

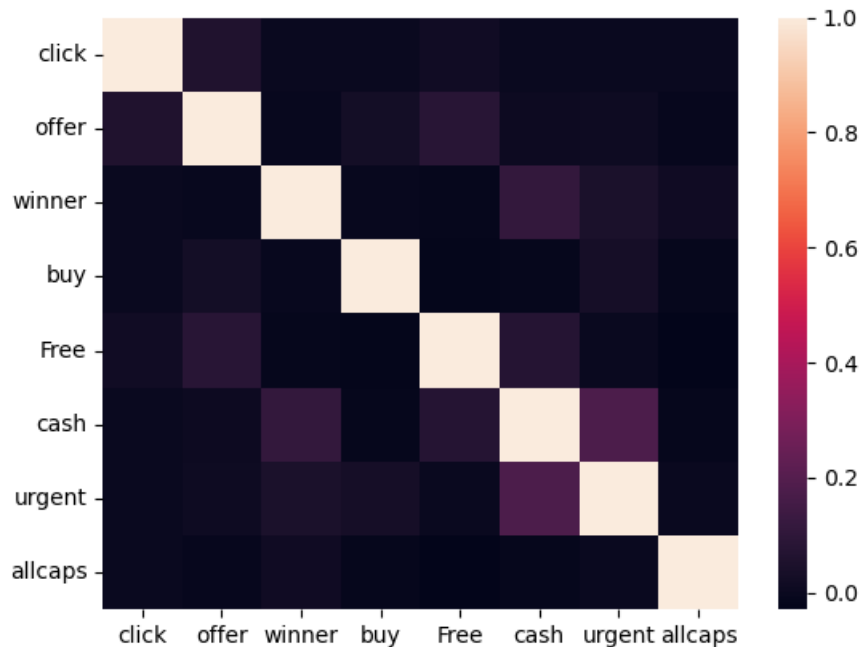
Text Mining, Network Mining, Matrix, SQL, NumPy, & Pandas Read/Write CSV

