```python
import numpy as np
import pandas as pd

a= pd.read_csv(r'D:\log2.csv ')
```

```python
b = a.sample(frac=0.1, random_state=1)
print(b)
```

```
       Source Port  Destination Port  NAT Source Port  NAT Destination Port  \
12284         4296                53            43153                    53
64627        53771             37965                0                     0
41220        56842             24233            12414                 24233
32498        50037                53            63751                    53
1131         51443                53            51443                    53
...            ...               ...              ...                   ...
33562        54195               443            39081                   443
53145        58284               445                0                     0
37295        64870                53            42981                    53
8639         33042               443            44384                   443
50923        56961                80            26352                    80

       Action  Bytes  Bytes Sent  Bytes Received  Packets  Elapsed Time (sec)  \
12284   allow    217          86             131        2                  30
64627    deny     66          66               0        1                   0
41220   allow     70          70               0        2                   8
32498   allow    195         102              93        2                  31
1131    allow    217          87             130        2                  31
...       ...    ...         ...             ...      ...                 ...
33562   allow   1786         172            1614        7                 120
53145    drop     70          70               0        1                   0
37295   allow    200         102              98        2                  33
8639    allow  10328        5341            4987       26                  35
50923   allow   5885        3796            2089       16                  30

       pkts_sent  pkts_received
12284          1              1
64627          1              0
41220          2              0
32498          1              1
1131           1              1
...          ...            ...
33562          3              4
53145          1              0
37295          1              1
8639          13             13
50923         10              6

[6553 rows x 12 columns]
```

```python
a['Total Bytes'] = a['Bytes Sent'] + a['Bytes Received']
print(a)
```

	Source Port	Destination Port	Action	Bytes	Bytes Sent
0	57222	53	allow	177	94
1	56258	3389	allow	4768	1600
2	6881	50321	allow	238	118
3	50553	3389	allow	3327	1438
4	50002	443	allow	25358	6778
...	...	...	...	...	...
65527	63691	80	allow	314	192
65528	50964	80	allow	4680740	67312
65529	54871	445	drop	70	70
65530	54870	445	drop	70	70
65531	54867	445	drop	70	70

	Bytes Received	Packets	Elapsed Time (sec)	pkts_sent	pkts_received
0	83	2	30	1	1
1	3168	19	17	10	9
2	120	2	1199	1	1
3	1889	15	17	8	7
4	18580	31	16	13	18
...	...	...	...	...	...
65527	122	6	15	4	2
65528	4613428	4675	77	985	3690
65529	0	1	0	1	0
65530	0	1	0	1	0
65531	0	1	0	1	0

	Total Bytes
0	177
1	4768
2	238
3	3327
4	25358
...	...
65527	314
65528	4680740
65529	70
65530	70
65531	70

[65532 rows x 11 columns]

```
In [13]: c = a[a['Action'] == 'allow']
         print(c)
```

```
        Source Port  Destination Port Action      Bytes  Bytes Sent  \
0              57222                53  allow        177          94
1              56258              3389  allow       4768        1600
2               6881             50321  allow        238         118
3              50553              3389  allow       3327        1438
4              50002               443  allow      25358        6778
...              ...               ...    ...        ...         ...
65512          56985                53  allow        711          87
65525          65323                53  allow        356         118
65526          51710             43069  allow         70          70
65527          63691                80  allow        314         192
65528          50964                80  allow    4680740       67312

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                   83        2                  30          1              1
1                 3168       19                  17         10              9
2                  120        2                1199          1              1
3                 1889       15                  17          8              7
4                18580       31                  16         13             18
...                ...      ...                 ...        ...            ...
65512              624        2                  31          1              1
65525              238        2                  30          1              1
65526                0        2                   8          2              0
65527              122        6                  15          4              2
65528          4613428     4675                  77        985           3690

        Total Bytes
0               177
1              4768
2               238
3              3327
4             25358
...             ...
65512           711
65525           356
65526            70
65527           314
65528       4680740

[37640 rows x 11 columns]
```

