Project

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline

DDoS_df = pd.read_csv("C:/Users/Lenovo/Documents/Data Set/DDoS.csv")

C:\Users\Lenovo\AppData\Local\Temp\ipykernel_8692\1313474350.py:1:
DtypeWarning: Columns (8,10) have mixed types. Specify dtype option on
import or set low_memory=False.
  DDoS_df = pd.read_csv("C:/Users/Lenovo/Documents/Data Set/DDoS.csv")

DDoS_df

         Unnamed: 0  pkSeqID         stime flgs  flgs_number proto  \
0           1650261  1650261  1.528103e+09    e            1   tcp
1           1650262  1650262  1.528103e+09    e            1   tcp
2           1650263  1650263  1.528103e+09    e            1   tcp
3           1650264  1650264  1.528103e+09    e            1   tcp
4           1650265  1650265  1.528103e+09    e            1   tcp
...             ...      ...           ...  ...          ...   ...
1927096     3577359  3577357  1.526352e+09    e            1   udp
1927097     3577360  3577358  1.526352e+09    e            1   udp
1927098     3577361  3577359  1.526352e+09    e            1   udp
1927099     3577362  3577360  1.526352e+09    e            1   udp
1927100     3577363  3577361  1.526352e+09    e            1   udp

         proto_number            saddr  sport            daddr  ...  \
0                   1  192.168.100.150  54110    192.168.100.3  ...
1                   1  192.168.100.150  54112    192.168.100.3  ...
2                   1  192.168.100.150  54114    192.168.100.3  ...
3                   1  192.168.100.150  54116    192.168.100.3  ...
4                   1  192.168.100.150  54118    192.168.100.3  ...
...               ...              ...    ...              ...  ...
1927096             3    192.168.100.3  36242  205.251.194.102  ...
1927097             3    192.168.100.3  63574  205.251.194.102  ...
1927098             3    192.168.100.3  59485  205.251.194.154  ...
1927099             3    192.168.100.3  20844     192.31.80.30  ...
1927100             3    192.168.100.3  31102     192.31.80.30  ...

        AR_P_Proto_P_DstIP  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  \
0                  1.21662                 40                 38
1                  1.21662                 40                 38
2                  1.21662                 40                 38
3                  1.21662                 40                 38
4                  1.21662                 40                 38
...                    ...                ...                ...
```

```
1927096            6.83201                 2                 74
1927097            6.83201                 2                 74
1927098            7.19694                 1                 74
1927099            7.12689                 2                 74
1927100            7.12689                 2                 74

        AR_P_Proto_P_Sport  AR_P_Proto_P_Dport  \
0                  1.56093             1.21662
1                  1.56107             1.21662
2                  1.24980             1.21662
3                  1.24986             1.21662
4                  1.24991             1.21662
...                    ...                 ...
1927096            6.81487             9.49326
1927097            6.84924             9.49326
1927098            7.19694             9.49326
1927099            7.12398             9.49326
1927100            7.12979             9.49326

         Pkts_P_State_P_Protocol_P_DestIP
Pkts_P_State_P_Protocol_P_SrcIP  \
0                                     328
308
1                                     328
308
2                                     328
308
3                                     328
308
4                                     328
308
...                                   ...
...
1927096                                 4
122
1927097                                 4
122
1927098                                 2
122
1927099                                 4
122
1927100                                 4
122

         attack  category  subcategory
0             1      DDoS         HTTP
1             1      DDoS         HTTP
2             1      DDoS         HTTP
3             1      DDoS         HTTP
4             1      DDoS         HTTP
```

```
...          ...       ...          ...
1927096       0    Normal       Normal
1927097       0    Normal       Normal
1927098       0    Normal       Normal
1927099       0    Normal       Normal
1927100       0    Normal       Normal

[1927101 rows x 47 columns]
```

```
set(DDoS_df["category"])
```

```
{'DDoS', 'Normal'}
```

```
set(DDoS_df["subcategory"])
```

```
{'HTTP', 'Normal', 'TCP', 'UDP'}
```

```
set(DDoS_df["flgs"])
```

```
{'e', 'e &', 'e *', 'e d', 'e g', 'e s', 'eU'}
```

```
DDoS_df.head()
```

```
   Unnamed: 0  pkSeqID         stime flgs  flgs_number proto
proto_number  \
0     1650261  1650261  1.528103e+09    e            1   tcp
1
1     1650262  1650262  1.528103e+09    e            1   tcp
1
2     1650263  1650263  1.528103e+09    e            1   tcp
1
3     1650264  1650264  1.528103e+09    e            1   tcp
1
4     1650265  1650265  1.528103e+09    e            1   tcp
1

              saddr  sport          daddr  ... AR_P_Proto_P_DstIP  \
0  192.168.100.150  54110  192.168.100.3  ...            1.21662
1  192.168.100.150  54112  192.168.100.3  ...            1.21662
2  192.168.100.150  54114  192.168.100.3  ...            1.21662
3  192.168.100.150  54116  192.168.100.3  ...            1.21662
4  192.168.100.150  54118  192.168.100.3  ...            1.21662

   N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP AR_P_Proto_P_Sport  \
0                 40                 38           1.56093
1                 40                 38           1.56107
2                 40                 38           1.24980
3                 40                 38           1.24986
4                 40                 38           1.24991

   AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
```

```
0             1.21662                                328
1             1.21662                                328
2             1.21662                                328
3             1.21662                                328
4             1.21662                                328

   Pkts_P_State_P_Protocol_P_SrcIP  attack  category  subcategory
0                              308       1      DDoS         HTTP
1                              308       1      DDoS         HTTP
2                              308       1      DDoS         HTTP
3                              308       1      DDoS         HTTP
4                              308       1      DDoS         HTTP

[5 rows x 47 columns]
```

```
DDoS_df.tail()
```

```
         Unnamed: 0  pkSeqID         stime flgs  flgs_number proto  \
1927096     3577359  3577357  1.526352e+09    e            1   udp
1927097     3577360  3577358  1.526352e+09    e            1   udp
1927098     3577361  3577359  1.526352e+09    e            1   udp
1927099     3577362  3577360  1.526352e+09    e            1   udp
1927100     3577363  3577361  1.526352e+09    e            1   udp

         proto_number          saddr  sport            daddr  ...  \
1927096             3  192.168.100.3  36242  205.251.194.102  ...
1927097             3  192.168.100.3  63574  205.251.194.102  ...
1927098             3  192.168.100.3  59485  205.251.194.154  ...
1927099             3  192.168.100.3  20844     192.31.80.30  ...
1927100             3  192.168.100.3  31102     192.31.80.30  ...

        AR_P_Proto_P_DstIP  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  \
1927096            6.83201                  2                 74
1927097            6.83201                  2                 74
1927098            7.19694                  1                 74
1927099            7.12689                  2                 74
1927100            7.12689                  2                 74

        AR_P_Proto_P_Sport  AR_P_Proto_P_Dport  \
1927096            6.81487             9.49326
1927097            6.84924             9.49326
1927098            7.19694             9.49326
1927099            7.12398             9.49326
1927100            7.12979             9.49326

         Pkts_P_State_P_Protocol_P_DestIP
Pkts_P_State_P_Protocol_P_SrcIP  \
1927096                                4
122
1927097                                4
```

```
122
1927098                                    2
122
1927099                                    4
122
1927100                                    4
122

         attack  category  subcategory
1927096       0    Normal       Normal
1927097       0    Normal       Normal
1927098       0    Normal       Normal
1927099       0    Normal       Normal
1927100       0    Normal       Normal

[5 rows x 47 columns]
```

```
DDoS_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1927101 entries, 0 to 1927100
Data columns (total 47 columns):
 #   Column                                Dtype
---  ------                                -----
 0   Unnamed: 0                            int64
 1   pkSeqID                               int64
 2   stime                                 float64
 3   flgs                                  object
 4   flgs_number                           int64
 5   proto                                 object
 6   proto_number                          int64
 7   saddr                                 object
 8   sport                                 object
 9   daddr                                 object
 10  dport                                 object
 11  pkts                                  int64
 12  bytes                                 int64
 13  state                                 object
 14  state_number                          int64
 15  ltime                                 float64
 16  seq                                   int64
 17  dur                                   float64
 18  mean                                  float64
 19  stddev                                float64
 20  sum                                   float64
 21  min                                   float64
 22  max                                   float64
 23  spkts                                 int64
 24  dpkts                                 int64
 25  sbytes                                int64
```

```
 26  dbytes                              int64
 27  rate                                float64
 28  srate                               float64
 29  drate                               float64
 30  TnBPSrcIP                           int64
 31  TnBPDstIP                           int64
 32  TnP_PSrcIP                          int64
 33  TnP_PDstIP                          int64
 34  TnP_PerProto                        int64
 35  TnP_Per_Dport                       int64
 36  AR_P_Proto_P_SrcIP                  float64
 37  AR_P_Proto_P_DstIP                  float64
 38  N_IN_Conn_P_DstIP                   int64
 39  N_IN_Conn_P_SrcIP                   int64
 40  AR_P_Proto_P_Sport                  float64
 41  AR_P_Proto_P_Dport                  float64
 42  Pkts_P_State_P_Protocol_P_DestIP    int64
 43  Pkts_P_State_P_Protocol_P_SrcIP     int64
 44  attack                              int64
 45  category                            object
 46  subcategory                         object
dtypes: float64(15), int64(23), object(9)
memory usage: 691.0+ MB
```

```
set(DDoS_df["proto"])
```

```
{'arp', 'icmp', 'ipv6-icmp', 'tcp', 'udp'}
```

```
DDoS_df.isnull().sum()
```

```
Unnamed: 0                          0
pkSeqID                             0
stime                               0
flgs                                0
flgs_number                         0
proto                               0
proto_number                        0
saddr                               0
sport                               0
daddr                               0
dport                               0
pkts                                0
bytes                               0
state                               0
state_number                        0
ltime                               0
seq                                 0
dur                                 0
mean                                0
stddev                              0
sum                                 0
```

```
min                                 0
max                                 0
spkts                               0
dpkts                               0
sbytes                              0
dbytes                              0
rate                                0
srate                               0
drate                               0
TnBPSrcIP                           0
TnBPDstIP                           0
TnP_PSrcIP                          0
TnP_PDstIP                          0
TnP_PerProto                        0
TnP_Per_Dport                       0
AR_P_Proto_P_SrcIP                  0
AR_P_Proto_P_DstIP                  0
N_IN_Conn_P_DstIP                   0
N_IN_Conn_P_SrcIP                   0
AR_P_Proto_P_Sport                  0
AR_P_Proto_P_Dport                  0
Pkts_P_State_P_Protocol_P_DestIP    0
Pkts_P_State_P_Protocol_P_SrcIP     0
attack                              0
category                            0
subcategory                         0
dtype: int64
```

```
DDoS_cdf = DDoS_df.drop(["Unnamed:
0","pkSeqID","stime","flgs","daddr","state","proto","saddr","sport","d
port"],axis = 1)
```

```
DDoS_cdf
```

```
         flgs_number  proto_number  pkts  bytes  state_number
ltime  \
0                  1             1    10   1729             1
1.528103e+09
1                  1             1    10   1604             1
1.528103e+09
2                  1             1     8   1708             1
1.528103e+09
3                  1             1     8   1462             1
1.528103e+09
4                  1             1     8   1296             1
1.528103e+09
...              ...           ...   ...    ...           ...
...
1927096            1             3     2    397             2
1.526352e+09
1927097            1             3     2    297             2
```

```
1.526352e+09
1927098            1             3     2    337             2
1.526352e+09
1927099            1             3     2    936             2
1.526352e+09
1927100            1             3     2    936             2
1.526352e+09

          seq       dur      mean    stddev  ...
AR_P_Proto_P_DstIP  \
0          20  6.406424  0.679473  0.544126  ...             1.21662

1          21  6.405851  0.679572  0.544197  ...             1.21662

2          22  6.401038  1.110847  1.110847  ...             1.21662

3          23  6.400703  1.113328  1.113328  ...             1.21662

4          24  6.400472  1.113098  1.113098  ...             1.21662

...       ...       ...       ...       ...  ...                 ...