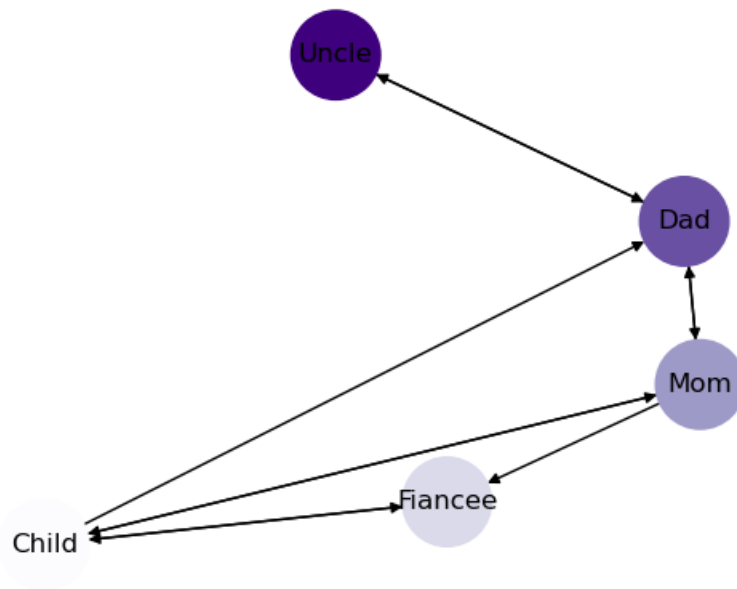
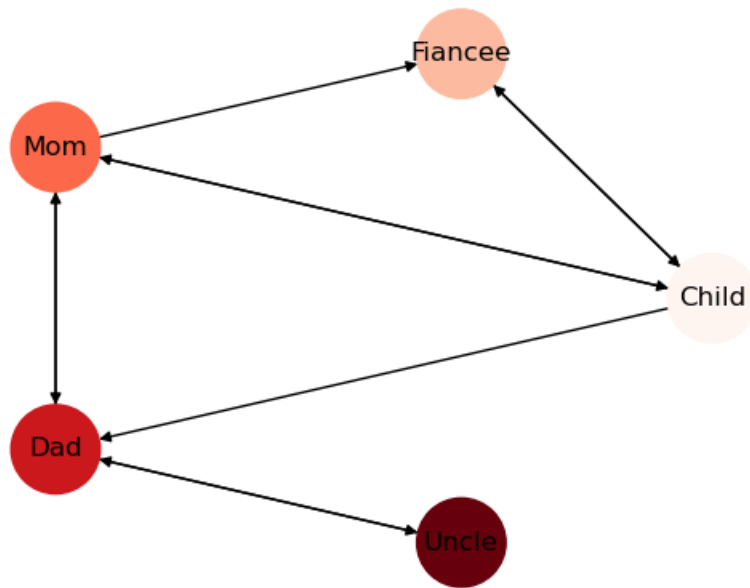
```
(5572, 2)
ham      4825
spam      747
Name: spam, dtype: int64

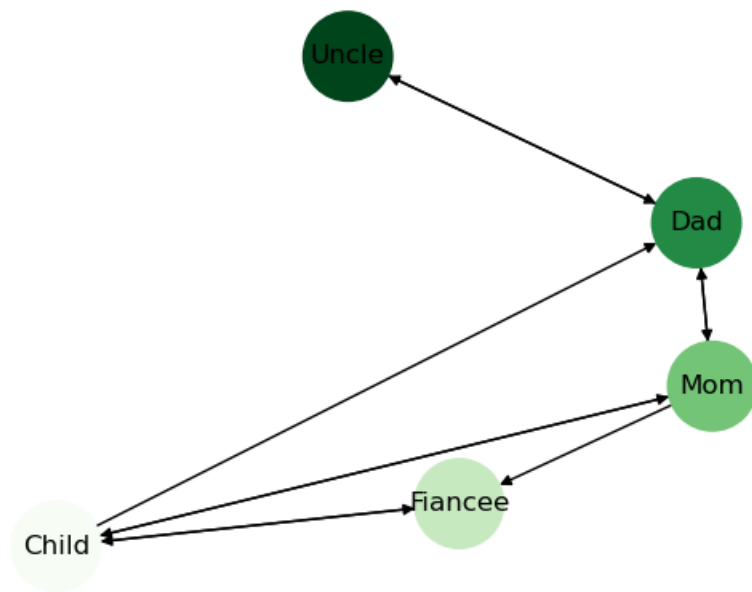
   spam      message
0  ham  Go until jurong point, crazy.. Available only ...
1  ham                      Ok lar... Joking wif u oni...
2  spam  Free entry in 2 a wkly comp to win FA Cup fina...
3  ham  U dun say so early hor... U c already then say...
4  ham  Nah I don't think he goes to usf, he lives aro...

   spam      message  click  offer  winner  buy  Free  cash  urgent
0  ham  Go until jurong point, crazy.. Available only ...  False  False  False  False  False  False  False
1  ham                      Ok lar... Joking wif u oni...  False  False  False  False  False  False  False
2  spam  Free entry in 2 a wkly comp to win FA Cup fina...  False  False  False  False  True  False  False
   spam      message  click  offer  winner  buy  Free  cash  urgent  allcaps
14 ham          I HAVE A DATE ON SUNDAY WITH WILL!!  False  False  False  False  False  False  False  True
43 ham          WHO ARE YOU SEEING?  False  False  False  False  False  False  False  True
72 ham  HI BABE IM AT HOME NOW WANNA DO SOMETHING? XX  False  False  False  False  False  False  False  True
<class 'pandas.core.frame.DataFrame'> <class 'pandas.core.series.Series'>

   click  offer  winner  buy  Free  cash  urgent  allcaps
0  False  False  False  False  False  False  False  False
1  False  False  False  False  False  False  False  False
0  ham
1  ham
Name: spam, dtype: object
Number of mislabeled messages out of a total 5572 points: 501
```







```

1      spam
Name: spam, dtype: object
Number of mislabeled messages out of a total 5572 points:  501
-----Confusion Matrix-----
[[4731   94]
 [ 407  340]]
ham      4825
spam      747
Name: spam, dtype: int64
-----
spam keyword is  click
spam            message  click  offer  winner  buy  Free  cash  urgent  allcaps
15  spam  XXXMobileMovieClub: To use your credit, click ...   True  False   False  False  False  False  False  False
907 spam  all the lastest from Stereophonics, Marley, Di...   True  False   False  False  False  False  False  False
-----
spam keyword is  offer
spam            message  click  offer  winner  buy  Free  cash  urgent  allcaps
53   ham  Wow. I never realized that you were so embaras...  False   True   False  False  False  False  False  False
181   ham  You lifted my hopes with the offer of money. I...  False   True   False  False  False  False  False  False
399   ham  Good evening Sir, Al Salam Wahleykkum.sharing ...  False   True   False  False  False  False  False  False
835   ham                               Surely result will offer:)  False   True   False  False  False  False  False  False
1160 ham  Yun buying... But school got offer 2000 plus o...  False   True   False   True  False  False  False  False  False

