HTTP

September 28, 2021

[ ]:

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

[ ]:

```
# Read from CSV

df = pd.read_csv('Outputs/packets-http-legitimo-2021.09.27-processed')
```

[ ]:

```
# Setting global var

bytesize = 32
proto = 'TCP'
srcport = 80
encoding = 'plaintext'
text = 'HTTP'
```

[ ]:

```
# Add a new column to the end called 'flow'

df['flow'] = df['srcip'] + ':' + df.srcport.map(str) + ' -> ' + df['dstip'] + ':
 ↪' + df.dstport.map(str)
# Read a specific location (R,C)
print('Example of flow {}'.format(df.iloc[5,10]))
```

```
Example of flow 192.168.0.1:80 -> 192.168.0.119:1054
```

[ ]:

```
# Sort dataframe by an index (column) and show

df = df.sort_values(['payload_size','flow'])
print(df.iloc[:,6:11])
```

```
     payload_size   shannon      bien     tbien  \
273             1 -0.000000  0.000000  0.000000
219             5  0.530103  0.477113  0.860083
245             5  0.530103  0.477113  0.860083
288             5  0.530103  0.477113  0.860083
222             5  0.530103  0.477113  0.860083
..            …         …         …         …
276          1460  0.297409  0.599001  0.978848
```

```
277          1460  0.298132  0.594225  0.978804
278          1460  0.299847  0.614111  0.979566
280          1460  0.299349  0.565068  0.978128
281          1460  0.294409  0.670219  0.979994

                                     flow
273  192.168.0.119:1051 -> 192.168.0.1:80
219  192.168.0.1:80 -> 192.168.0.119:1060
245  192.168.0.1:80 -> 192.168.0.119:1062
288  192.168.0.1:80 -> 192.168.0.119:1064
222  192.168.0.1:80 -> 192.168.0.119:1066
..                                      …
276  192.168.0.1:80 -> 192.168.0.119:1078
277  192.168.0.1:80 -> 192.168.0.119:1078
278  192.168.0.1:80 -> 192.168.0.119:1078
280  192.168.0.1:80 -> 192.168.0.119:1078
281  192.168.0.1:80 -> 192.168.0.119:1078

[290 rows x 5 columns]
```

[ ]:

```
# Filtering by port

is_port = df['srcport']==srcport
print(is_port.head())
df = df[is_port]
```

```
273    False
219     True
245     True
288     True
222     True
Name: srcport, dtype: bool
```

[ ]:

```
# Filtering by the number of packets of chosen size

is_bytes = df['payload_size']>2
print(is_bytes.head())
df = df[is_bytes]
```

```
219    True
245    True
288    True
222    True
229    True
Name: payload_size, dtype: bool
```

[ ]:

```
# Minimize number of displayed columns
# pd.set_option("display.max.columns", None)
# df.head()
```

[ ]:

```
# Aggregation by flow and each entropies mean

df[['flow','shannon','bien','tbien','payload_size']].groupby('flow').mean().
 ↪sort_values('tbien', ascending=False)
```

[ ]:

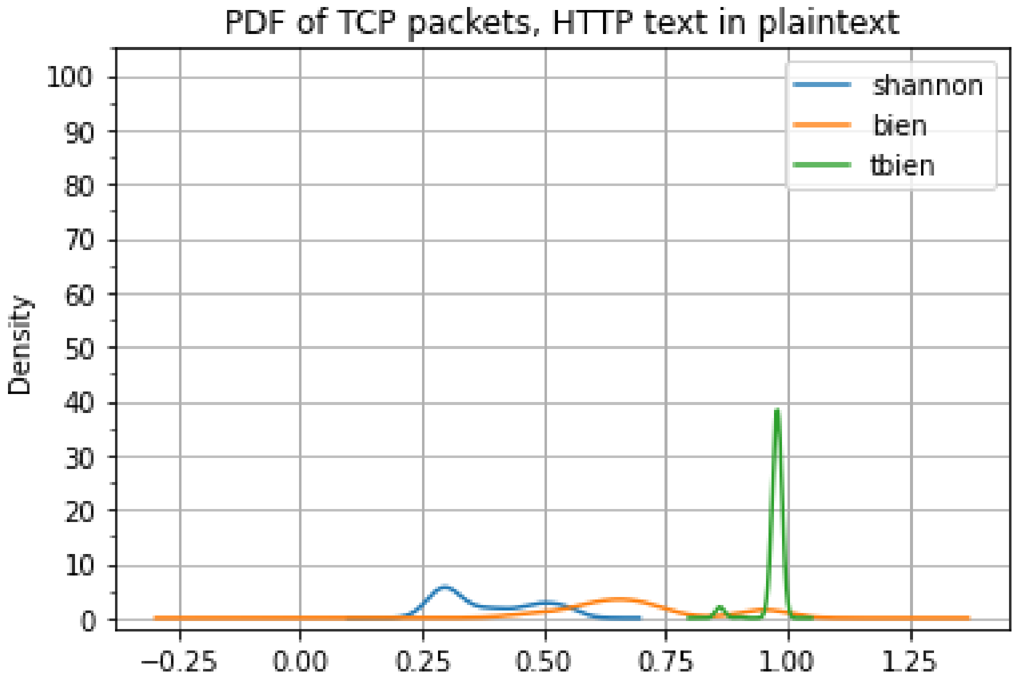
```
                                           shannon      bien     tbien  \
flow
192.168.0.1:80 -> 192.168.0.119:1074  0.459490  0.825880  0.983347
192.168.0.1:80 -> 192.168.0.119:1045  0.450644  0.758350  0.980266
192.168.0.1:80 -> 192.168.0.119:1031  0.451397  0.657500  0.979959
192.168.0.1:80 -> 192.168.0.119:1061  0.443833  0.786182  0.979885
192.168.0.1:80 -> 192.168.0.119:1037  0.418848  0.762728  0.979642
192.168.0.1:80 -> 192.168.0.119:1054  0.446066  0.746885  0.979594
192.168.0.1:80 -> 192.168.0.119:1038  0.430060  0.600449  0.978858
192.168.0.1:80 -> 192.168.0.119:1068  0.403475  0.707959  0.978285
192.168.0.1:80 -> 192.168.0.119:1052  0.422831  0.741490  0.978067
192.168.0.1:80 -> 192.168.0.119:1051  0.418604  0.735303  0.977669
192.168.0.1:80 -> 192.168.0.119:1032  0.338121  0.689315  0.977031
192.168.0.1:80 -> 192.168.0.119:1035  0.401986  0.696155  0.976956
192.168.0.1:80 -> 192.168.0.119:1053  0.357413  0.697428  0.976722
192.168.0.1:80 -> 192.168.0.119:1039  0.417006  0.745829  0.975285
192.168.0.1:80 -> 192.168.0.119:1078  0.322695  0.628981  0.972967
192.168.0.1:80 -> 192.168.0.119:1077  0.334142  0.629042  0.968206
192.168.0.1:80 -> 192.168.0.119:1062  0.340631  0.614054  0.967522
192.168.0.1:80 -> 192.168.0.119:1064  0.385844  0.693913  0.967328
192.168.0.1:80 -> 192.168.0.119:1070  0.484815  0.709719  0.942815
192.168.0.1:80 -> 192.168.0.119:1060  0.472761  0.709072  0.942774
192.168.0.1:80 -> 192.168.0.119:1067  0.459961  0.650515  0.941192
192.168.0.1:80 -> 192.168.0.119:1069  0.440299  0.627044  0.940784
192.168.0.1:80 -> 192.168.0.119:1071  0.460209  0.580837  0.940464
192.168.0.1:80 -> 192.168.0.119:1066  0.450980  0.630038  0.940324

                                      payload_size
flow
192.168.0.1:80 -> 192.168.0.119:1074     97.500000
192.168.0.1:80 -> 192.168.0.119:1045    111.500000
192.168.0.1:80 -> 192.168.0.119:1031     94.000000
192.168.0.1:80 -> 192.168.0.119:1061    368.000000
192.168.0.1:80 -> 192.168.0.119:1037    170.000000
192.168.0.1:80 -> 192.168.0.119:1054    129.500000
192.168.0.1:80 -> 192.168.0.119:1038    166.000000
192.168.0.1:80 -> 192.168.0.119:1068    540.714286
192.168.0.1:80 -> 192.168.0.119:1052    348.916667
192.168.0.1:80 -> 192.168.0.119:1051    483.666667
```

```
192.168.0.1:80 -> 192.168.0.119:1032   1058.500000
192.168.0.1:80 -> 192.168.0.119:1035    236.000000
192.168.0.1:80 -> 192.168.0.119:1053    903.734694
192.168.0.1:80 -> 192.168.0.119:1039    472.565217
192.168.0.1:80 -> 192.168.0.119:1078   1205.894737
192.168.0.1:80 -> 192.168.0.119:1077   1145.600000
192.168.0.1:80 -> 192.168.0.119:1062   1115.600000
192.168.0.1:80 -> 192.168.0.119:1064    696.818182
192.168.0.1:80 -> 192.168.0.119:1070     65.000000
192.168.0.1:80 -> 192.168.0.119:1060     79.666667
192.168.0.1:80 -> 192.168.0.119:1067    136.000000
192.168.0.1:80 -> 192.168.0.119:1069    357.333333
192.168.0.1:80 -> 192.168.0.119:1071    122.333333
192.168.0.1:80 -> 192.168.0.119:1066    200.000000
```