In [14]:
```python
a['Packets Per Second'] = a['Packets'] / a['Elapsed Time (sec)']
print(a)
```

```
        Source Port  Destination Port Action      Bytes  Bytes Sent  \
0             57222                53  allow         177          94
1             56258              3389  allow        4768        1600
2              6881             50321  allow         238         118
3             50553              3389  allow        3327        1438
4             50002               443  allow       25358        6778
...             ...               ...    ...         ...         ...
65527         63691                80  allow         314         192
65528         50964                80  allow     4680740       67312
65529         54871               445   drop          70          70
65530         54870               445   drop          70          70
65531         54867               445   drop          70          70

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                   83        2                  30          1              1
1                 3168       19                  17         10              9
2                  120        2                1199          1              1
3                 1889       15                  17          8              7
4                18580       31                  16         13             18
...                ...      ...                 ...        ...            ...
65527              122        6                  15          4              2
65528          4613428     4675                  77        985           3690
65529                0        1                   0          1              0
65530                0        1                   0          1              0
65531                0        1                   0          1              0

        Total Bytes  Packets Per Second
0               177            0.066667
1              4768            1.117647
2               238            0.001668
3              3327            0.882353
4             25358            1.937500
...             ...                 ...
65527           314            0.400000
65528       4680740           60.714286
65529            70                 inf
65530            70                 inf
65531            70                 inf

[65532 rows x 12 columns]
```

```python
In [15]:  d = a[a['Total Bytes'] > 1000]
          print(d)
```

```
        Source Port  Destination Port Action      Bytes  Bytes Sent  \
1             56258              3389  allow        4768        1600
3             50553              3389  allow        3327        1438
4             50002               443  allow       25358        6778
5             51465               443  allow        3961        1595
7             50049               443  allow        7912        3269
...             ...               ...    ...         ...         ...
65499         50343                80  allow       22233       10123
65501         50438              3389  allow        3429        1474
65505         35608               443  allow        5776        1880
65511         58574               443  allow        3447         788
65528         50964                80  allow     4680740       67312

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
1                 3168       19                  17         10              9
3                 1889       15                  17          8              7
4                18580       31                  16         13             18
5                 2366       21                  16         12              9
7                 4643       23                  96         12             11
...                ...      ...                 ...        ...            ...
65499            12110       37                  28         16             21
65501             1955       16                  16          8              8
65505             3896       19                 272         11              8
65511             2659       13                 135          6              7
65528          4613428     4675                  77        985           3690

        Total Bytes  Packets Per Second
1              4768            1.117647
3              3327            0.882353
4             25358            1.937500
5              3961            1.312500
7              7912            0.239583
...             ...                 ...
65499         22233            1.321429
65501          3429            1.000000
65505          5776            0.069853
65511          3447            0.096296
65528       4680740           60.714286

[14650 rows x 12 columns]
```

```
In [16]: e = a[a['Source Port'].isin([80, 443])]
         print(e)
```

```
        Source Port  Destination Port Action  Bytes  Bytes Sent  \
184              443               47582  deny     60          60
185              443               47582  deny     85          85
186              443               47582  deny    100         100
243              443               49988  deny     82          82
379              443               18368  deny     60          60
...              ...                 ...   ...    ...         ...
64017            443               22238  deny    112         112
64151            443               29326  deny     82          82
64194            443               29326  deny     82          82
64612            443               63113  deny    100         100
64993            443               43775  deny     97          97

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
184                  0        1                   0          1              0
185                  0        1                   0          1              0
186                  0        1                   0          1              0
243                  0        1                   0          1              0
379                  0        1                   0          1              0
...                ...      ...                 ...        ...            ...
64017                0        1                   0          1              0
64151                0        1                   0          1              0
64194                0        1                   0          1              0
64612                0        1                   0          1              0
64993                0        1                   0          1              0

        Total Bytes  Packets Per Second
184              60                 inf
185              85                 inf
186             100                 inf
243              82                 inf
379              60                 inf
...             ...                 ...
64017           112                 inf
64151            82                 inf
64194            82                 inf
64612           100                 inf
64993            97                 inf

[319 rows x 12 columns]
```

In [17]:
```python
f = a['Bytes Sent'].mean()
print(f)
```

```
22385.79690838064
```

In [18]:
```python
g = a['Packets'].sum()
print(g)
```

```
6741017
```

In [19]:
```python
h = a['Bytes Received'].var()
print(h)
```

```
6067392231884.413
```