```

spam keyword is winner

Empty DataFrame

Columns: [spam, message, click, offer, winner, buy, Free, cash, urgent, allcaps]

Index: []

spam keyword is buy

	spam	message	click	offer	winner	buy	Free	cash	urgent	allcaps
430	ham	I wnt to buy a BMW car urgently..its vry urgen...	False	False	False	True	False	False	True	False
1160	ham	Yun buying... But school got offer 2000 plus o...	False	True	False	True	False	False	False	False
1778	spam	Buy Space Invaders 4 a chance 2 win orig Arcad...	False	False	False	True	False	False	False	False
1984	ham	I wnt to buy a BMW car urgently..its vry urgen...	False	False	False	True	False	False	True	False
2330	ham	Am surfing online store. For offers do you wan...	False	True	False	True	False	False	False	False
3501	spam	Dorothy@kiefer.com (Bank of Granite issues Str...	False	False	False	True	False	False	False	False
3991	spam	(Bank of Granite issues Strong-Buy) EXPLOSIVE ...	False	False	False	True	False	False	False	False
4256	spam	Block Breaker now comes in deluxe format with ...	False	False	False	True	False	False	False	False
4735	spam	Buy Space Invaders 4 a chance 2 win orig Arcad...	False	False	False	True	False	False	False	False
5105	ham	I wnt to buy a BMW car urgently..its vry urgen...	False	False	False	True	False	False	True	False
5570	ham	The guy did some bitching but I acted like i'd...	False	False	False	True	True	False	False	False