1927096  3808  0.293476  0.293476  0.000000  ...             6.83201

1927097  3809  0.292003  0.292003  0.000000  ...             6.83201

1927098  3815  0.277896  0.277896  0.000000  ...             7.19694

1927099  3816  0.280742  0.280742  0.000000  ...             7.12689

1927100  3817  0.280513  0.280513  0.000000  ...             7.12689


         N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  \
0                       40                 38             1.56093
1                       40                 38             1.56107
2                       40                 38             1.24980
3                       40                 38             1.24986
4                       40                 38             1.24991
...                    ...                ...                 ...
1927096                  2                 74             6.81487
1927097                  2                 74             6.84924
1927098                  1                 74             7.19694
1927099                  2                 74             7.12398
1927100                  2                 74             7.12979

         AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
0                   1.21662                               328
1                   1.21662                               328
```

```
2                   1.21662                                328
3                   1.21662                                328
4                   1.21662                                328
...                     ...                                ...
1927096             9.49326                                  4
1927097             9.49326                                  4
1927098             9.49326                                  2
1927099             9.49326                                  4
1927100             9.49326                                  4

         Pkts_P_State_P_Protocol_P_SrcIP  attack  category
subcategory
0                                    308       1      DDoS
HTTP
1                                    308       1      DDoS
HTTP
2                                    308       1      DDoS
HTTP
3                                    308       1      DDoS
HTTP
4                                    308       1      DDoS
HTTP
...                                  ...     ...       ...          ..
.
1927096                              122       0    Normal
Normal
1927097                              122       0    Normal
Normal
1927098                              122       0    Normal
Normal
1927099                              122       0    Normal
Normal
1927100                              122       0    Normal
Normal

[1927101 rows x 37 columns]
```

```
DDoS_cdf.shape
```

```
(1927101, 37)
```

Apply Label Encoder

```
from sklearn.preprocessing import LabelEncoder

le_category = LabelEncoder()
print(le_category)
DDoS_cdf["category"] = le_category.fit_transform(DDoS_cdf["category"])

DDoS_cdf
```

```
LabelEncoder()

         flgs_number  proto_number  pkts  bytes  state_number
ltime  \
0                  1             1    10   1729             1
1.528103e+09
1                  1             1    10   1604             1
1.528103e+09
2                  1             1     8   1708             1
1.528103e+09
3                  1             1     8   1462             1
1.528103e+09
4                  1             1     8   1296             1
1.528103e+09
...              ...           ...   ...    ...           ...
...
1927096            1             3     2    397             2
1.526352e+09
1927097            1             3     2    297             2
1.526352e+09
1927098            1             3     2    337             2
1.526352e+09
1927099            1             3     2    936             2
1.526352e+09
1927100            1             3     2    936             2
1.526352e+09

          seq       dur      mean    stddev  ...
AR_P_Proto_P_DstIP  \
0          20  6.406424  0.679473  0.544126  ...              1.21662

1          21  6.405851  0.679572  0.544197  ...              1.21662

2          22  6.401038  1.110847  1.110847  ...              1.21662

3          23  6.400703  1.113328  1.113328  ...              1.21662

4          24  6.400472  1.113098  1.113098  ...              1.21662

...       ...       ...       ...       ...  ...                  ...

1927096  3808  0.293476  0.293476  0.000000  ...              6.83201

1927097  3809  0.292003  0.292003  0.000000  ...              6.83201

1927098  3815  0.277896  0.277896  0.000000  ...              7.19694

1927099  3816  0.280742  0.280742  0.000000  ...              7.12689
```

```
1927100  3817  0.280513  0.280513  0.000000  ...             7.12689


         N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  \
0                       40                 38             1.56093
1                       40                 38             1.56107
2                       40                 38             1.24980
3                       40                 38             1.24986
4                       40                 38             1.24991
...                    ...                ...                 ...
1927096                  2                 74             6.81487
1927097                  2                 74             6.84924
1927098                  1                 74             7.19694
1927099                  2                 74             7.12398
1927100                  2                 74             7.12979

         AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
0                   1.21662                               328
1                   1.21662                               328
2                   1.21662                               328
3                   1.21662                               328
4                   1.21662                               328
...                     ...                               ...
1927096             9.49326                                 4
1927097             9.49326                                 4
1927098             9.49326                                 2
1927099             9.49326                                 4
1927100             9.49326                                 4

         Pkts_P_State_P_Protocol_P_SrcIP  attack  category
subcategory
0                                    308       1         0
HTTP
1                                    308       1         0
HTTP
2                                    308       1         0
HTTP
3                                    308       1         0
HTTP
4                                    308       1         0
HTTP
...                                  ...     ...       ...          ..
.
1927096                              122       0         1
Normal
1927097                              122       0         1
Normal
1927098                              122       0         1
Normal
1927099                              122       0         1
```

```
Normal
1927100                                122       0         1
Normal

[1927101 rows x 37 columns]
```

```
le_subcategory = LabelEncoder()
print(le_subcategory)
DDoS_cdf["subcategory"] =
le_subcategory.fit_transform(DDoS_cdf["subcategory"])
DDoS_cdf
```

```
LabelEncoder()
```

```
         flgs_number  proto_number  pkts  bytes  state_number
ltime  \
0                  1             1    10   1729             1
1.528103e+09
1                  1             1    10   1604             1
1.528103e+09
2                  1             1     8   1708             1
1.528103e+09
3                  1             1     8   1462             1
1.528103e+09
4                  1             1     8   1296             1
1.528103e+09
...              ...           ...   ...    ...           ...
...
1927096            1             3     2    397             2
1.526352e+09
1927097            1             3     2    297             2
1.526352e+09
1927098            1             3     2    337             2
1.526352e+09
1927099            1             3     2    936             2
1.526352e+09
1927100            1             3     2    936             2
1.526352e+09

          seq       dur      mean    stddev  ...
AR_P_Proto_P_DstIP  \
0          20  6.406424  0.679473  0.544126  ...             1.21662

1          21  6.405851  0.679572  0.544197  ...             1.21662

2          22  6.401038  1.110847  1.110847  ...             1.21662

3          23  6.400703  1.113328  1.113328  ...             1.21662

4          24  6.400472  1.113098  1.113098  ...             1.21662
```

```
...       ...       ...       ...       ...  ...                ...

1927096  3808  0.293476  0.293476  0.000000  ...             6.83201

1927097  3809  0.292003  0.292003  0.000000  ...             6.83201

1927098  3815  0.277896  0.277896  0.000000  ...             7.19694

1927099  3816  0.280742  0.280742  0.000000  ...             7.12689

1927100  3817  0.280513  0.280513  0.000000  ...             7.12689


         N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  \
0                       40                 38             1.56093
1                       40                 38             1.56107
2                       40                 38             1.24980
3                       40                 38             1.24986
4                       40                 38             1.24991
...                    ...                ...                 ...
1927096                  2                 74             6.81487
1927097                  2                 74             6.84924
1927098                  1                 74             7.19694
1927099                  2                 74             7.12398
1927100                  2                 74             7.12979

         AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
0                   1.21662                               328
1                   1.21662                               328
2                   1.21662                               328
3                   1.21662                               328
4                   1.21662                               328
...                     ...                               ...
1927096             9.49326                                 4
1927097             9.49326                                 4
1927098             9.49326                                 2
1927099             9.49326                                 4
1927100             9.49326                                 4

         Pkts_P_State_P_Protocol_P_SrcIP  attack  category
subcategory
0                                    308       1         0
0
1                                    308       1         0
0
2                                    308       1         0
0
3                                    308       1         0
```

```
4                                   308       1         0
0
...                                 ...     ...       ...          ..
.
1927096                             122       0         1
1
1927097                             122       0         1
1
1927098                             122       0         1
1
1927099                             122       0         1
1
1927100                             122       0         1
1

[1927101 rows x 37 columns]
```

```
le_ltime = LabelEncoder()
print(le_ltime)
DDoS_cdf["ltime"] = le_ltime.fit_transform(DDoS_cdf["ltime"])
DDoS_cdf.astype(float)
```

```
LabelEncoder()
```

```
         flgs_number  proto_number  pkts   bytes  state_number
ltime  \
0                1.0           1.0  10.0  1729.0           1.0
182114.0
1                1.0           1.0  10.0  1604.0           1.0
182115.0
2                1.0           1.0   8.0  1708.0           1.0
182116.0
3                1.0           1.0   8.0  1462.0           1.0
182117.0
4                1.0           1.0   8.0  1296.0           1.0
182118.0
...              ...           ...   ...     ...           ...       .
..
1927096          1.0           3.0   2.0   397.0           2.0
455.0
1927097          1.0           3.0   2.0   297.0           2.0
456.0
1927098          1.0           3.0   2.0   337.0           2.0
457.0
1927099          1.0           3.0   2.0   936.0           2.0
459.0
1927100          1.0           3.0   2.0   936.0           2.0
458.0

            seq       dur      mean    stddev  ...  AR_P_Proto_P_DstIP
```

```
\
0          20.0  6.406424  0.679473  0.544126  ...             1.21662

1          21.0  6.405851  0.679572  0.544197  ...             1.21662

2          22.0  6.401038  1.110847  1.110847  ...             1.21662

3          23.0  6.400703  1.113328  1.113328  ...             1.21662

4          24.0  6.400472  1.113098  1.113098  ...             1.21662

...         ...       ...       ...       ...  ...                 ...