In [20]:
```python
i = a.corr()
print(i)
```

	Source Port	Destination Port	Bytes	Bytes Sent \
Source Port	1.000000	-0.332246	0.000221	-0.000931
Destination Port	-0.332246	1.000000	-0.005297	0.001675
Bytes	0.000221	-0.005297	1.000000	0.933462
Bytes Sent	-0.000931	0.001675	0.933462	1.000000
Bytes Received	0.001950	-0.014684	0.830225	0.575047
Packets	-0.001742	-0.006063	0.974379	0.887596
Elapsed Time (sec)	-0.046515	0.023537	0.148834	0.126039
pkts_sent	-0.001422	-0.002134	0.966548	0.973976
pkts_received	-0.001962	-0.010909	0.850209	0.639098
Total Bytes	0.000221	-0.005297	1.000000	0.933462
Packets Per Second	-0.013084	-0.030777	0.254119	0.095398

	Bytes Received	Packets	Elapsed Time (sec)	pkts_sent \
Source Port	0.001950	-0.001742	-0.046515	-0.001422
Destination Port	-0.014684	-0.006063	0.023537	-0.002134
Bytes	0.830225	0.974379	0.148834	0.966548
Bytes Sent	0.575047	0.887596	0.126039	0.973976
Bytes Received	1.000000	0.843067	0.143601	0.690959
Packets	0.843067	1.000000	0.147074	0.961286
Elapsed Time (sec)	0.143601	0.147074	1.000000	0.135101
pkts_sent	0.690959	0.961286	0.135101	1.000000
pkts_received	0.946039	0.916978	0.143954	0.771550
Total Bytes	0.830225	0.974379	0.148834	0.966548
Packets Per Second	0.431456	0.286722	0.008834	0.185554

	pkts_received	Total Bytes	Packets Per Second
Source Port	-0.001962	0.000221	-0.013084
Destination Port	-0.010909	-0.005297	-0.030777
Bytes	0.850209	1.000000	0.254119
Bytes Sent	0.639098	0.933462	0.095398
Bytes Received	0.946039	0.830225	0.431456
Packets	0.916978	0.974379	0.286722
Elapsed Time (sec)	0.143954	0.148834	0.008834
pkts_sent	0.771550	0.966548	0.185554
pkts_received	1.000000	0.850209	0.393347
Total Bytes	0.850209	1.000000	0.254119
Packets Per Second	0.393347	0.254119	1.000000

```
C:\Users\23bad051\AppData\Local\Temp\ipykernel_19192\458278798.py:1: FutureWarnin
g: The default value of numeric_only in DataFrame.corr is deprecated. In a future
version, it will default to False. Select only valid columns or specify the value
of numeric_only to silence this warning.
  i = a.corr()
```

In [21]:
```python
a.fillna(a.mean(), inplace=True)
print(a)
```

```
        Source Port  Destination Port Action    Bytes  Bytes Sent  \
0             57222                 53  allow      177          94
1             56258               3389  allow     4768        1600
2              6881              50321  allow      238         118
3             50553               3389  allow     3327        1438
4             50002                443  allow    25358        6778
...             ...                ...    ...      ...         ...
65527         63691                 80  allow      314         192
65528         50964                 80  allow  4680740       67312
65529         54871                445   drop       70          70
65530         54870                445   drop       70          70
65531         54867                445   drop       70          70

       Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                  83        2                  30          1              1
1                3168       19                  17         10              9
2                 120        2                1199          1              1
3                1889       15                  17          8              7
4               18580       31                  16         13             18
...               ...      ...                 ...        ...            ...
65527             122        6                  15          4              2
65528         4613428     4675                  77        985           3690
65529               0        1                   0          1              0
65530               0        1                   0          1              0
65531               0        1                   0          1              0

       Total Bytes  Packets Per Second
0              177            0.066667
1             4768            1.117647
2              238            0.001668
3             3327            0.882353
4            25358            1.937500
...            ...                 ...
65527          314            0.400000
65528      4680740           60.714286
65529           70                 inf
65530           70                 inf
65531           70                 inf

[65532 rows x 12 columns]
```

```
C:\Users\23bad051\AppData\Local\Temp\ipykernel_19192\2237836958.py:1: FutureWarnin
g: The default value of numeric_only in DataFrame.mean is deprecated. In a future
version, it will default to False. In addition, specifying 'numeric_only=None' is
deprecated. Select only valid columns or specify the value of numeric_only to sile
nce this warning.
  a.fillna(a.mean(), inplace=True)
```