spam keyword is Free

	spam	message	click	offer	winner	buy	Free	cash	urgent	allcaps
75	ham	I am waiting machan. Call me once you free.	False	False	False	False	True	False	False	False
89	ham	Ela kano.,il download, come wen ur free..	False	False	False	False	True	False	False	False
172	ham	Hmmm.. Thk sure got time to hop ard... Ya, can...	False	False	False	False	True	False	False	False
178	ham	Turns out my friends are staying for the whole...	False	False	False	False	True	False	False	False
180	ham	Hi! You just spoke to MANEESHA V. We'd like to...	False	False	False	False	True	False	False	False
495	ham	Are you free now?can i call now?	False	False	False	False	True	False	False	False
519	ham	That way transport is less problematic than on...	False	False	False	False	True	False	False	False
566	ham	Ill call u 2mrw at ninish, with my address tha...	False	False	False	False	True	False	False	False
659	ham	It doesnt make sense to take it there unless i...	False	False	False	False	True	False	False	False
744	ham	Ok. There may be a free gym about.	False	False	False	False	True	False	False	False
948	ham	Hey i booked the kb on sat already... what oth...	False	False	False	False	True	False	False	False
1067	ham	Once free call me sir. I am waiting for you.	False	False	False	False	True	False	False	False
1094	ham	Well the weather in cali's great. But its comp...	False	False	False	False	True	False	False	False
1364	ham	Yetunde, i'm sorry but moji and i seem too bus...	False	False	False	False	True	False	False	False
1506	ham	Total video converter free download type this ...	False	False	False	False	True	False	False	False
1609	ham	Are your freezing ? Are you home yet ? Will yo...	False	False	False	False	True	False	False	False
1759	ham	Sorry i'm not free...	False	False	False	False	True	False	False	False
1784	ham	No dear i do have free messages without any re...	False	False	False	False	True	False	False	False
1791	ham	Am not working but am up to eyes in philosophy...	False	False	False	False	True	False	False	False
2121	ham	Argh my 3g is spotty, anyway the only thing I ...	False	False	False	False	True	False	False	False
2225	ham	I prefer my free days... Tues, wed, fri oso ca...	False	False	False	False	True	False	False	False
2232	ham	K, wen ur free come to my home and also tel vi...	False	False	False	False	True	False	False	False
2370	ham	A Boy loved a gal. He propsd bt she didnt mind...	False	False	False	False	True	False	False	False
2380	ham	Hi! Mahesh... STAYSAFE... has added you to th...	False	False	False	False	True	False	False	False

```

spam keyword is cash
spam message click offer winner buy Free cash urgent allcaps
87 ham Yes I started to send requests to make it but ... False False False False False True False False
107 ham Aight, I'll hit you up when I get some cash False False False False False True False False
603 ham Speaking of does he have any cash yet? False False False False False True False False
625 ham Nah it's straight, if you can just bring bud o... False False False False False True False False
1261 ham Yo, I'm at my parents' gettin cash. Good news:... False False False False False True False False
2092 ham Then get some cash together and I'll text jason False False False False False True False False
2615 ham Sir, hope your day is going smoothly. i really... False False False False False True False False
3110 ham Lol I was gonna last month. I cashed some in b... False False False False False True False False
3800 ham Actually nvm, got hella cash, we still on for ... False False False False False True False False
4672 ham Probably not, I'm almost out of gas and I get ... False False False False False True False False
5016 ham I think the other two still need to get cash b... False False False False False True False False
5161 ham Lol no. I just need to cash in my nitros. Hurr... False False False False False True False False
5554 ham Well keep in mind I've only got enough gas for... False False False False False True False False
-----
spam keyword is urgent
spam message click offer winner buy Free cash urgent allcaps
430 ham I wnt to buy a BMW car urgently..its vry urgen... False False False True False False True False
1062 ham I might come to kerala for 2 days.so you can b... False False False False False False True False
1246 ham Hello which the site to download songs its urg... False False False False False False True False
1984 ham I wnt to buy a BMW car urgently..its vry urgen... False False False True False False True False
2482 ham K.:)do it at evening da:)urgent:) False False False False False False True False
3728 ham Aldrine, rakhesh ex RTM here.pls call.urgent. False False False False False False True False
5105 ham I wnt to buy a BMW car urgently..its vry urgen... False False False True False False True False
-----

```

```

Name: allcaps, dtype: float64
This family network graph has 5 nodes and 10 edges.
The nodes are: ['Child', 'Fiancee', 'Mom', 'Dad', 'Uncle']
The edges are: [('Child', 'Fiancee'), ('Child', 'Dad'), ('Child', 'Mom'), ('Fiancee', 'Child'), ('Mom', 'Fiancee'), ('Mom', 'Dad'), ('Mom', 'Child'), ('Dad', 'Mom'), ('Dad', 'Un
-----
The Child node has in-degree of 2 and an out-degree of 3
The Fiancee node has in-degree of 2 and an out-degree of 1
The Mom node has in-degree of 2 and an out-degree of 3
The Dad node has in-degree of 3 and an out-degree of 2
The Uncle node has in-degree of 1 and an out-degree of 1
-----
The closeness centrality scores are: {'Child': 0.5714285714285714, 'Fiancee': 0.5714285714285714, 'Mom': 0.6666666666666666, 'Dad': 0.8, 'Uncle': 0.5}
The node degrees are: [('Child', 5), ('Fiancee', 3), ('Mom', 5), ('Dad', 5), ('Uncle', 2)]