1927096  3808.0  0.293476  0.293476  0.000000  ...             6.83201

1927097  3809.0  0.292003  0.292003  0.000000  ...             6.83201

1927098  3815.0  0.277896  0.277896  0.000000  ...             7.19694

1927099  3816.0  0.280742  0.280742  0.000000  ...             7.12689

1927100  3817.0  0.280513  0.280513  0.000000  ...             7.12689


         N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  \
0                     40.0               38.0             1.56093
1                     40.0               38.0             1.56107
2                     40.0               38.0             1.24980
3                     40.0               38.0             1.24986
4                     40.0               38.0             1.24991
...                    ...                ...                 ...
1927096                2.0               74.0             6.81487
1927097                2.0               74.0             6.84924
1927098                1.0               74.0             7.19694
1927099                2.0               74.0             7.12398
1927100                2.0               74.0             7.12979

         AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
0                   1.21662                             328.0
1                   1.21662                             328.0
2                   1.21662                             328.0
3                   1.21662                             328.0
4                   1.21662                             328.0
...                     ...                               ...
1927096             9.49326                               4.0
1927097             9.49326                               4.0
1927098             9.49326                               2.0
1927099             9.49326                               4.0
1927100             9.49326                               4.0
```

```
         Pkts_P_State_P_Protocol_P_SrcIP  attack  category
subcategory
0                                  308.0     1.0       0.0
0.0
1                                  308.0     1.0       0.0
0.0
2                                  308.0     1.0       0.0
0.0
3                                  308.0     1.0       0.0
0.0
4                                  308.0     1.0       0.0
0.0
...                                  ...     ...       ...          ..
.
1927096                            122.0     0.0       1.0
1.0
1927097                            122.0     0.0       1.0
1.0
1927098                            122.0     0.0       1.0
1.0
1927099                            122.0     0.0       1.0
1.0
1927100                            122.0     0.0       1.0
1.0

[1927101 rows x 37 columns]
```

```
DDoS_cdf.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1927101 entries, 0 to 1927100
Data columns (total 37 columns):
 #   Column                             Dtype
---  ------                             -----
 0   flgs_number                        int64
 1   proto_number                       int64
 2   pkts                               int64
 3   bytes                              int64
 4   state_number                       int64
 5   ltime                              int64
 6   seq                                int64
 7   dur                                float64
 8   mean                               float64
 9   stddev                             float64
 10  sum                                float64
 11  min                                float64
 12  max                                float64
 13  spkts                              int64
 14  dpkts                              int64
```

```
 15  sbytes                              int64
 16  dbytes                              int64
 17  rate                                float64
 18  srate                               float64
 19  drate                               float64
 20  TnBPSrcIP                           int64
 21  TnBPDstIP                           int64
 22  TnP_PSrcIP                          int64
 23  TnP_PDstIP                          int64
 24  TnP_PerProto                        int64
 25  TnP_Per_Dport                       int64
 26  AR_P_Proto_P_SrcIP                  float64
 27  AR_P_Proto_P_DstIP                  float64
 28  N_IN_Conn_P_DstIP                   int64
 29  N_IN_Conn_P_SrcIP                   int64
 30  AR_P_Proto_P_Sport                  float64
 31  AR_P_Proto_P_Dport                  float64
 32  Pkts_P_State_P_Protocol_P_DestIP    int64
 33  Pkts_P_State_P_Protocol_P_SrcIP     int64
 34  attack                              int64
 35  category                            int32
 36  subcategory                         int32
dtypes: float64(13), int32(2), int64(22)
memory usage: 529.3 MB
```

Apply Variance

```
import pandas as pd
from sklearn.feature_selection import VarianceThreshold

DDoS_cdf
```

```
         flgs_number  proto_number  pkts  bytes  state_number   ltime
seq  \
0                  1             1    10   1729             1  182114
20
1                  1             1    10   1604             1  182115
21
2                  1             1     8   1708             1  182116
22
3                  1             1     8   1462             1  182117
23
4                  1             1     8   1296             1  182118
24
...              ...           ...   ...    ...           ...     ...
...
1927096            1             3     2    397             2     455
3808
1927097            1             3     2    297             2     456
3809
```

```
1927098            1             3     2    337             2     457
3815
1927099            1             3     2    936             2     459
3816
1927100            1             3     2    936             2     458
3817

              dur      mean    stddev  ...  AR_P_Proto_P_DstIP  \
0        6.406424  0.679473  0.544126  ...             1.21662
1        6.405851  0.679572  0.544197  ...             1.21662
2        6.401038  1.110847  1.110847  ...             1.21662
3        6.400703  1.113328  1.113328  ...             1.21662
4        6.400472  1.113098  1.113098  ...             1.21662
...           ...       ...       ...  ...                 ...
1927096  0.293476  0.293476  0.000000  ...             6.83201
1927097  0.292003  0.292003  0.000000  ...             6.83201
1927098  0.277896  0.277896  0.000000  ...             7.19694
1927099  0.280742  0.280742  0.000000  ...             7.12689
1927100  0.280513  0.280513  0.000000  ...             7.12689

         N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  \
0                       40                 38             1.56093
1                       40                 38             1.56107
2                       40                 38             1.24980
3                       40                 38             1.24986
4                       40                 38             1.24991
...                    ...                ...                 ...
1927096                  2                 74             6.81487
1927097                  2                 74             6.84924
1927098                  1                 74             7.19694
1927099                  2                 74             7.12398
1927100                  2                 74             7.12979

         AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
0                   1.21662                               328
1                   1.21662                               328
2                   1.21662                               328
3                   1.21662                               328
4                   1.21662                               328
...                     ...                               ...
1927096             9.49326                                 4
1927097             9.49326                                 4
1927098             9.49326                                 2
1927099             9.49326                                 4
1927100             9.49326                                 4

         Pkts_P_State_P_Protocol_P_SrcIP  attack  category
subcategory
0                                    308       1         0
0
```

```
1                                   308       1         0
0
2                                   308       1         0
0
3                                   308       1         0
0
4                                   308       1         0
0
...                                 ...     ...       ...          ..
.
1927096                             122       0         1
1
1927097                             122       0         1
1
1927098                             122       0         1
1
1927099                             122       0         1
1
1927100                             122       0         1
1

[1927101 rows x 37 columns]
```

```
DDoS_cdf.shape
```

```
(1927101, 37)
```

```
var_thres=VarianceThreshold(threshold=0.5)
var_thres.fit(DDoS_cdf)
```

```
VarianceThreshold(threshold=0.5)
```

```
#which column is having good variaty of data means good variance
var_thres.get_support()
```

```
array([False,  True,  True,  True,  True,  True,  True,  True,  True,
        True,  True,  True,  True,  True,  True,  True,  True,  True,
        True,  True,  True,  True,  True,  True,  True,  True,  True,
        True,  True,  True,  True,  True,  True,  True, False, False,
       False])
```

```
DDoS_cdf.columns[var_thres.get_support() == True]
```

```
Index(['proto_number', 'pkts', 'bytes', 'state_number', 'ltime',
'seq', 'dur',
       'mean', 'stddev', 'sum', 'min', 'max', 'spkts', 'dpkts',
'sbytes',
       'dbytes', 'rate', 'srate', 'drate', 'TnBPSrcIP', 'TnBPDstIP',
       'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PerProto', 'TnP_Per_Dport',
       'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP',
'N_IN_Conn_P_DstIP',
       'N_IN_Conn_P_SrcIP', 'AR_P_Proto_P_Sport',
```

```
'AR_P_Proto_P_Dport',
       'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_SrcIP'],
      dtype='object')

columns_having_var_more_than_50 =
DDoS_cdf.columns[var_thres.get_support() == True]

len(columns_having_var_more_than_50)

33

len(DDoS_cdf.columns)

37

37-33

4

DDoS_cdf.columns[var_thres.get_support() == False]

Index(['flgs_number', 'attack', 'category', 'subcategory'],
dtype='object')

columns_having_var_less_than_50 =
DDoS_cdf.columns[var_thres.get_support() == False]

len(columns_having_var_less_than_50)

4

DDoS_cdf

         flgs_number  proto_number  pkts  bytes  state_number   ltime
seq  \
0                  1             1    10   1729             1  182114
20
1                  1             1    10   1604             1  182115
21
2                  1             1     8   1708             1  182116
22
3                  1             1     8   1462             1  182117
23
4                  1             1     8   1296             1  182118
24
...              ...           ...   ...    ...           ...     ...
...
1927096            1             3     2    397             2     455
3808
1927097            1             3     2    297             2     456
3809
1927098            1             3     2    337             2     457
```

```
3815
1927099            1             3     2    936             2     459
3816
1927100            1             3     2    936             2     458
3817

             dur      mean    stddev  ...  AR_P_Proto_P_DstIP  \
0        6.406424  0.679473  0.544126  ...             1.21662
1        6.405851  0.679572  0.544197  ...             1.21662
2        6.401038  1.110847  1.110847  ...             1.21662
3        6.400703  1.113328  1.113328  ...             1.21662
4        6.400472  1.113098  1.113098  ...             1.21662
...           ...       ...       ...  ...                 ...
1927096  0.293476  0.293476  0.000000  ...             6.83201
1927097  0.292003  0.292003  0.000000  ...             6.83201
1927098  0.277896  0.277896  0.000000  ...             7.19694
1927099  0.280742  0.280742  0.000000  ...             7.12689
1927100  0.280513  0.280513  0.000000  ...             7.12689

         N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  \
0                       40                 38             1.56093
1                       40                 38             1.56107
2                       40                 38             1.24980
3                       40                 38             1.24986
4                       40                 38             1.24991
...                    ...                ...                 ...
1927096                  2                 74             6.81487
1927097                  2                 74             6.84924
1927098                  1                 74             7.19694
1927099                  2                 74             7.12398
1927100                  2                 74             7.12979

         AR_P_Proto_P_Dport  Pkts_P_State_P_Protocol_P_DestIP  \
0                   1.21662                               328
1                   1.21662                               328
2                   1.21662                               328
3                   1.21662                               328
4                   1.21662                               328
...                     ...                               ...
1927096             9.49326                                 4
1927097             9.49326                                 4
1927098             9.49326                                 2
1927099             9.49326                                 4
1927100             9.49326                                 4

         Pkts_P_State_P_Protocol_P_SrcIP  attack  category
subcategory
0                                    308       1         0
0
1                                    308       1         0
```

```
0
2                                    308       1         0
0
3                                    308       1         0
0
4                                    308       1         0
0
...                                  ...     ...       ...          ..
.
1927096                              122       0         1
1
1927097                              122       0         1
1
1927098                              122       0         1
1
1927099                              122       0         1
1
1927100                              122       0         1
1

[1927101 rows x 37 columns]
```

```
DDoS_cdf = DDoS_cdf.drop(columns_having_var_less_than_50,axis= 1)
```

```
DDoS_cdf
```

```
         proto_number  pkts  bytes  state_number   ltime   seq
dur  \
0                   1    10   1729             1  182114    20
6.406424
1                   1    10   1604             1  182115    21
6.405851
2                   1     8   1708             1  182116    22
6.401038
3                   1     8   1462             1  182117    23
6.400703
4                   1     8   1296             1  182118    24
6.400472
...               ...   ...    ...           ...     ...   ...       .
..
1927096             3     2    397             2     455  3808
0.293476
1927097             3     2    297             2     456  3809
0.292003
1927098             3     2    337             2     457  3815
0.277896
1927099             3     2    936             2     459  3816
0.280742
1927100             3     2    936             2     458  3817
0.280513
```

```
             mean    stddev       sum  ...  TnP_PerProto
TnP_Per_Dport  \
0        0.679473  0.544126  1.358946  ...           328
700
1        0.679572  0.544197  1.359144  ...           328
700
2        1.110847  1.110847  2.221694  ...           328
700
3        1.113328  1.113328  2.226655  ...           328
700
4        1.113098  1.113098  2.226195  ...           328
700
...           ...       ...       ...  ...           ...            ..
.
1927096  0.293476  0.000000  0.293476  ...           142
122
1927097  0.292003  0.000000  0.292003  ...           142
122
1927098  0.277896  0.000000  0.277896  ...           142
122
1927099  0.280742  0.000000  0.280742  ...           142
122
1927100  0.280513  0.000000  0.280513  ...           142
122

         AR_P_Proto_P_SrcIP  AR_P_Proto_P_DstIP  N_IN_Conn_P_DstIP  \
0                   1.26889             1.21662                 40
1                   1.26889             1.21662                 40
2                   1.26889             1.21662                 40
3                   1.26889             1.21662                 40
4                   1.26889             1.21662                 40
...                     ...                 ...                ...
1927096             9.49326             6.83201                  2
1927097             9.49326             6.83201                  2
1927098             9.49326             7.19694                  1
1927099             9.49326             7.12689                  2
1927100             9.49326             7.12689                  2

         N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  AR_P_Proto_P_Dport  \
0                       38             1.56093             1.21662
1                       38             1.56107             1.21662
2                       38             1.24980             1.21662
3                       38             1.24986             1.21662
4                       38             1.24991             1.21662
...                    ...                 ...                 ...
1927096                 74             6.81487             9.49326
1927097                 74             6.84924             9.49326
1927098                 74             7.19694             9.49326
1927099                 74             7.12398             9.49326
1927100                 74             7.12979             9.49326
```