In [22]:
```python
j = pd.DataFrame({'Source Port': [80, 443], 'Port Description': ['HTTP', 'HTTPS']})
print(j)
```

```
   Source Port Port Description
0           80             HTTP
1          443            HTTPS
```

In [23]:
```python
k = pd.merge(a, j, on='Source Port', how='left')
print(k)
```

```
         Source Port  Destination Port Action      Bytes  Bytes Sent  \
0              57222                53  allow         177          94
1              56258              3389  allow        4768        1600
2               6881             50321  allow         238         118
3              50553              3389  allow        3327        1438
4              50002               443  allow       25358        6778
...              ...               ...    ...         ...         ...
65527          63691                80  allow         314         192
65528          50964                80  allow     4680740       67312
65529          54871               445   drop          70          70
65530          54870               445   drop          70          70
65531          54867               445   drop          70          70

       Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                  83        2                  30          1              1
1                3168       19                  17         10              9
2                 120        2                1199          1              1
3                1889       15                  17          8              7
4               18580       31                  16         13             18
...               ...      ...                 ...        ...            ...
65527             122        6                  15          4              2
65528         4613428     4675                  77        985           3690
65529               0        1                   0          1              0
65530               0        1                   0          1              0
65531               0        1                   0          1              0

       Total Bytes  Packets Per Second Port Description
0              177            0.066667             NaN
1             4768            1.117647             NaN
2              238            0.001668             NaN
3             3327            0.882353             NaN
4            25358            1.937500             NaN
...            ...                 ...             ...
65527          314            0.400000             NaN
65528      4680740           60.714286             NaN
65529           70                 inf             NaN
65530           70                 inf             NaN
65531           70                 inf             NaN

[65532 rows x 13 columns]
```

In [24]:
```python
a['Log Bytes Sent'] = a['Bytes Sent'].apply(np.log)
print(a)
```

```
       Source Port  Destination Port Action     Bytes  Bytes Sent  \
0            57222                53  allow       177          94
1            56258              3389  allow      4768        1600
2             6881             50321  allow       238         118
3            50553              3389  allow      3327        1438
4            50002               443  allow     25358        6778
...            ...               ...    ...       ...         ...
65527        63691                80  allow       314         192
65528        50964                80  allow   4680740       67312
65529        54871               445   drop        70          70
65530        54870               445   drop        70          70
65531        54867               445   drop        70          70

       Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                  83        2                  30          1              1
1                3168       19                  17         10              9
2                 120        2                1199          1              1
3                1889       15                  17          8              7
4               18580       31                  16         13             18
...               ...      ...                 ...        ...            ...
65527             122        6                  15          4              2
65528         4613428     4675                  77        985           3690
65529               0        1                   0          1              0
65530               0        1                   0          1              0
65531               0        1                   0          1              0

       Total Bytes  Packets Per Second  Log Bytes Sent
0              177            0.066667        4.543295
1             4768            1.117647        7.377759
2              238            0.001668        4.770685
3             3327            0.882353        7.271009
4            25358            1.937500        8.821437
...            ...                 ...             ...
65527          314            0.400000        5.257495
65528      4680740           60.714286       11.117094
65529           70                 inf        4.248495
65530           70                 inf        4.248495
65531           70                 inf        4.248495

[65532 rows x 13 columns]
```

In [25]:
```python
l = a.groupby('Action')['Bytes Sent'].mean()
print(l)
```

```
Action
allow       38917.411743
deny           83.036098
drop           68.675278
reset-both    141.796296
Name: Bytes Sent, dtype: float64
```

In [27]:
```python
b = a.sample(frac=0.1, random_state=1)
print(b)
```

	Source Port	Destination Port	Action	Bytes	Bytes Sent	\
12284	4296	53	allow	217	86	
64627	53771	37965	deny	66	66	
41220	56842	24233	allow	70	70	
32498	50037	53	allow	195	102	
1131	51443	53	allow	217	87	
...	...	...	...	...	...	
33562	54195	443	allow	1786	172	
53145	58284	445	drop	70	70	
37295	64870	53	allow	200	102	
8639	33042	443	allow	10328	5341	
50923	56961	80	allow	5885	3796	