```

Matrix :

```

7 #----- # using NumPy arrays
8 A = np.array([[3,12,10], [1,5,2]]) # creating a NumPy two dimensional array A
9 print(A, ' = Array A ~ Array A type: ',type(A)) # printing array A type and elements
10 print(A.T, ' = Array A transposed') # printing array A transposed
11 print(A.T.T, ' = Array A transpose,transpose = Array A') # printing array A transpose, transpose (original A)
12 B = np.array([[4,8,6], [7,11,9]]) # creating a NumPy two dimensional array B
13 print(B, ' = Array B ~ Array B type: ',type(B)) # printing array B type and contents
14 AxBT = np.dot(A, B.T) # the np.dot() multiplies array A * array B (must transpose B)
15 C = A + 2 # create a NumPy array C that is array A +2 for each element
16 C2 = A ** 2 # creating a NumPy array C2 that is array A**2 for each element
17 print(AxBT, ' = Array AxBT = np.dot(A, B.T) ~ Array AxBT type: ', type(AxBT)) # printing array AxBT
18 print(C, ' = Array C = Array A + 2 ~ Array C type: ', type(C)) # printing array C type and elements
19 print(C2, ' = Array C2 = Array A*2 ~ Array C2 type: ', type(C2)) # printing array C2 type and elements
20 #----- # more NumPy arrays, NumPy matrix, & NumPy matrix as Pandas df
21 C3 = np.array([[1,24,23], [-4,5,-6], [8,-8,8]]) # creating a NumPy two dimensional array C3 that is a 3x3
22 C4 = C3.diagonal() # np.array.diagonal() returns the diagonal elements of an array
23 print(C3, ' = Array C3 is a 3x3 ~ Array C3 type: ', type(C3)) # print NumPy two dimensional array C3
24 print(C4, ' = Array C4 is the C3 diagonal ~ Array C4 type: ', type(C4)) # print NumPy two dimensional array C4