```
         Pkts_P_State_P_Protocol_P_DestIP
Pkts_P_State_P_Protocol_P_SrcIP
0                                      328
308
1                                      328
308
2                                      328
308
3                                      328
308
4                                      328
308
...                                    ...
...
1927096                                  4
122
1927097                                  4
122
1927098                                  2
122
1927099                                  4
122
1927100                                  4
122

[1927101 rows x 33 columns]
```

```
set(DDoS_cdf["proto_number"])
```

```
{1, 2, 3, 4, 5}
```

```
DDoS_cdf.columns
```

```
Index(['proto_number', 'pkts', 'bytes', 'state_number', 'ltime',
'seq', 'dur',
       'mean', 'stddev', 'sum', 'min', 'max', 'spkts', 'dpkts',
'sbytes',
       'dbytes', 'rate', 'srate', 'drate', 'TnBPSrcIP', 'TnBPDstIP',
       'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PerProto', 'TnP_Per_Dport',
       'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP',
'N_IN_Conn_P_DstIP',
       'N_IN_Conn_P_SrcIP', 'AR_P_Proto_P_Sport',
'AR_P_Proto_P_Dport',
       'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_SrcIP'],
      dtype='object')
```

Apply Correlation

```
X = DDoS_cdf.drop("proto_number",axis=1)
Y = DDoS_cdf["proto_number"]
```

```
X
```

```
         pkts  bytes  state_number   ltime   seq       dur
mean  \
0          10   1729             1  182114    20  6.406424  0.679473

1          10   1604             1  182115    21  6.405851  0.679572

2           8   1708             1  182116    22  6.401038  1.110847

3           8   1462             1  182117    23  6.400703  1.113328

4           8   1296             1  182118    24  6.400472  1.113098

...       ...    ...           ...     ...   ...       ...       ...

1927096     2    397             2     455  3808  0.293476  0.293476

1927097     2    297             2     456  3809  0.292003  0.292003

1927098     2    337             2     457  3815  0.277896  0.277896

1927099     2    936             2     459  3816  0.280742  0.280742

1927100     2    936             2     458  3817  0.280513  0.280513


           stddev       sum       min  ...  TnP_PerProto
TnP_Per_Dport  \
0        0.544126  1.358946  0.135347  ...           328
700
1        0.544197  1.359144  0.135375  ...           328
700
2        1.110847  2.221694  0.000000  ...           328
700
3        1.113328  2.226655  0.000000  ...           328
700
4        1.113098  2.226195  0.000000  ...           328
700
...           ...       ...       ...  ...           ...            ..
.
1927096  0.000000  0.293476  0.293476  ...           142
122
1927097  0.000000  0.292003  0.292003  ...           142
122
```

```
1927098  0.000000  0.277896  0.277896  ...           142
122
1927099  0.000000  0.280742  0.280742  ...           142
122
1927100  0.000000  0.280513  0.280513  ...           142
122

         AR_P_Proto_P_SrcIP  AR_P_Proto_P_DstIP  N_IN_Conn_P_DstIP  \
0                   1.26889             1.21662                 40
1                   1.26889             1.21662                 40
2                   1.26889             1.21662                 40
3                   1.26889             1.21662                 40
4                   1.26889             1.21662                 40
...                     ...                 ...                ...
1927096             9.49326             6.83201                  2
1927097             9.49326             6.83201                  2
1927098             9.49326             7.19694                  1
1927099             9.49326             7.12689                  2
1927100             9.49326             7.12689                  2

         N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  AR_P_Proto_P_Dport  \
0                       38             1.56093             1.21662
1                       38             1.56107             1.21662
2                       38             1.24980             1.21662
3                       38             1.24986             1.21662
4                       38             1.24991             1.21662
...                    ...                 ...                 ...
1927096                 74             6.81487             9.49326
1927097                 74             6.84924             9.49326
1927098                 74             7.19694             9.49326
1927099                 74             7.12398             9.49326
1927100                 74             7.12979             9.49326

         Pkts_P_State_P_Protocol_P_DestIP
Pkts_P_State_P_Protocol_P_SrcIP
0                                     328
308
1                                     328
308
2                                     328
308
3                                     328
308
4                                     328
308
...                                   ...
...
1927096                                 4
122
1927097                                 4
```

```
122
1927098                                    2
122
1927099                                    4
122
1927100                                    4
122

[1927101 rows x 32 columns]
```

```
Y
```

```
0          1
1          1
2          1
3          1
4          1
          ..
1927096    3
1927097    3
1927098    3
1927099    3
1927100    3
Name: proto_number, Length: 1927101, dtype: int64
```

```
# separate dataset into train and test
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(
    X,
    Y,
    test_size=0.3,
    random_state=1500)

X_train.shape, X_test.shape
```

```
((1348970, 32), (578131, 32))
```

```
X_train
```

```
         pkts  bytes  state_number   ltime     seq        dur
mean  \
520598      2    308             3   36521  257466  10.266716
0.000000
1914179     8    480             4  181668  149359  14.904573
3.615303
1071449    12    720             4  132183   93093  14.190584
3.652243
1108600     6    360             4  126692  130244  12.639044
2.867329
609814      7    890             1   93748   84534  14.208751
2.404751
```

```
...       ...    ...           ...     ...     ...        ...       ..
.
455534      7    890             1   52032  192401  13.583353
2.452777
1753981     7    420             4  162465  251314  12.221958
2.722289
417985      5    676             7   52353  154852  14.390765
4.114915
907083     10   1070             1  109586  119657  38.925873
0.124271
601363      5    770             3   75022   76083  12.039134
1.993141

           stddev        sum       min  ...  TnP_PerProto
TnP_Per_Dport  \
520598   0.000000   0.000000  0.000000  ...           200
200
1914179  0.631889  10.845908  2.721679  ...          1016
1016
1071449  0.464660  10.956730  2.995471  ...          1287
1287
1108600  2.037249   8.601987  0.000000  ...           600
600
609814   1.631084   7.214253  0.105011  ...           700
700
...           ...        ...       ...  ...           ...            .
..
455534   1.735260   7.358330  0.000000  ...           677
677
1753981  1.924962   8.166868  0.000000  ...           700
700
417985   0.077593   8.229830  4.037309  ...           565
565
907083   0.109862   0.621353  0.000000  ...           807
807
601363   1.409365   5.979422  0.000000  ...           500
500

         AR_P_Proto_P_SrcIP  AR_P_Proto_P_DstIP  N_IN_Conn_P_DstIP  \
520598             0.194837            0.194837                100
1914179            0.536748            0.715927                100
1071449            0.906784            0.906784                100
1108600            0.474696            0.474696                100
609814             0.492675            0.492675                100
...                     ...                 ...                ...
455534             0.484703            0.504741                100
1753981            0.572600            0.569759                100
417985             0.397585            0.393538                100
907083             0.234724            0.197765                100
601363             0.415315            0.415315                100
```

```
         N_IN_Conn_P_SrcIP  AR_P_Proto_P_Sport  AR_P_Proto_P_Dport  \
520598                 100            0.194804            0.194837
1914179                 64            0.536748            0.715927
1071449                100            0.845631            0.906784
1108600                100            0.474719            0.474696
609814                 100            0.492654            0.492675
...                    ...                 ...                 ...
455534                  87            0.515337            0.504741
1753981                 61            0.572740            0.569759
417985                  88            0.347445            0.393538
907083                  66            0.256899            0.197765
601363                 100            0.415312            0.415315

         Pkts_P_State_P_Protocol_P_DestIP
Pkts_P_State_P_Protocol_P_SrcIP
520598                                200
200
1914179                              1016
512
1071449                              1287
1287
1108600                               600
600
609814                                700
700
...                                   ...
...
455534                                437
333
1753981                               700
427
417985                                160
160
907083                                563
563
601363                                500
500

[1348970 rows x 32 columns]
```

```
X_train.shape
```

```
(1348970, 32)
```

```
X_train.corr()
```

```
                                    pkts     bytes  state_number
ltime  \
pkts                            1.000000  0.983197      0.006875
0.010555
```

```
bytes                          0.983197  1.000000     -0.002602 -
0.005456
state_number                   0.006875 -0.002602      1.000000
0.667532
ltime                          0.010555 -0.005456      0.667532
1.000000
seq                           -0.012222 -0.005285      0.071093 -
0.091371
dur                            0.450233  0.401283     -0.134025
0.166844
mean                           0.020408  0.005365      0.513416
0.609196
stddev                         0.000130 -0.003114      0.228093
0.282371
sum                            0.707167  0.626997      0.282868
0.356145
min                            0.015250  0.004530      0.294509
0.348667
max                            0.016961  0.003329      0.491067
0.599349
spkts                          0.955005  0.908994      0.018124
0.023336
dpkts                          0.921988  0.945615     -0.008750 -
0.007574
sbytes                         0.956219  0.965381     -0.002560 -
0.005592
dbytes                         0.920931  0.945624     -0.002400 -
0.004755
rate                           0.000580  0.000636     -0.003471 -
0.005287
srate                          0.000017  0.000043     -0.001366 -
0.003132
drate                          0.016857  0.017286     -0.006166 -
0.004510
TnBPSrcIP                      0.620845  0.622756     -0.006321 -
0.000041
TnBPDstIP                      0.759999  0.721135     -0.009097
0.000816
TnP_PSrcIP                     0.547737  0.531521      0.201652
0.327476
TnP_PDstIP                     0.665889  0.611415      0.233203
0.378235
TnP_PerProto                   0.273220  0.244769      0.086640
0.117492
TnP_Per_Dport                  0.789015  0.769936      0.224517
0.360791
AR_P_Proto_P_SrcIP             0.000476  0.000674     -0.005871 -
0.012259
AR_P_Proto_P_DstIP             0.000088  0.000231     -0.003202 -
0.008746
```

```
N_IN_Conn_P_DstIP                -0.115833 -0.103588      0.049276
0.024691
N_IN_Conn_P_SrcIP                -0.008229 -0.009028      0.077696
0.095810
AR_P_Proto_P_Sport                0.001076  0.001092     -0.005077 -
0.002940
AR_P_Proto_P_Dport                0.000543  0.000838     -0.005350 -
0.016963
Pkts_P_State_P_Protocol_P_DestIP  0.520543  0.491873      0.409461
0.620568
Pkts_P_State_P_Protocol_P_SrcIP   0.469838  0.444294      0.353999
0.544509

                                       seq       dur      mean
stddev  \
pkts                             -0.012222  0.450233  0.020408
0.000130
bytes                            -0.005285  0.401283  0.005365 -
0.003114
state_number                      0.071093 -0.134025  0.513416
0.228093
ltime                            -0.091371  0.166844  0.609196
0.282371
seq                               1.000000 -0.200014 -0.061260
0.084881
dur                              -0.200014  1.000000 -0.156414 -
0.023405
mean                             -0.061260 -0.156414  1.000000
0.239100
stddev                            0.084881 -0.023405  0.239100
1.000000
sum                              -0.089315  0.404207  0.512205
0.167446
min                              -0.131035 -0.099371  0.748989 -
0.443755
max                              -0.041414 -0.109866  0.918259
0.578664
spkts                            -0.016489  0.490653  0.033214
0.003299
dpkts                            -0.004979  0.335890  0.000898 -
0.004025
sbytes                           -0.006006  0.430537  0.006280 -
0.003239
dbytes                           -0.003870  0.325661  0.003701 -
0.002656
rate                             -0.003266 -0.004576 -0.005225 -
0.004373
srate                            -0.002465 -0.001999 -0.002563 -
0.001976
drate                            -0.003497  0.005672 -0.003187 -
```