	Bytes Received	Packets	Elapsed Time (sec)	pkts_sent	pkts_received	\
12284	131	2	30	1	1	
64627	0	1	0	1	0	
41220	0	2	8	2	0	
32498	93	2	31	1	1	
1131	130	2	31	1	1	
...	...	...	...	...	...	
33562	1614	7	120	3	4	
53145	0	1	0	1	0	
37295	98	2	33	1	1	
8639	4987	26	35	13	13	
50923	2089	16	30	10	6	

	Total Bytes	Packets Per Second	Log Bytes Sent
12284	217	0.066667	4.454347
64627	66	inf	4.189655
41220	70	0.250000	4.248495
32498	195	0.064516	4.624973
1131	217	0.064516	4.465908
...	...	...	...
33562	1786	0.058333	5.147494
53145	70	inf	4.248495
37295	200	0.060606	4.624973
8639	10328	0.742857	8.583168
50923	5885	0.533333	8.241703

[6553 rows x 13 columns]

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [35]:

In [36]:

In [37]:

In [38]:

In [39]:

In [ ]:

In [ ]:

In [ ]:

In [57]:
```python
a['Total Time (sec)'] = a['Elapsed Time (sec)'] + 1
print(a)
```

```
       Source Port  Destination Port Action      Bytes  Bytes Sent  \
0            57222                53  allow        177          94
1            56258              3389  allow       4768        1600
2             6881             50321  allow        238         118
3            50553              3389  allow       3327        1438
4            50002               443  allow      25358        6778
...            ...               ...    ...        ...         ...
65527        63691                80  allow        314         192
65528        50964                80  allow    4680740       67312
65529        54871               445   drop         70          70
65530        54870               445   drop         70          70
65531        54867               445   drop         70          70

       Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                  83        2                  30          1              1
1                3168       19                  17         10              9
2                 120        2                1199          1              1
3                1889       15                  17          8              7
4               18580       31                  16         13             18
...               ...      ...                 ...        ...            ...
65527             122        6                  15          4              2
65528         4613428     4675                  77        985           3690
65529               0        1                   0          1              0
65530               0        1                   0          1              0
65531               0        1                   0          1              0

       Total Bytes  Packets Per Second  Log Bytes Sent  Total Packets  \
0              177            0.066667        4.543295              3
1             4768            1.117647        7.377759             28
2              238            0.001668        4.770685              3
3             3327            0.882353        7.271009             22
4            25358            1.937500        8.821437             49
...            ...                 ...             ...            ...
65527          314            0.400000        5.257495              8
65528      4680740           60.714286       11.117094           8365
65529           70                 inf        4.248495              1
65530           70                 inf        4.248495              1
65531           70                 inf        4.248495              1

       Total Time (sec)  Time Per Port  Log Time
0                    31       0.000524  3.401197
1                    18       0.000302  2.833213
2                  1200       0.174248  7.089243
3                    18       0.000336  2.833213
4                    17       0.000320  2.772589
...                 ...            ...       ...
65527                16       0.000236  2.708050
65528                78       0.001511  4.343805
65529                 1       0.000000      -inf
65530                 1       0.000000      -inf
65531                 1       0.000000      -inf

[65532 rows x 17 columns]
```