```

```

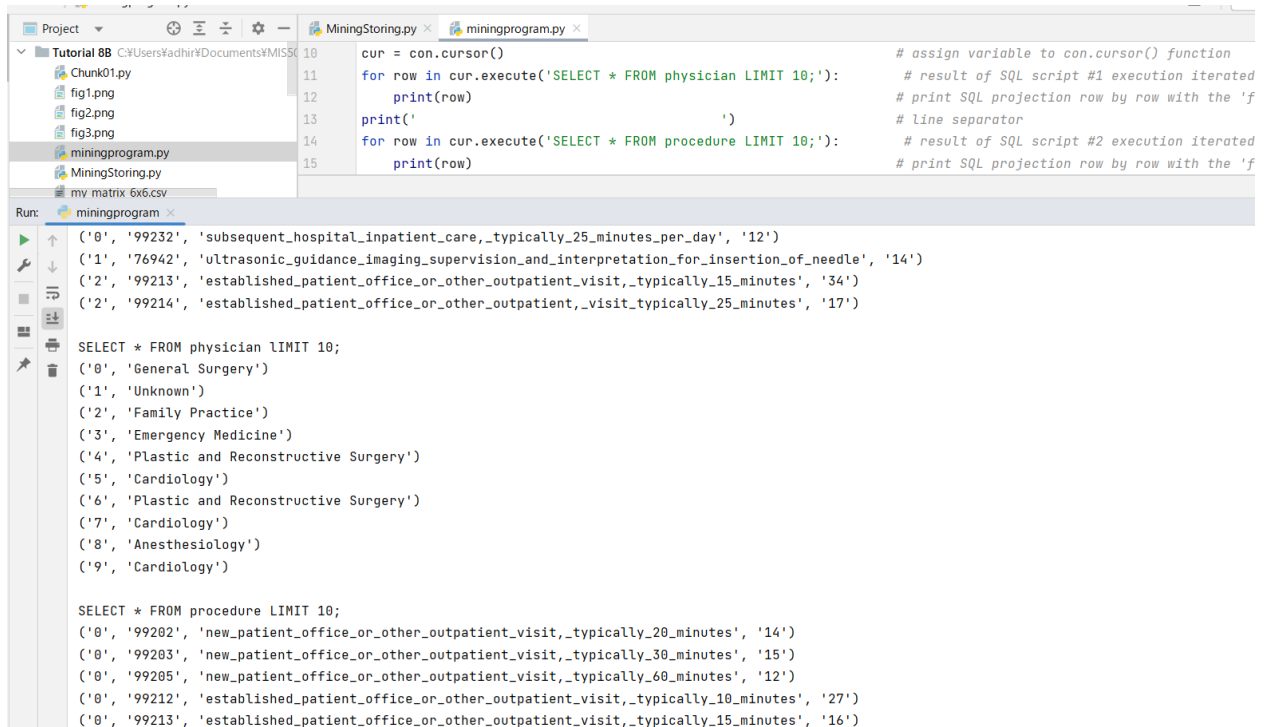
[[ 3 12 10]
 [ 1 5 2]] = Array A ~ Array A type:  <class 'numpy.ndarray'>
[[ 3 1]
 [12 5]
 [10 2]] = Array A transposed
[[ 3 12 10]
 [ 1 5 2]] = Array A transpose, transpose = Array A
[[ 4 8 6]
 [ 7 11 9]] = Array B ~ Array B type:  <class 'numpy.ndarray'>
[[168 243]
 [ 56 80]] = Array AxBT = np.dot(A, B.T) ~ Array AxBT type:  <class 'numpy.ndarray'>
[[ 5 14 12]
 [ 3 7 4]] = Array C = Array A + 2 ~ Array C type:  <class 'numpy.ndarray'>
[[ 9 144 100]
 [ 1 25 4]] = Array C2 = Array A**2 ~ Array C2 type:  <class 'numpy.ndarray'>
[[ 1 24 23]
 [-4 5 -6]
 [ 8 -8 8]] = Array C3 is a 3x3 ~ Array C3 type:  <class 'numpy.ndarray'>
[1 5 8] = Array C4 is the C3 diagonal ~ Array C4 type:  <class 'numpy.ndarray'>
[[ 3 12 10]
 [ 1 5 2]] = matrix A = array A ~ matrix A type:  <class 'numpy.matrix'>
..... matrix A sum = 33 | mean = 5.5 | std = 4.112987559751022 | variance = 16.916666666666668
..... matrix.nonzero() returns indices of nonzero elements ~ (array([0, 0, 0, 1, 1, 1], dtype=int64), array([0, 1, 2
[[-1 4 4]
 [-6 -6 -7]] = A-B results when array B is subtracted from matrix A
[[ 7 20 16]
 [ 8 16 11]] = A+B results when array B is added to matrix A
[[168 243]
 [ 56 80]] = A.dot(B.T) results when matrix A is multiplied by array B transposed

[[-1 4 4]
 [-6 -6 -7]] = A-B results when array B is subtracted from matrix A
[[ 7 20 16]
 [ 8 16 11]] = A+B results when array B is added to matrix A
[[168 243]
 [ 56 80]] = A.dot(B.T) results when matrix A is multiplied by array B transposed
0 1 2
0 3 12 10
1 1 5 2 = matrix A as a Pandas Dataframe ~ type(A_df) = <class 'pandas.core.frame.DataFrame'>