```
0.002309
TnBPSrcIP                          -0.017458  0.324382  0.011903 -
0.001778
TnBPDstIP                          -0.020288  0.423591  0.016634 -
0.000919
TnP_PSrcIP                         -0.131100  0.328759  0.289378
0.068161
TnP_PDstIP                         -0.160082  0.415230  0.334479
0.082347
TnP_PerProto                       -0.076661  0.234732  0.105670
0.017211
TnP_Per_Dport                      -0.149594  0.413035  0.319365
0.078924
AR_P_Proto_P_SrcIP                  0.000693 -0.010416 -0.013003 -
0.010169
AR_P_Proto_P_DstIP                  0.000005 -0.006638 -0.008867 -
0.006584
N_IN_Conn_P_DstIP                   0.066645 -0.171148  0.037996
0.028615
N_IN_Conn_P_SrcIP                   0.024783  0.002184  0.056005
0.037386
AR_P_Proto_P_Sport                  0.000427 -0.005431 -0.004716 -
0.004809
AR_P_Proto_P_Dport                  0.009746 -0.014847 -0.018675 -
0.014439
Pkts_P_State_P_Protocol_P_DestIP -0.223403  0.270442  0.535129
0.141018
Pkts_P_State_P_Protocol_P_SrcIP  -0.190609  0.278360  0.474494
0.119058

                                        sum       min  ...
TnP_PerProto  \
pkts                                0.707167  0.015250  ...
0.273220
bytes                               0.626997  0.004530  ...
0.244769
state_number                        0.282868  0.294509  ...
0.086640
ltime                               0.356145  0.348667  ...
0.117492
seq                                -0.089315 -0.131035  ...     -
0.076661
dur                                 0.404207 -0.099371  ...
0.234732
mean                                0.512205  0.748989  ...
0.105670
stddev                              0.167446 -0.443755  ...
0.017211
sum                                 1.000000  0.340770  ...
0.353924
```

```
min                                0.340770  1.000000  ...
0.079840
max                                0.483556  0.471095  ...
0.093085
spkts                              0.777425  0.024241  ...
0.302187
dpkts                              0.518732  0.001425  ...
0.198038
sbytes                             0.672135  0.005368  ...
0.266520
dbytes                             0.509553  0.003044  ...
0.193770
rate                              -0.002214 -0.002118  ...
0.002241
srate                             -0.001314 -0.001107  ...
0.102547
drate                              0.008153 -0.001647  ...
0.084625
TnBPSrcIP                          0.485640  0.010114  ...
0.434117
TnBPDstIP                          0.631165  0.013499  ...
0.270135
TnP_PSrcIP                         0.606325  0.209612  ...
0.460453
TnP_PDstIP                         0.764293  0.239434  ...
0.322247
TnP_PerProto                       0.353924  0.079840  ...
1.000000
TnP_Per_Dport                      0.775552  0.228634  ...
0.312440
AR_P_Proto_P_SrcIP                -0.006227 -0.005630  ...
0.000527
AR_P_Proto_P_DstIP                -0.004404 -0.004029  ...
0.000666
N_IN_Conn_P_DstIP                 -0.107902  0.016709  ...     -
0.419721
N_IN_Conn_P_SrcIP                  0.023946  0.026926  ...     -
0.018601
AR_P_Proto_P_Sport                -0.001662 -0.001447  ...
0.010452
AR_P_Proto_P_Dport                -0.009018 -0.008180  ...     -
0.000875
Pkts_P_State_P_Protocol_P_DestIP   0.722618  0.376133  ...
0.301608
Pkts_P_State_P_Protocol_P_SrcIP    0.660656  0.338392  ...
0.303947

                                   TnP_Per_Dport  AR_P_Proto_P_SrcIP  \
pkts                                    0.789015            0.000476
bytes                                   0.769936            0.000674
```

state_number	0.224517	-0.005871
ltime	0.360791	-0.012259
seq	-0.149594	0.000693
dur	0.413035	-0.010416
mean	0.319365	-0.013003
stddev	0.078924	-0.010169
sum	0.775552	-0.006227
min	0.228634	-0.005630
max	0.293112	-0.015109
spkts	0.814088	0.000290
dpkts	0.648378	0.000655
sbytes	0.809917	0.000666
dbytes	0.644978	0.000618
rate	-0.001797	0.561200
srate	-0.001239	0.000032
drate	0.010890	0.000009
TnBPSrcIP	0.614334	0.010203
TnBPDstIP	0.734263	0.067859
TnP_PSrcIP	0.733775	0.004977
TnP_PDstIP	0.852171	0.057403
TnP_PerProto	0.312440	0.000527
TnP_Per_Dport	1.000000	-0.004991
AR_P_Proto_P_SrcIP	-0.004991	1.000000
AR_P_Proto_P_DstIP	-0.003817	0.567000
N_IN_Conn_P_DstIP	-0.069713	-0.072813
N_IN_Conn_P_SrcIP	0.033444	-0.007879
AR_P_Proto_P_Sport	-0.000740	0.725873
AR_P_Proto_P_Dport	-0.007184	0.724975
Pkts_P_State_P_Protocol_P_DestIP	0.797293	-0.007725
Pkts_P_State_P_Protocol_P_SrcIP	0.701556	-0.006554

	AR_P_Proto_P_DstIP	N_IN_Conn_P_DstIP \
pkts	0.000088	-0.115833
bytes	0.000231	-0.103588
state_number	-0.003202	0.049276
ltime	-0.008746	0.024691
seq	0.000005	0.066645
dur	-0.006638	-0.171148
mean	-0.008867	0.037996
stddev	-0.006584	0.028615
sum	-0.004404	-

0.107902
min -0.004029
0.016709
max -0.010140
0.041853
spkts -0.000031 -
0.127007
dpkts 0.000230 -
0.085404
sbytes 0.000226 -
0.112354
dbytes 0.000214 -
0.082553
rate 0.939022 -
0.085373
srate 0.000198 -
0.051273
drate 0.000086 -
0.042738
TnBPSrcIP 0.000240 -
0.158221
TnBPDstIP 0.026739 -
0.132071
TnP_PSrcIP -0.002992 -
0.129090
TnP_PDstIP 0.019820 -
0.094282
TnP_PerProto 0.000666 -
0.419721
TnP_Per_Dport -0.003817 -
0.069713
AR_P_Proto_P_SrcIP 0.567000 -
0.072813
AR_P_Proto_P_DstIP 1.000000 -
0.069850
N_IN_Conn_P_DstIP -0.069850
1.000000
N_IN_Conn_P_SrcIP -0.007371
0.062410
AR_P_Proto_P_Sport 0.292396 -
0.006506
AR_P_Proto_P_Dport 0.294013 -
0.001033
Pkts_P_State_P_Protocol_P_DestIP -0.005738 -
0.035306
Pkts_P_State_P_Protocol_P_SrcIP -0.004962 -
0.047616

N_IN_Conn_P_SrcIP
AR_P_Proto_P_Sport \

pkts -0.008229
0.001076
bytes -0.009028
0.001092
state_number 0.077696 -
0.005077
ltime 0.095810 -
0.002940
seq 0.024783
0.000427
dur 0.002184 -
0.005431
mean 0.056005 -
0.004716
stddev 0.037386 -
0.004809
sum 0.023946 -
0.001662
min 0.026926 -
0.001447
max 0.061810 -
0.006013
spkts -0.007683
0.000970
dpkts -0.007816
0.001068
sbytes -0.009789
0.001057
dbytes -0.007198
0.001029
rate -0.008099
0.275077
srate -0.004479
0.000455
drate -0.004270
0.000448
TnBPSrcIP 0.012810
0.001970
TnBPDstIP -0.010975
0.000879
TnP_PSrcIP 0.263915
0.000844
TnP_PDstIP 0.034358
0.000291
TnP_PerProto -0.018601
0.010452
TnP_Per_Dport 0.033444 -
0.000740
AR_P_Proto_P_SrcIP -0.007879
0.725873

```
AR_P_Proto_P_DstIP                          -0.007371
0.292396
N_IN_Conn_P_DstIP                            0.062410          -
0.006506
N_IN_Conn_P_SrcIP                            1.000000          -
0.003056
AR_P_Proto_P_Sport                          -0.003056
1.000000
AR_P_Proto_P_Dport                          -0.004865
0.994100
Pkts_P_State_P_Protocol_P_DestIP             0.089628          -
0.001342
Pkts_P_State_P_Protocol_P_SrcIP              0.379851          -
0.000955

                                    AR_P_Proto_P_Dport  \
pkts                                          0.000543
bytes                                         0.000838
state_number                                 -0.005350
ltime                                        -0.016963
seq                                           0.009746
dur                                          -0.014847
mean                                         -0.018675
stddev                                       -0.014439
sum                                          -0.009018
min                                          -0.008180
max                                          -0.021630
spkts                                         0.000319
dpkts                                         0.000762
sbytes                                        0.000832
dbytes                                        0.000764
rate                                          0.273422
srate                                        -0.000015
drate                                        -0.000046
TnBPSrcIP                                     0.000012
TnBPDstIP                                     0.000137
TnP_PSrcIP                                   -0.006067
TnP_PDstIP                                   -0.006446
TnP_PerProto                                 -0.000875
TnP_Per_Dport                                -0.007184
AR_P_Proto_P_SrcIP                            0.724975
AR_P_Proto_P_DstIP                            0.294013
N_IN_Conn_P_DstIP                            -0.001033
N_IN_Conn_P_SrcIP                            -0.004865
AR_P_Proto_P_Sport                            0.994100
AR_P_Proto_P_Dport                            1.000000
Pkts_P_State_P_Protocol_P_DestIP             -0.010877
Pkts_P_State_P_Protocol_P_SrcIP              -0.009381