In [58]:
```python
c = a[a['Source Port'] > 1000]
```

```
print(c)
```

```
        Source Port  Destination Port Action     Bytes  Bytes Sent  \
0             57222                53  allow       177          94
1             56258              3389  allow      4768        1600
2              6881             50321  allow       238         118
3             50553              3389  allow      3327        1438
4             50002               443  allow     25358        6778
...             ...               ...    ...       ...         ...
65527         63691                80  allow       314         192
65528         50964                80  allow   4680740       67312
65529         54871               445   drop        70          70
65530         54870               445   drop        70          70
65531         54867               445   drop        70          70

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                   83        2                  30          1              1
1                 3168       19                  17         10              9
2                  120        2                1199          1              1
3                 1889       15                  17          8              7
4                18580       31                  16         13             18
...                ...      ...                 ...        ...            ...
65527              122        6                  15          4              2
65528          4613428     4675                  77        985           3690
65529                0        1                   0          1              0
65530                0        1                   0          1              0
65531                0        1                   0          1              0

        Total Bytes  Packets Per Second  Log Bytes Sent  Total Packets  \
0               177            0.066667        4.543295              3
1              4768            1.117647        7.377759             28
2               238            0.001668        4.770685              3
3              3327            0.882353        7.271009             22
4             25358            1.937500        8.821437             49
...             ...                 ...             ...            ...
65527           314            0.400000        5.257495              8
65528       4680740           60.714286       11.117094           8365
65529            70                 inf        4.248495              1
65530            70                 inf        4.248495              1
65531            70                 inf        4.248495              1

        Total Time (sec)  Time Per Port  Log Time
0                     31       0.000524  3.401197
1                     18       0.000302  2.833213
2                   1200       0.174248  7.089243
3                     18       0.000336  2.833213
4                     17       0.000320  2.772589
...                  ...            ...       ...
65527                 16       0.000236  2.708050
65528                 78       0.001511  4.343805
65529                  1       0.000000      -inf
65530                  1       0.000000      -inf
65531                  1       0.000000      -inf

[64947 rows x 17 columns]
```

```
In [59]:  a['Time Per Port'] = a['Elapsed Time (sec)'] / a['Source Port']
          print(a)
```

```
        Source Port  Destination Port Action      Bytes  Bytes Sent  \
0             57222                53  allow        177          94
1             56258              3389  allow       4768        1600
2              6881             50321  allow        238         118
3             50553              3389  allow       3327        1438
4             50002               443  allow      25358        6778
...             ...               ...    ...        ...         ...
65527         63691                80  allow        314         192
65528         50964                80  allow    4680740       67312
65529         54871               445   drop         70          70
65530         54870               445   drop         70          70
65531         54867               445   drop         70          70

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                   83        2                  30          1              1
1                 3168       19                  17         10              9
2                  120        2                1199          1              1
3                 1889       15                  17          8              7
4                18580       31                  16         13             18
...                ...      ...                 ...        ...            ...
65527              122        6                  15          4              2
65528          4613428     4675                  77        985           3690
65529                0        1                   0          1              0
65530                0        1                   0          1              0
65531                0        1                   0          1              0

        Total Bytes  Packets Per Second  Log Bytes Sent  Total Packets  \
0               177            0.066667        4.543295              3
1              4768            1.117647        7.377759             28
2               238            0.001668        4.770685              3
3              3327            0.882353        7.271009             22
4             25358            1.937500        8.821437             49
...             ...                 ...             ...            ...
65527           314            0.400000        5.257495              8
65528       4680740           60.714286       11.117094           8365
65529            70                 inf        4.248495              1
65530            70                 inf        4.248495              1
65531            70                 inf        4.248495              1

        Total Time (sec)  Time Per Port  Log Time
0                     31       0.000524  3.401197
1                     18       0.000302  2.833213
2                   1200       0.174248  7.089243
3                     18       0.000336  2.833213
4                     17       0.000320  2.772589
...                  ...            ...       ...
65527                 16       0.000236  2.708050
65528                 78       0.001511  4.343805
65529                  1       0.000000      -inf
65530                  1       0.000000      -inf
65531                  1       0.000000      -inf

[65532 rows x 17 columns]
```

```python
In [60]: d = a[a['Elapsed Time (sec)'] > 100]