```

Process finished with exit code 0

|



```

MiningStoring.py 10 cur = con.cursor() # assign variable to con.cursor() function
11 for row in cur.execute('SELECT * FROM physician LIMIT 10;'): # result of SQL script #1 execution iterated
12     print(row) # print SQL projection row by row with the 'f
13     print('') # line separator
14 for row in cur.execute('SELECT * FROM procedure LIMIT 10;'): # result of SQL script #2 execution iterated
15     print(row) # print SQL projection row by row with the 'f

Run: miningprogram
('0', '99232', 'subsequent_hospital_inpatient_care,_typically_25_minutes_per_day', '12')
('1', '76942', 'ultrasonic_guidance_imaging_supervision_and_interpretation_for_insertion_of_needle', '14')
('2', '99213', 'established_patient_office_or_other_outpatient_visit,_typically_15_minutes', '34')
('2', '99214', 'established_patient_office_or_other_outpatient,_visit_typically_25_minutes', '17')

SELECT * FROM physician LIMIT 10;
('0', 'General Surgery')
('1', 'Unknown')
('2', 'Family Practice')
('3', 'Emergency Medicine')
('4', 'Plastic and Reconstructive Surgery')
('5', 'Cardiology')
('6', 'Plastic and Reconstructive Surgery')
('7', 'Cardiology')
('8', 'Anesthesiology')
('9', 'Cardiology')

SELECT * FROM procedure LIMIT 10;
('0', '99202', 'new_patient_office_or_other_outpatient_visit,_typically_20_minutes', '14')
('0', '99203', 'new_patient_office_or_other_outpatient_visit,_typically_30_minutes', '15')
('0', '99205', 'new_patient_office_or_other_outpatient_visit,_typically_60_minutes', '12')
('0', '99212', 'established_patient_office_or_other_outpatient_visit,_typically_10_minutes', '27')
('0', '99213', 'established_patient_office_or_other_outpatient_visit,_typically_15_minutes', '16')