                                    Pkts_P_State_P_Protocol_P_DestIP  \
```

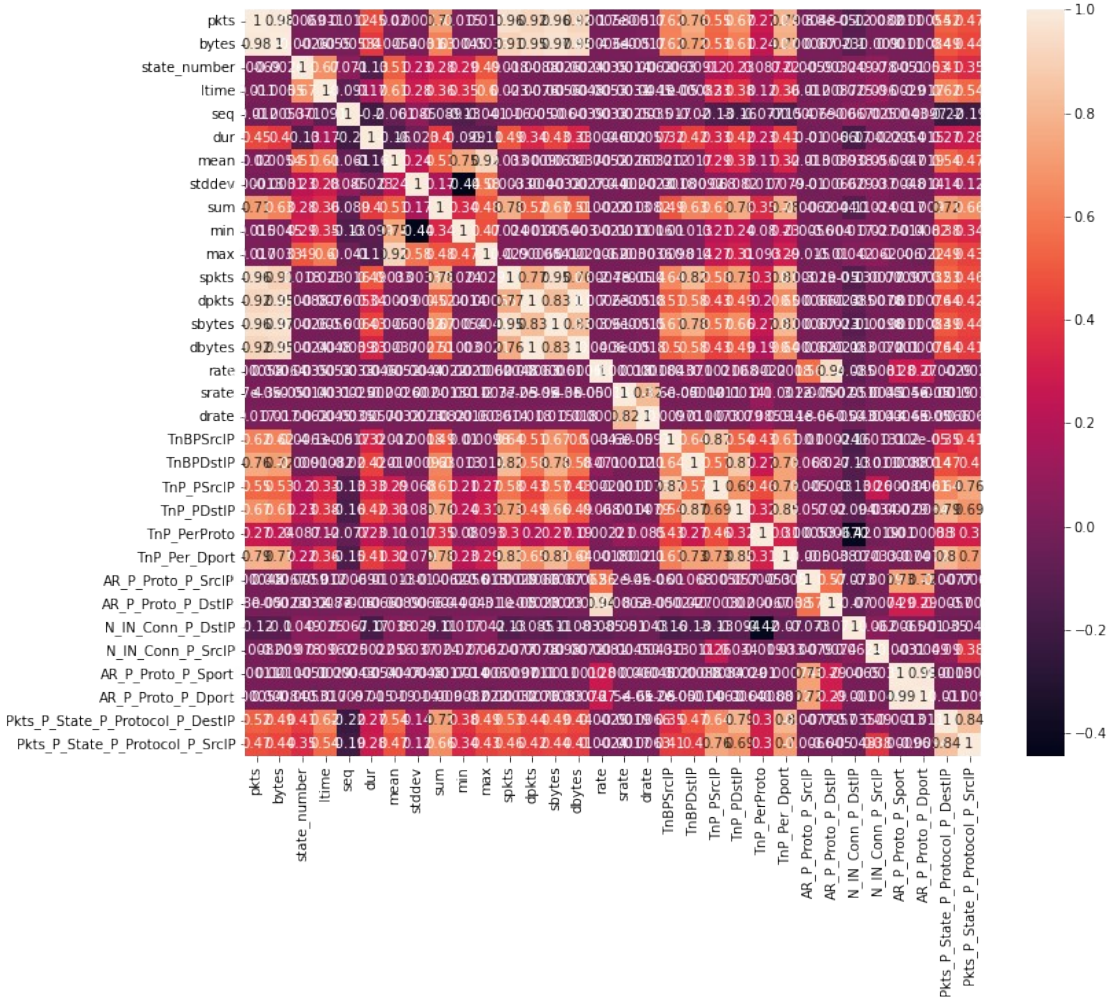
pkts	0.520543
bytes	0.491873
state_number	0.409461
ltime	0.620568
seq	-0.223403
dur	0.270442
mean	0.535129
stddev	0.141018
sum	0.722618
min	0.376133
max	0.490777
spkts	0.528083
dpkts	0.439512
sbytes	0.493625
dbytes	0.441709
rate	-0.002854
srate	-0.001879
drate	0.006560
TnBPSrcIP	0.346037
TnBPDstIP	0.469227
TnP_PSrcIP	0.640508
TnP_PDstIP	0.794558
TnP_PerProto	0.301608
TnP_Per_Dport	0.797293
AR_P_Proto_P_SrcIP	-0.007725
AR_P_Proto_P_DstIP	-0.005738
N_IN_Conn_P_DstIP	-0.035306
N_IN_Conn_P_SrcIP	0.089628
AR_P_Proto_P_Sport	-0.001342
AR_P_Proto_P_Dport	-0.010877
Pkts_P_State_P_Protocol_P_DestIP	1.000000
Pkts_P_State_P_Protocol_P_SrcIP	0.842317

	Pkts_P_State_P_Protocol_P_SrcIP
pkts	0.469838
bytes	0.444294
state_number	0.353999
ltime	0.544509
seq	-0.190609
dur	0.278360
mean	0.474494
stddev	0.119058
sum	0.660656
min	0.338392
max	0.434844
spkts	0.462428
dpkts	0.415259
sbytes	0.435297
dbytes	0.412174
rate	-0.002369

```
srate                                  -0.001698
drate                                   0.006274
TnBPSrcIP                               0.412290
TnBPDstIP                               0.398828
TnP_PSrcIP                              0.756800
TnP_PDstIP                              0.685120
TnP_PerProto                            0.303947
TnP_Per_Dport                           0.701556
AR_P_Proto_P_SrcIP                     -0.006554
AR_P_Proto_P_DstIP                     -0.004962
N_IN_Conn_P_DstIP                      -0.047616
N_IN_Conn_P_SrcIP                       0.379851
AR_P_Proto_P_Sport                     -0.000955
AR_P_Proto_P_Dport                     -0.009381
Pkts_P_State_P_Protocol_P_DestIP        0.842317
Pkts_P_State_P_Protocol_P_SrcIP         1.000000

[32 rows x 32 columns]
```

```
import seaborn as sns
# Using Pearson Correlation
plt.figure(figsize=(12,10))
cor = X_train.corr()
sns.heatmap(cor, annot=True)
plt.show()
```




```
# with the following function we can select highly correlated features
# it will remove the first feature that is correlated with anything
other feature

def correlation(dataset, threshold):# X_train,0.5
    col_corr = set()  # Set of all the names of correlated columns
    col_corr_lst = []
    print(f"set initial {col_corr}")
    print(f"list initial {col_corr_lst}")
    corr_arr = dataset.corr() # corr_arr is my correlaion matrix which
is 2d
    for row in range(len(corr_arr)):
        for col in range(row):
            if abs(corr_arr.iloc[row, col]) > threshold: # we are
interested in absolute coeff value
                colname = corr_arr.columns[row]  # getting the name of
column
                col_corr_lst.append(colname)
                col_corr.add(colname)
                print(f"colname name which is correlated is
```

```
{colname}")
                print(f"set {col_corr}")
                print(f"lst {col_corr_lst}")


    print(f"list is {col_corr_lst}")
    return col_corr

corr_features = correlation(X_train, 0.5)#data,threshold
len(set(corr_features))
```

```
set initial set()
list initial []
colname name which is correlated is bytes
set {'bytes'}
lst ['bytes']
colname name which is correlated is ltime
set {'bytes', 'ltime'}
lst ['bytes', 'ltime']
colname name which is correlated is mean
set {'bytes', 'ltime', 'mean'}
lst ['bytes', 'ltime', 'mean']
colname name which is correlated is mean
set {'bytes', 'ltime', 'mean'}
lst ['bytes', 'ltime', 'mean', 'mean']
colname name which is correlated is sum
set {'bytes', 'ltime', 'mean', 'sum'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum']
colname name which is correlated is sum
set {'bytes', 'ltime', 'mean', 'sum'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum']
colname name which is correlated is sum
set {'bytes', 'ltime', 'mean', 'sum'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum']
colname name which is correlated is min
set {'sum', 'mean', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min']
colname name which is correlated is max
set {'max', 'sum', 'mean', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max']
colname name which is correlated is max
set {'max', 'sum', 'mean', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max']
colname name which is correlated is max
set {'max', 'sum', 'mean', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max']
colname name which is correlated is spkts
```

```
set {'max', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts']
colname name which is correlated is spkts
set {'max', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts']
colname name which is correlated is spkts
set {'max', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts']
colname name which is correlated is dpkts
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts']
colname name which is correlated is dpkts
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts']
colname name which is correlated is dpkts
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts']
colname name which is correlated is dpkts
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts']
colname name which is correlated is sbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes']
colname name which is correlated is sbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes']
colname name which is correlated is sbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes']
colname name which is correlated is sbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'sbytes', 'min'}
```

```
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes']
colname name which is correlated is sbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes']
colname name which is correlated is dbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes']
colname name which is correlated is dbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes']
colname name which is correlated is dbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes']
colname name which is correlated is dbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes']
colname name which is correlated is dbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes']
colname name which is correlated is dbytes
set {'max', 'dpkts', 'sum', 'mean', 'spkts', 'ltime', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
```

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'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes']
colname name which is correlated is drate
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate']
colname name which is correlated is TnBPSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP']
colname name which is correlated is TnBPSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP']
colname name which is correlated is TnBPSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP']
colname name which is correlated is TnBPSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP']
colname name which is correlated is TnBPSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP']
colname name which is correlated is TnBPSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'spkts', 'ltime',
```

'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',

'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP']
colname name which is correlated is TnBPDstIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes',
'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes',
'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',

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'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes',
'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes',
'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
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'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
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'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes',
'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
```

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'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP']
colname name which is correlated is TnP_PSrcIP
set {'max', 'dpkts', 'drate', 'sum', 'mean', 'TnBPDstIP', 'spkts',
'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes',
'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
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'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
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'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
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'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',

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'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP']
colname name which is correlated is TnP_PDstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_PSrcIP', 'bytes',
'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
```

'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
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'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
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'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
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'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',

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'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
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'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
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'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
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'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
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'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
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'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
```

```
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport']
colname name which is correlated is TnP_Per_Dport
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'ltime', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport']
```

```
colname name which is correlated is AR_P_Proto_P_SrcIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'AR_P_Proto_P_SrcIP', 'ltime', 'TnBPSrcIP',
'TnP_Per_Dport', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP']
colname name which is correlated is AR_P_Proto_P_DstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'AR_P_Proto_P_SrcIP', 'ltime', 'TnBPSrcIP',
'TnP_Per_Dport', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min',
'AR_P_Proto_P_DstIP'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP']
colname name which is correlated is AR_P_Proto_P_DstIP
set {'max', 'TnP_PDstIP', 'dpkts', 'drate', 'sum', 'mean',
'TnBPDstIP', 'spkts', 'AR_P_Proto_P_SrcIP', 'ltime', 'TnBPSrcIP',
'TnP_Per_Dport', 'TnP_PSrcIP', 'bytes', 'dbytes', 'sbytes', 'min',
'AR_P_Proto_P_DstIP'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
```

'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP']
colname name which is correlated is AR_P_Proto_P_Sport
set {'dpkts', 'TnBPSrcIP', 'TnP_Per_Dport', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport']
colname name which is correlated is AR_P_Proto_P_Dport
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PDstIP', 'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'sum', 'spkts', 'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP',
'AR_P_Proto_P_DstIP', 'mean', 'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport']
colname name which is correlated is AR_P_Proto_P_Dport
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'TnP_PDstIP', 'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'sum', 'spkts', 'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP',

'AR_P_Proto_P_DstIP', 'mean', 'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',

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'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
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'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
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'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_DestIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',

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'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_SrcIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'Pkts_P_State_P_Protocol_P_SrcIP', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP']
```

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colname name which is correlated is Pkts_P_State_P_Protocol_P_SrcIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'Pkts_P_State_P_Protocol_P_SrcIP', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_SrcIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'Pkts_P_State_P_Protocol_P_SrcIP', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
```

'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_SrcIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'Pkts_P_State_P_Protocol_P_SrcIP', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_SrcIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'Pkts_P_State_P_Protocol_P_SrcIP', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',

```
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP']
colname name which is correlated is Pkts_P_State_P_Protocol_P_SrcIP
set {'dpkts', 'AR_P_Proto_P_Dport', 'TnBPSrcIP', 'TnP_Per_Dport',
'Pkts_P_State_P_Protocol_P_DestIP', 'TnP_PDstIP',
'AR_P_Proto_P_Sport', 'bytes', 'min', 'sbytes', 'max',
'Pkts_P_State_P_Protocol_P_SrcIP', 'sum', 'spkts',
'AR_P_Proto_P_SrcIP', 'TnP_PSrcIP', 'AR_P_Proto_P_DstIP', 'mean',
'ltime', 'drate', 'TnBPDstIP', 'dbytes'}
lst ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
```