         print(d)
```

```
        Source Port  Destination Port Action  Bytes  Bytes Sent  \
2              6881             50321  allow    238         118
31            58615               443  allow   6796        1541
34            34529               443  allow  62652       30891
35            52184               443  allow  13902        3253
36            60377               443  allow   8678        2974
...             ...               ...    ...    ...         ...
65490         55015               443  allow   1786         172
65492         56457               443  allow   3654        1144
65493         59021               443  allow   4596        1442
65505         35608               443  allow   5776        1880
65511         58574               443  allow   3447         788

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
2                  120        2                1199          1              1
31                5255       23                 121         11             12
34               31761      158                 381         67             91
35               10649       26                 135         14             12
36                5704       50                 123         27             23
...                ...      ...                 ...        ...            ...
65490             1614        7                 120          3              4
65492             2510       10                 120          5              5
65493             3154       24                 154         11             13
65505             3896       19                 272         11              8
65511             2659       13                 135          6              7

        Total Bytes  Packets Per Second  Log Bytes Sent  Total Packets  \
2               238            0.001668        4.770685              3
31             6796            0.190083        7.340187             35
34            62652            0.414698       10.338220            249
35            13902            0.192593        8.087333             38
36             8678            0.406504        7.997663             73
...             ...                 ...             ...            ...
65490          1786            0.058333        5.147494             11
65492          3654            0.083333        7.042286             15
65493          4596            0.155844        7.273786             37
65505          5776            0.069853        7.539027             27
65511          3447            0.096296        6.669498             20

        Total Time (sec)  Time Per Port  Log Time
2                   1200       0.174248  7.089243
31                   122       0.002064  4.795791
34                   382       0.011034  5.942799
35                   136       0.002587  4.905275
36                   124       0.002037  4.812184
...                  ...            ...       ...
65490                121       0.002181  4.787492
65492                121       0.002126  4.787492
65493                155       0.002609  5.036953
65505                273       0.007639  5.605802
65511                136       0.002305  4.905275

[6800 rows x 17 columns]
```

```python
In [61]: e = a[a['Source Port'].isin([80, 443])]
         print(e)
```

```
        Source Port  Destination Port Action   Bytes  Bytes Sent  \
184            443               47582   deny      60          60
185            443               47582   deny      85          85
186            443               47582   deny     100         100
243            443               49988   deny      82          82
379            443               18368   deny      60          60
...            ...                 ...    ...     ...         ...
64017          443               22238   deny     112         112
64151          443               29326   deny      82          82
64194          443               29326   deny      82          82
64612          443               63113   deny     100         100
64993          443               43775   deny      97          97

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
184                  0        1                   0          1              0
185                  0        1                   0          1              0
186                  0        1                   0          1              0
243                  0        1                   0          1              0
379                  0        1                   0          1              0
...                ...      ...                 ...        ...            ...
64017                0        1                   0          1              0
64151                0        1                   0          1              0
64194                0        1                   0          1              0
64612                0        1                   0          1              0
64993                0        1                   0          1              0

        Total Bytes  Packets Per Second  Log Bytes Sent  Total Packets  \
184              60                 inf        4.094345              1
185              85                 inf        4.442651              1
186             100                 inf        4.605170              1
243              82                 inf        4.406719              1
379              60                 inf        4.094345              1
...             ...                 ...             ...            ...
64017           112                 inf        4.718499              1
64151            82                 inf        4.406719              1
64194            82                 inf        4.406719              1
64612           100                 inf        4.605170              1
64993            97                 inf        4.574711              1

        Total Time (sec)  Time Per Port  Log Time
184                    1            0.0      -inf
185                    1            0.0      -inf
186                    1            0.0      -inf
243                    1            0.0      -inf
379                    1            0.0      -inf
...                  ...            ...       ...
64017                  1            0.0      -inf
64151                  1            0.0      -inf
64194                  1            0.0      -inf
64612                  1            0.0      -inf
64993                  1            0.0      -inf

[319 rows x 17 columns]
```

```python
In [62]: f = a['Source Port'].mean()
         print(f)
```

```
49391.96934322163
```

```python
In [63]: g = a['Elapsed Time (sec)'].sum()
         print(g)
```

```
4314206
```