```

Complete ss→

```
C:\Users\adhir\anaconda\python.exe "C:\Users\adhir\Documents\MIS502\Tutorial 8B\miningprogram.py"
('0', 'General Surgery')
('1', 'Unknown')
('2', 'Family Practice')
('3', 'Emergency Medicine')
('4', 'Plastic and Reconstructive Surgery')
('5', 'Cardiology')
('6', 'Plastic and Reconstructive Surgery')
('7', 'Cardiology')
('8', 'Anesthesiology')
('9', 'Cardiology')

('0', '99202', 'new_patient_office_or_other_outpatient_visit,_typically_20_minutes', '14')
('0', '99203', 'new_patient_office_or_other_outpatient_visit,_typically_30_minutes', '15')
('0', '99205', 'new_patient_office_or_other_outpatient_visit,_typically_60_minutes', '12')
('0', '99212', 'established_patient_office_or_other_outpatient_visit,_typically_10_minutes', '27')
('0', '99213', 'established_patient_office_or_other_outpatient_visit,_typically_15_minutes', '16')
('0', '99221', 'initial_hospital_inpatient_care,_typically_30_minutes_per_day', '13')
('0', '99232', 'subsequent_hospital_inpatient_care,_typically_25_minutes_per_day', '12')
('1', '76942', 'ultrasonic_guidance_imaging_supervision_and_interpretation_for_insertion_of_needle', '14')
('2', '99213', 'established_patient_office_or_other_outpatient_visit,_typically_15_minutes', '34')
('2', '99214', 'established_patient_office_or_other_outpatient,_visit_ttypically_25_minutes', '17')

SELECT * FROM physician LIMIT 10;
('0', 'General Surgery')
('1', 'Unknown')
('2', 'Family Practice')
('3', 'Emergency Medicine')
('4', 'Plastic and Reconstructive Surgery')
('5', 'Cardiology')
('6', 'Plastic and Reconstructive Surgery')
('7', 'Cardiology')
('8', 'Anesthesiology')
('9', 'Cardiology')

SELECT * FROM procedure LIMIT 10;
('0', '99202', 'new_patient_office_or_other_outpatient_visit,_typically_20_minutes', '14')
('0', '99203', 'new_patient_office_or_other_outpatient_visit,_typically_30_minutes', '15')
('0', '99205', 'new_patient_office_or_other_outpatient_visit,_typically_60_minutes', '12')
('0', '99212', 'established_patient_office_or_other_outpatient_visit,_typically_10_minutes', '27')
('0', '99213', 'established_patient_office_or_other_outpatient_visit,_typically_15_minutes', '16')
('0', '99221', 'initial_hospital_inpatient_care,_typically_30_minutes_per_day', '13')
('0', '99232', 'subsequent_hospital_inpatient_care,_typically_25_minutes_per_day', '12')
('1', '76942', 'ultrasonic_guidance_imaging_supervision_and_interpretation_for_insertion_of_needle', '14')
('2', '99213', 'established_patient_office_or_other_outpatient_visit,_typically_15_minutes', '34')
('2', '99214', 'established_patient_office_or_other_outpatient,_visit_ttypically_25_minutes', '17')
physician_id      specialty
0                 General Surgery
1                 Unknown
2                 Family Practice
3                 Emergency Medicine
(36025, 2)
```

```
[[6. 3. 5. 5. 4. 2.]
 [6. 6. 5. 3. 2. 2.]
 [6. 1. 8. 6. 3. 1.]
 [6. 4. 7. 6. 2. 2.]
 [6. 5. 5. 7. 2. 2.]
 [6. 4. 3. 7. 4. 2.]] <class 'numpy.ndarray'>

[[36.  9. 25. 25. 16.  4.]
 [36. 36. 25.  9.  4.  4.]
 [36.  1. 64. 36.  9.  1.]
 [36. 16. 49. 36.  4.  4.]
 [36. 25. 25. 49.  4.  4.]
 [36. 16.  9. 49. 16.  4.]] <class 'numpy.matrix'>
[[6 3 5 4 2]
 [6 6 5 3 2 2]
 [6 1 8 6 3 1]
 [6 4 6 6 2 2]
 [6 5 6 7 2 2]] <class 'numpy.ndarray'>

[[36  9  9 25 16  4]
 [36 36 25  9  4  4]
 [36  1 64 36  9  1]
 [36 16 36 36  4  4]
 [36 25 36 49  4  4]] <class 'numpy.matrix'>

[[6 3 4 6 4 1]
 [6 5 7 6 5 2]
 [6 7 3 7 2 2]
 [6 5 8 4 3 1]
 [6 7 7 6 3 2]] <class 'numpy.ndarray'>

[[36  9 16 36 16  1]
 [36 25 49 36 25  4]
 [36 49  9 49  4  4]
 [36 25 64 16  9  1]
 [36 49 49 36  9  4]] <class 'numpy.matrix'>
[[6 7 2 6 3 2]
 [6 7 2 3 1 2]
 [6 6 3 3 2 2]
 [6 5 5 7 3 1]
 [6 7 0 7 3 1]] <class 'numpy.ndarray'>

[[36 49  4 36  9  4]
 [36 49  4  9  1  4]
 [36 36  9  9  4  4]
 [36 25 25 49  9  1]
 [36 49  0 49  9  1]] <class 'numpy.matrix'>
[[6 6 7 6 4 2]
 [6 3 6 4 4 2]
 [6 5 7 6 4 1]
 [6 3 7 3 3 2]
 [6 3 8 4 3 2]] <class 'numpy.ndarray'>

[[36 36 49 36 16  4]
 [36  9 36 16 16  4]
 [36 25 49 36 16  1]
 [36  9 49  9  9  4]
 [36  9 64 16  9  4]] <class 'numpy.matrix'>
[[7 4 8 4 3 2]
 [7 5 6 2 2 1]
 [7 4 5 4 3 1]
 [7 2 4 4 3 2]
 [7 6 2 6 3 2]] <class 'numpy.ndarray'>

[[49 16 64 16  9  4]
 [49 25 36  4  4  1]
 [49 16 25 16  9  1]
 [49  4 16 16  9  4]
 [49 36  4 36  9  4]] <class 'numpy.matrix'>
```

Process finished with exit code 0