```
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP']
list is ['bytes', 'ltime', 'mean', 'mean', 'sum', 'sum', 'sum', 'min',
'max', 'max', 'max', 'spkts', 'spkts', 'spkts', 'dpkts', 'dpkts',
'dpkts', 'dpkts', 'sbytes', 'sbytes', 'sbytes', 'sbytes', 'sbytes',
'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'dbytes', 'drate',
'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP', 'TnBPSrcIP',
'TnBPSrcIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP',
'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnBPDstIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP', 'TnP_PSrcIP',
'TnP_PSrcIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP', 'TnP_PDstIP',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'TnP_Per_Dport', 'TnP_Per_Dport', 'TnP_Per_Dport',
'AR_P_Proto_P_SrcIP', 'AR_P_Proto_P_DstIP', 'AR_P_Proto_P_DstIP',
'AR_P_Proto_P_Sport', 'AR_P_Proto_P_Dport', 'AR_P_Proto_P_Dport',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP',
'Pkts_P_State_P_Protocol_P_DestIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP', 'Pkts_P_State_P_Protocol_P_SrcIP',
'Pkts_P_State_P_Protocol_P_SrcIP']

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corr_features

{'AR_P_Proto_P_Dport',
 'AR_P_Proto_P_DstIP',
 'AR_P_Proto_P_Sport',
 'AR_P_Proto_P_SrcIP',
 'Pkts_P_State_P_Protocol_P_DestIP',
 'Pkts_P_State_P_Protocol_P_SrcIP',
 'TnBPDstIP',
 'TnBPSrcIP',
 'TnP_PDstIP',
 'TnP_PSrcIP',
 'TnP_Per_Dport',
```

```
 'bytes',
 'dbytes',
 'dpkts',
 'drate',
 'ltime',
 'max',
 'mean',
 'min',
 'sbytes',
 'spkts',
 'sum'}
```

```
X_train.drop(corr_features,axis=1,inplace = True)
X_test.drop(corr_features,axis=1,inplace = True)
```

```
X_train
```

```
         pkts  state_number     seq        dur    stddev      rate
srate  \
520598      2             3  257466  10.266716  0.000000  0.097402
0.097402
1914179     8             4  149359  14.904573  0.631889  0.469655
0.469655
1071449    12             4   93093  14.190584  0.464660  0.775162
0.775162
1108600     6             4  130244  12.639044  2.037249  0.395600
0.395600
609814      7             1   84534  14.208751  1.631084  0.422275
0.351896
...       ...           ...     ...        ...       ...       ...
...
455534      7             1  192401  13.583353  1.735260  0.441717
0.368098
1753981     7             4  251314  12.221958  1.924962  0.490920
0.490920
417985      5             7  154852  14.390765  0.077593  0.277956
0.208467
907083     10             1  119657  38.925873  0.109862  0.231209
0.154139
601363      5             3   76083  12.039134  1.409365  0.332250
0.332250

         TnP_PerProto  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP
520598            200                100                100
1914179          1016                100                 64
1071449          1287                100                100
1108600           600                100                100
609814            700                100                100
...               ...                ...                ...
455534            677                100                 87
1753981           700                100                 61
```

```
417985            565                100                 88
907083            807                100                 66
601363            500                100                100

[1348970 rows x 10 columns]
```

```
X_train.head()
```

```
         pkts  state_number     seq        dur    stddev      rate
srate  \
520598      2             3  257466  10.266716  0.000000  0.097402
0.097402
1914179     8             4  149359  14.904573  0.631889  0.469655
0.469655
1071449    12             4   93093  14.190584  0.464660  0.775162
0.775162
1108600     6             4  130244  12.639044  2.037249  0.395600
0.395600
609814      7             1   84534  14.208751  1.631084  0.422275
0.351896

         TnP_PerProto  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP
520598            200                100                100
1914179          1016                100                 64
1071449          1287                100                100
1108600           600                100                100
609814            700                100                100
```

```
X_train.tail()
```

```
         pkts  state_number     seq        dur    stddev      rate
srate  \
455534      7             1  192401  13.583353  1.735260  0.441717
0.368098
1753981     7             4  251314  12.221958  1.924962  0.490920
0.490920
417985      5             7  154852  14.390765  0.077593  0.277956
0.208467
907083     10             1  119657  38.925873  0.109862  0.231209
0.154139
601363      5             3   76083  12.039134  1.409365  0.332250
0.332250

         TnP_PerProto  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP
455534            677                100                 87
1753981           700                100                 61
417985            565                100                 88
907083            807                100                 66
601363            500                100                100
```

```
X_test
```

```
         pkts  state_number     seq        dur    stddev      rate
srate  \
1469849     7             4  229332  12.160902  1.913691  0.493384
0.493384
1719023     7             4  216356  12.225194  1.923236  0.490790
0.490790
1707752     7             4  205085  12.385556  1.951734  0.484435
0.484435
191696      1             3  190716   0.000000  0.000000  0.000000
0.000000
1773604    10             4    8784  13.721261  0.631952  0.655916
0.655916
...       ...           ...     ...        ...       ...       ...
...
723413      4             3  198134  10.580403  0.105388  0.283543
0.283543
938878      4             3  151452  43.613834  0.000000  0.068786
0.068786
640806      5             3  115527  13.063910  1.556461  0.306187
0.306187
398444      5             3  135311  15.793093  1.891196  0.253275
0.253275
1478858     7             4  238341  12.165138  1.913675  0.493213
0.493213

         TnP_PerProto  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP
1469849           675                100                100
1719023           700                100                 68
1707752           700                100                100
191696            100                100                100
1773604          1317                100                 38
...               ...                ...                ...
723413            400                100                 74
938878            526                100                100
640806            570                100                 56
398444            690                100                 97
1478858           700                100                 42

[578131 rows x 10 columns]
```

```
X_test.head()
```

```
         pkts  state_number     seq        dur    stddev      rate
srate  \
1469849     7             4  229332  12.160902  1.913691  0.493384
0.493384
1719023     7             4  216356  12.225194  1.923236  0.490790
0.490790
1707752     7             4  205085  12.385556  1.951734  0.484435
0.484435
```

```
191696      1             3  190716   0.000000  0.000000  0.000000
0.000000
1773604    10             4    8784  13.721261  0.631952  0.655916
0.655916

         TnP_PerProto  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP
1469849           675                100                100
1719023           700                100                 68
1707752           700                100                100
191696            100                100                100
1773604          1317                100                 38

X_test.tail()

         pkts  state_number     seq        dur    stddev      rate
srate  \
723413      4             3  198134  10.580403  0.105388  0.283543
0.283543
938878      4             3  151452  43.613834  0.000000  0.068786
0.068786
640806      5             3  115527  13.063910  1.556461  0.306187
0.306187
398444      5             3  135311  15.793093  1.891196  0.253275
0.253275
1478858     7             4  238341  12.165138  1.913675  0.493213
0.493213

         TnP_PerProto  N_IN_Conn_P_DstIP  N_IN_Conn_P_SrcIP
723413            400                100                 74
938878            526                100                100
640806            570                100                 56
398444            690                100                 97
1478858           700                100                 42

DDoS_cdf =
DDoS_cdf.drop(["AR_P_Proto_P_Dport","AR_P_Proto_P_DstIP","AR_P_Proto_P
_Sport","AR_P_Proto_P_SrcIP","Pkts_P_State_P_Protocol_P_DestIP","Pkts_
P_State_P_Protocol_P_SrcIP","TnBPDstIP","TnBPSrcIP","TnP_Per_Dport","b
ytes","dbytes","dpkts","drate","ltime","max","mean","min","sbytes","sp
kts","sum"],axis = 1)
DDoS_cdf

         proto_number  pkts  state_number   seq       dur    stddev
rate  \
0                   1    10             1    20  6.406424  0.544126
1.404840
1                   1    10             1    21  6.405851  0.544197
1.404966
2                   1     8             1    22  6.401038  1.110847
1.093573
3                   1     8             1    23  6.400703  1.113328
```

```
1.093630
4                   1     8             1    24  6.400472  1.113098
1.093669
...               ...   ...           ...   ...       ...       ...
...
1927096             3     2             2  3808  0.293476  0.000000
3.407434
1927097             3     2             2  3809  0.292003  0.000000
3.424622
1927098             3     2             2  3815  0.277896  0.000000
3.598469
1927099             3     2             2  3816  0.280742  0.000000
3.561990
1927100             3     2             2  3817  0.280513  0.000000
3.564897

            srate  TnP_PSrcIP  TnP_PDstIP  TnP_PerProto
N_IN_Conn_P_DstIP  \
0        0.780467         308         328           328
40
1        0.780536         308         328           328
40
2        0.624899         308         328           328
40
3        0.624931         308         328           328
40
4        0.624954         308         328           328
40
...           ...         ...         ...           ...
...
1927096  0.000000         190           4           142
2
1927097  0.000000         190           4           142
2
1927098  0.000000         190           2           142
1
1927099  0.000000         190           4           142
2
1927100  0.000000         190           4           142
2

         N_IN_Conn_P_SrcIP
0                       38
1                       38
2                       38
3                       38
4                       38
...                    ...
1927096                 74
1927097                 74
```

```
1927098                 74
1927099                 74
1927100                 74

[1927101 rows x 13 columns]
```

```
DDoS_cdf.shape
```

```
(1927101, 13)
```

These are the columns are used for further analysis

```
X = DDoS_cdf.drop(["proto_number"],axis=1) #independent variable
X[0:5]
```

```
   pkts  state_number  seq       dur    stddev      rate     srate  \
0    10             1   20  6.406424  0.544126  1.404840  0.780467
1    10             1   21  6.405851  0.544197  1.404966  0.780536
2     8             1   22  6.401038  1.110847  1.093573  0.624899
3     8             1   23  6.400703  1.113328  1.093630  0.624931
4     8             1   24  6.400472  1.113098  1.093669  0.624954

   TnP_PSrcIP  TnP_PDstIP  TnP_PerProto  N_IN_Conn_P_DstIP
N_IN_Conn_P_SrcIP
0         308         328           328                 40
38
1         308         328           328                 40
38
2         308         328           328                 40
38
3         308         328           328                 40
38
4         308         328           328                 40
38
```

```
X.tail()
```

```
         pkts  state_number   seq       dur  stddev      rate
srate  \
1927096     2             2  3808  0.293476     0.0  3.407434    0.0

1927097     2             2  3809  0.292003     0.0  3.424622    0.0

1927098     2             2  3815  0.277896     0.0  3.598469    0.0

1927099     2             2  3816  0.280742     0.0  3.561990    0.0

1927100     2             2  3817  0.280513     0.0  3.564897    0.0
```

```
         TnP_PSrcIP  TnP_PDstIP  TnP_PerProto  N_IN_Conn_P_DstIP  \
1927096         190           4           142                  2
1927097         190           4           142                  2
1927098         190           2           142                  1
1927099         190           4           142                  2
1927100         190           4           142                  2

         N_IN_Conn_P_SrcIP
1927096                 74
1927097                 74
1927098                 74
1927099                 74
1927100                 74
```

```
X.shape
```

```
(1927101, 12)
```

```
Y = DDoS_cdf[["proto_number"]]  # Dependent Variable
```

```
Y
```

```
         proto_number
0                   1
1                   1
2                   1
3                   1
4                   1
...               ...
1927096             3
1927097             3
1927098             3
1927099             3
1927100             3

[1927101 rows x 1 columns]
```

Train and Test Split

```
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size =
0.2, random_state = 300)
```

```
X_train.shape
```

```
(1541680, 12)
```

```
X_test.shape
```

```
(385421, 12)
```

```
Y_train.shape
```

```
(1541680, 1)
```

```
Y_test.shape
```

```
(385421, 1)
```

Feature scaling

```
from sklearn.preprocessing import StandardScaler
sc_X = StandardScaler()
sc_Y = StandardScaler()
X_train = sc_X.fit_transform(X_train)
X_test = sc_X.transform(X_test)
Y_train = sc_Y.fit_transform(Y_train)
Y_test = sc_Y.transform(Y_test)
```

```
X_train
```

```
array([[-1.16234088e-02, -1.71572069e+00, -6.86916322e-01, ...,
        -2.52721630e-02,  4.38959128e-02,  7.45247304e-01],
       [-1.16234088e-02,  8.03349230e-01,  1.78183546e+00, ...,
        -8.01804605e-02,  4.38959128e-02,  4.56214851e-01],
       [-4.09540471e-02, -3.63407415e-02,  1.55428903e-01, ...,
        -3.34385542e-01,  4.38959128e-02,  7.45247304e-01],
       ...,
       [ 3.53056124e-02,  8.03349230e-01,  9.86220954e-02, ...,
         2.52319786e-01,  4.38959128e-02, -1.44314127e+00],
       [ 3.53056124e-02,  8.03349230e-01, -1.51672665e+00, ...,
         3.26547669e-01,  4.38959128e-02,  7.45247304e-01],
       [ 1.08846484e-04,  8.03349230e-01, -3.60637025e-02, ...,
         1.00813557e-01,  4.38959128e-02, -3.28301808e-01]])
```

```
X_test
```

```
array([[-1.74895365e-02, -3.63407415e-02,  1.08446143e+00, ...,
        -6.79786166e-02,  4.38959128e-02,  7.45247304e-01],
       [ 1.08846484e-04,  8.03349230e-01, -4.08608423e-02, ...,
         2.15015719e-02,  4.38959128e-02,  7.45247304e-01],
       [-2.33556641e-02, -1.71572069e+00, -1.64040884e+00, ...,
        -1.81862493e-01,  4.38959128e-02,  7.45247304e-01],
       ...,
       [ 1.77072294e-02,  8.03349230e-01, -1.58232821e+00, ...,
         1.30301347e-01,  4.38959128e-02, -8.05597053e-02],
       [-1.16234088e-02, -1.71572069e+00,  1.05140995e+00, ...,
        -1.03567328e-01,  4.38959128e-02,  7.45247304e-01],
       [-1.16234088e-02, -3.63407415e-02, -3.79167608e-01, ...,
        -4.76422101e-02,  4.38959128e-02, -1.63140406e-01]])
```

```
Y_train
```

```
array([[-0.98431077],
       [ 1.01592283],
       [-0.98431077],
       ...,
       [ 1.01592283],
       [ 1.01592283],
       [ 1.01592283]])
```

```
Y_test
```

```
array([[-0.98431077],
       [ 1.01592283],
       [-0.98431077],
       ...,
       [ 1.01592283],
       [-0.98431077],
       [-0.98431077]])
```

```
from sklearn import preprocessing
from sklearn import utils

#convert y values to categorical values
value = preprocessing.LabelEncoder()
Y_train_transformed = value.fit_transform(Y_train)

#view transformed values
print(Y_train_transformed)
```

```
C:\Users\Lenovo\anaconda3\lib\site-packages\sklearn\preprocessing\
_label.py:115: DataConversionWarning: A column-vector y was passed
when a 1d array was expected. Please change the shape of y to
(n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
[0 2 0 ... 2 2 2]
```

```
from sklearn import preprocessing
from sklearn import utils

#convert y values to categorical values
value = preprocessing.LabelEncoder()
Y_test_transformed = value.fit_transform(Y_test)

#view transformed values
print(Y_test_transformed)
```

```
[0 2 0 ... 2 0 0]
```

Using the logistics regression, Random Forest, Decision Tree algorithm

1. Logistics Regression

```
from sklearn.linear_model import LogisticRegression
LR = LogisticRegression(solver='saga')
LR.fit(X_train,Y_train_transformed) #training
LR
```

```
C:\Users\Lenovo\anaconda3\lib\site-packages\sklearn\linear_model\
_sag.py:352: ConvergenceWarning: The max_iter was reached which means
the coef_ did not converge
  warnings.warn(
```

```
LogisticRegression(solver='saga')
```

```
yhat = LR.predict(X_test)#only questions passed and answers are saved
for evaluation
yhat[:5]
```

```
array([0, 2, 0, 0, 2], dtype=int64)
```

```
yhat_prob = LR.predict_proba(X_test)
yhat_prob[:5]
```

```
array([[8.70261713e-01, 3.47028866e-03, 1.19186020e-01, 3.54367344e-
03,
        3.53830446e-03],
       [1.59051985e-02, 1.08848785e-03, 9.80761764e-01, 1.12063450e-
03,
        1.12391474e-03],
       [9.99919848e-01, 2.53683529e-05, 1.62681503e-07, 2.72420344e-
05,
        2.73792469e-05],
       [9.66524548e-01, 2.02159536e-03, 2.73484993e-02, 2.05163146e-
03,
        2.05372614e-03],
       [1.48724800e-03, 2.93853051e-04, 9.97592481e-01, 3.13055380e-
04,
        3.13362585e-04]])
```

```
from sklearn.metrics import f1_score
f1_score(Y_test_transformed, yhat,average ="weighted")
#actualvale,predvalue
```

```
0.9985954682398567
```

2. Decision Tree

```
from sklearn.tree import DecisionTreeClassifier
DDoS_cdf = DecisionTreeClassifier(criterion="entropy", max_depth = 4)
DDoS_cdf # it shows the default parameters
```

```
DecisionTreeClassifier(criterion='entropy', max_depth=4)
```

```
DDoS_cdf.fit(X_train,Y_train_transformed)
```

```
DecisionTreeClassifier(criterion='entropy', max_depth=4)
```

Prediction

```
y_pred = DDoS_cdf.predict(X_test)
```

```
y_pred
```

```
array([0, 2, 0, ..., 2, 0, 0], dtype=int64)
```

```
print (y_pred [0:5])#predicted by the ml model
print (Y_test_transformed [0:5])#actual values we have
```

```
[0 2 0 0 2]
[0 2 0 0 2]
```

```
Y_test_transformed
```

```
array([0, 2, 0, ..., 2, 0, 0], dtype=int64)
```

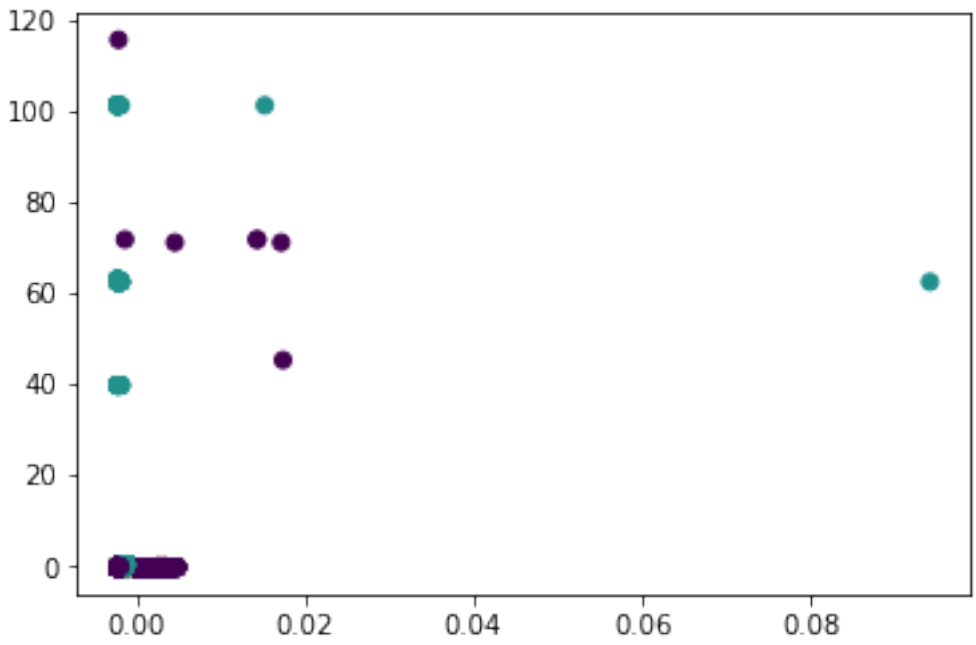
Evaluation

```
from sklearn import metrics
print("DecisionTrees's Accuracy:",
metrics.accuracy_score(Y_test_transformed, y_pred))
```

```
DecisionTrees's Accuracy: 0.9999948108691534
```

```
import matplotlib.pyplot as plt
plt.scatter(X_test[:,6],X_test[:,-3],c = Y_test_transformed)
```

```
<matplotlib.collections.PathCollection at 0x1cb8670c130>
```



3. Random Forest

```
from sklearn.ensemble import RandomForestClassifier
classifier = RandomForestClassifier(n_estimators = 400, criterion =
'entropy') #400 decision trees
classifier.fit(X_train,Y_train_transformed)
```

```
RandomForestClassifier(criterion='entropy', n_estimators=400)
```

```
# Predicting the test set results
Y_Pred = classifier.predict(X_test)#examination only question are
given
```

```
Y_Pred
```

```
array([0, 2, 0, ..., 2, 0, 0], dtype=int64)
```

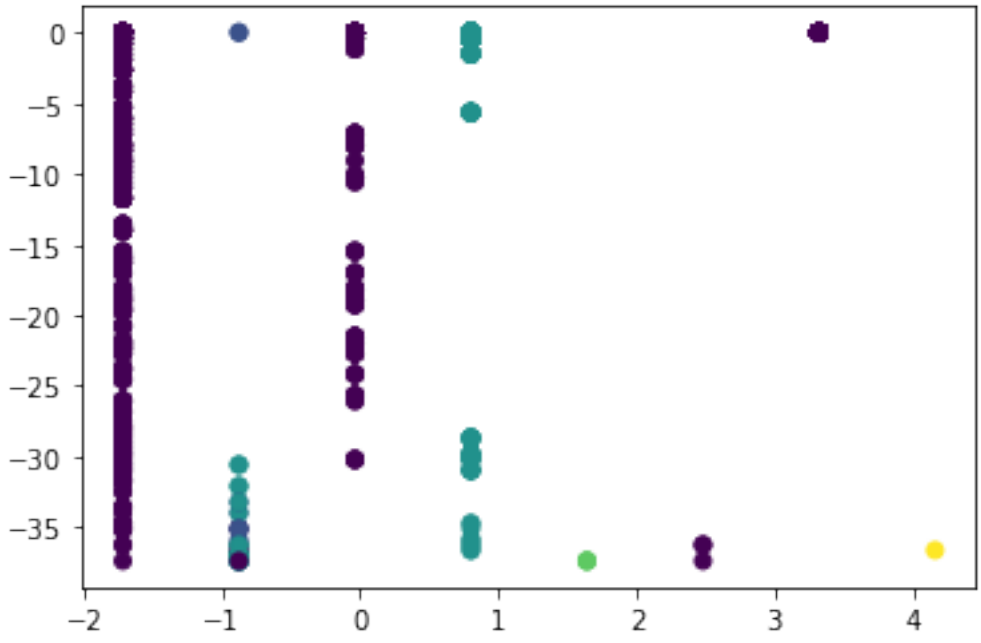
```
from sklearn.metrics import f1_score
f1_score(Y_test_transformed,Y_Pred,average ="weighted")#actual,predict
```

```
0.9999973490343003
```

```
import matplotlib.pyplot as plt
```

```
plt.scatter(X_test[:,1],X_test[:,-2],c = Y_test_transformed)
```

```
<matplotlib.collections.PathCollection at 0x1cb8b7f1fa0>
```



The accuracy are

Ans: 1) Logistics Regression - 99.85%

2) Decision Tree - 99.99%

3) Random Forest - 99.99%