In [64]:
```python
h = a['Source Port'].var()
print(h)
```

232736765.01132688

In [ ]:

In [ ]:

In [65]:
```python
j = pd.DataFrame({'Source Port': [80, 443], 'Port Description': ['HTTP', 'HTTPS']})
print(j)
```

```
   Source Port Port Description
0           80             HTTP
1          443            HTTPS
```

In [66]:
```python
k = pd.merge(a, j, on='Source Port', how='left')
print(k)
```

```
         Source Port   Destination Port Action      Bytes   Bytes Sent  \
0              57222                  53  allow        177           94
1              56258                3389  allow       4768         1600
2               6881               50321  allow        238          118
3              50553                3389  allow       3327         1438
4              50002                 443  allow      25358         6778
...              ...                 ...    ...        ...          ...
65527          63691                  80  allow        314          192
65528          50964                  80  allow    4680740        67312
65529          54871                 445   drop         70           70
65530          54870                 445   drop         70           70
65531          54867                 445   drop         70           70

         Bytes Received   Packets   Elapsed Time (sec)  pkts_sent  pkts_received  \
0                    83         2                   30          1              1
1                  3168        19                   17         10              9
2                   120         2                 1199          1              1
3                  1889        15                   17          8              7
4                 18580        31                   16         13             18
...                 ...       ...                  ...        ...            ...
65527               122         6                   15          4              2
65528           4613428      4675                   77        985           3690
65529                 0         1                    0          1              0
65530                 0         1                    0          1              0
65531                 0         1                    0          1              0

         Total Bytes   Packets Per Second   Log Bytes Sent   Total Packets  \
0                177             0.066667         4.543295               3
1               4768             1.117647         7.377759              28
2                238             0.001668         4.770685               3
3               3327             0.882353         7.271009              22
4              25358             1.937500         8.821437              49
...              ...                  ...              ...             ...
65527            314             0.400000         5.257495               8
65528        4680740            60.714286        11.117094            8365
65529             70                  inf         4.248495               1
65530             70                  inf         4.248495               1
65531             70                  inf         4.248495               1

         Total Time (sec)   Time Per Port   Log Time  Port Description
0                      31        0.000524   3.401197               NaN
1                      18        0.000302   2.833213               NaN
2                    1200        0.174248   7.089243               NaN
3                      18        0.000336   2.833213               NaN
4                      17        0.000320   2.772589               NaN
...                   ...             ...        ...               ...
65527                  16        0.000236   2.708050               NaN
65528                  78        0.001511   4.343805               NaN
65529                   1        0.000000       -inf               NaN
65530                   1        0.000000       -inf               NaN
65531                   1        0.000000       -inf               NaN

[65532 rows x 18 columns]
```

```
In [67]:  a['Log Time'] = a['Elapsed Time (sec)'].apply(np.log)
          print(a)
```

```
        Source Port  Destination Port Action      Bytes  Bytes Sent  \
0             57222                53  allow        177          94
1             56258              3389  allow       4768        1600
2              6881             50321  allow        238         118
3             50553              3389  allow       3327        1438
4             50002               443  allow      25358        6778
...             ...               ...    ...        ...         ...
65527         63691                80  allow        314         192
65528         50964                80  allow    4680740       67312
65529         54871               445   drop         70          70
65530         54870               445   drop         70          70
65531         54867               445   drop         70          70

        Bytes Received  Packets  Elapsed Time (sec)  pkts_sent  pkts_received  \
0                   83        2                  30          1              1
1                 3168       19                  17         10              9
2                  120        2                1199          1              1
3                 1889       15                  17          8              7
4                18580       31                  16         13             18
...                ...      ...                 ...        ...            ...
65527              122        6                  15          4              2
65528          4613428     4675                  77        985           3690
65529                0        1                   0          1              0
65530                0        1                   0          1              0
65531                0        1                   0          1              0

        Total Bytes  Packets Per Second  Log Bytes Sent  Total Packets  \
0               177            0.066667        4.543295              3
1              4768            1.117647        7.377759             28
2               238            0.001668        4.770685              3
3              3327            0.882353        7.271009             22
4             25358            1.937500        8.821437             49
...             ...                 ...             ...            ...
65527           314            0.400000        5.257495              8
65528       4680740           60.714286       11.117094           8365
65529            70                 inf        4.248495              1
65530            70                 inf        4.248495              1
65531            70                 inf        4.248495              1

        Total Time (sec)  Time Per Port  Log Time
0                     31       0.000524  3.401197
1                     18       0.000302  2.833213
2                   1200       0.174248  7.089243
3                     18       0.000336  2.833213
4                     17       0.000320  2.772589
...                  ...            ...       ...
65527                 16       0.000236  2.708050
65528                 78       0.001511  4.343805
65529                  1       0.000000      -inf
65530                  1       0.000000      -inf
65531                  1       0.000000      -inf

[65532 rows x 17 columns]
```

In [68]:
```python
l = a.groupby('Action')['Elapsed Time (sec)'].mean()
print(l)
```

```
Action
allow          114.617349
deny             0.000133
drop             0.000000
reset-both       0.129630
Name: Elapsed Time (sec), dtype: float64
```

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]: