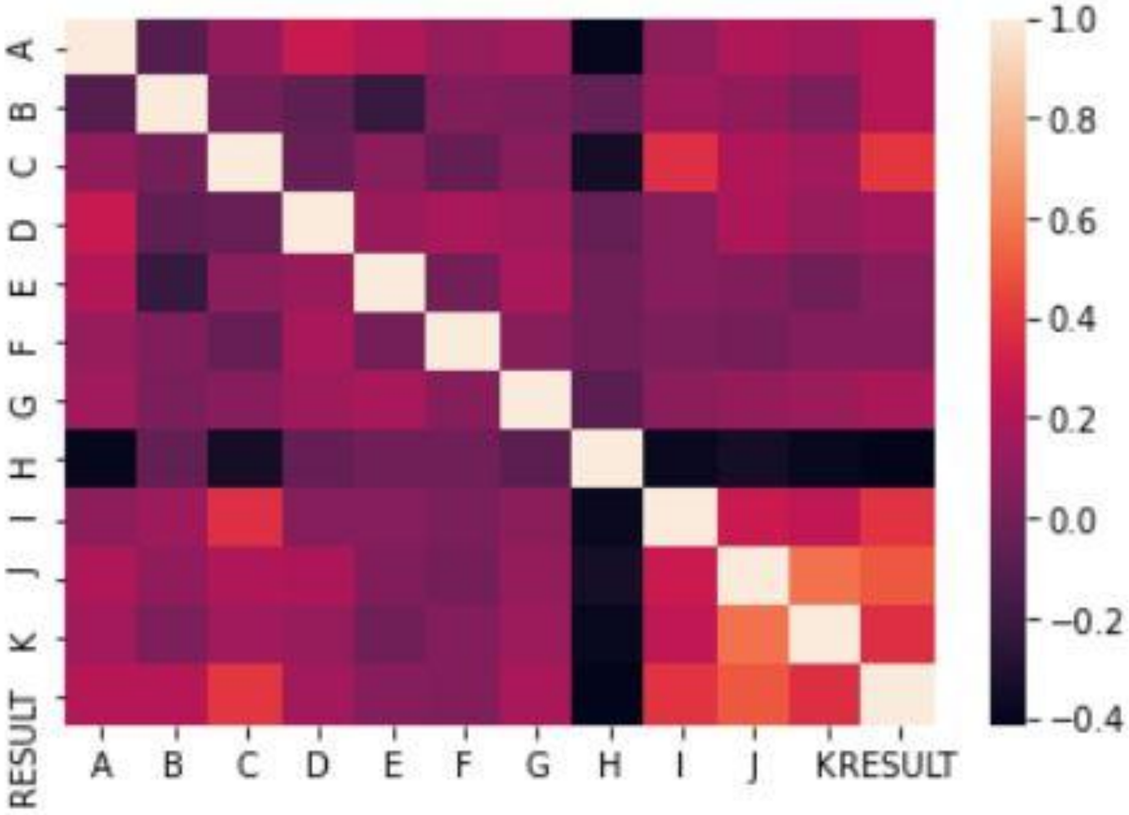
```
In [38]: from pgmpy.inference import VariableElimination
         infer = VariableElimination(model)
         print(infer.query(variables=["RESULT"],evidence ={"A":22}))
```

```
D:\Anaconda\lib\site-packages\pgmpy\factors\discrete\DiscreteFactor.py:518: UserWarning: Found unknown state name. Trying to sw
itch to using all state names as state numbers
  warn(
Finding Elimination Order: :   0%|          | 0/2 [00:00<?, ?it/s]
  0%|          | 0/2 [00:00<?, ?it/s]
Finding Elimination Order: : 100%|██████████| 2/2 [00:00<00:00, 334.39it/s]

Eliminating: B: 100%|██████████| 2/2 [00:00<00:00, 401.06it/s]
```

```
+-----------+---------------+
| RESULT    |   phi(RESULT) |
+===========+===============+
| RESULT(0) |        0.5387 |
+-----------+---------------+
| RESULT(1) |        0.1824 |
+-----------+---------------+
| RESULT(2) |        0.1196 |
+-----------+---------------+
| RESULT(3) |        0.1161 |
+-----------+---------------+
| RESULT(4) |        0.0433 |
+-----------+---------------+
```

Output Graph


A
B
C
D
E
F
G
H
I
J
K
RESULT
A
B
C
D
E
F
G
H
I
J
KRESULT