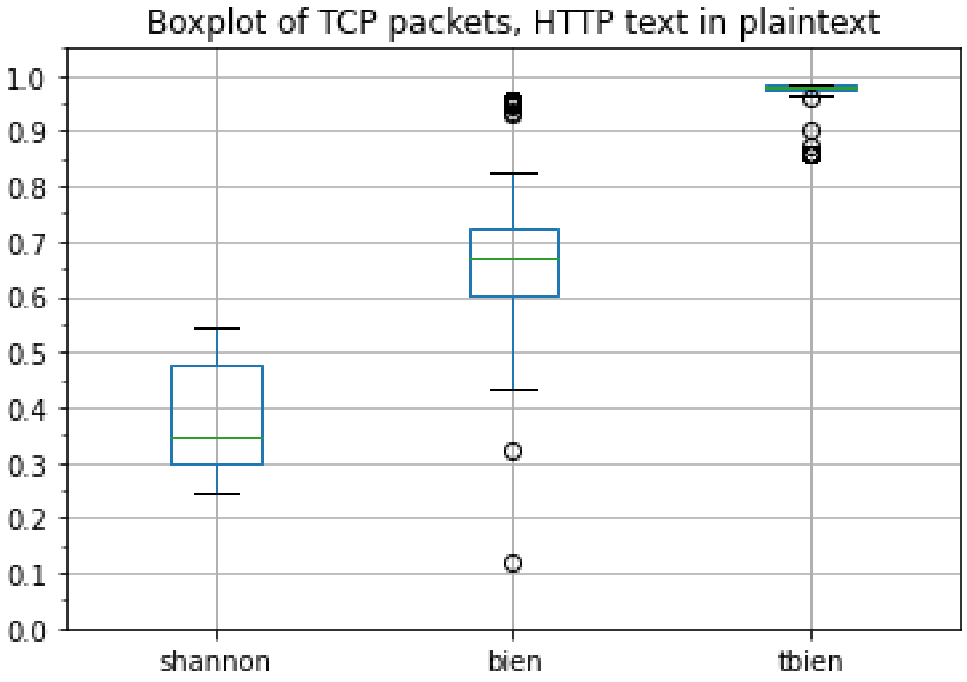
```
[ ]: # Plot 1

     title = 'PDF of {} packets, {} text in {}'.format(proto, text, encoding)
     ax = df.plot(x='payload_size',␣
      ↪y=['shannon','bien','tbien'],kind='density',title=title, grid=True)
     ax.xaxis.grid(True, which='major', linestyle='-', linewidth=1)
     ymajortick = arange(0,110,10)
     yminortick = arange(0,110,5)
     ax.set_yticks( ymajortick, minor=False )
     ax.set_yticks( yminortick, minor=True )
     ax.grid('on', which='both', axis='x' )
     plt.savefig('Plots/rfc761/{}{}{}density.png'.format(proto, encoding, text),␣
      ↪transparent=False)
```



```
[ ]: # Plot 2

     title = 'Boxplot of {} packets, {} text in {}'.format(proto, text, encoding)
     ax = df.plot(x='payload_size',␣
      ↪y=['shannon','bien','tbien'],kind='box',title=title, grid=True)
     ax.xaxis.grid(True, which='major', linestyle='-', linewidth=1)
     ymajortick = arange(0,1.1,0.1)
     yminortick = arange(0,1.1,0.05)
     ax.set_yticks( ymajortick, minor=False )
     ax.set_yticks( yminortick, minor=True )
     ax.grid('on', which='both', axis='x' )
     plt.savefig('Plots/rfc761/{}{}{}box.png'.format(proto, encoding, text),␣
      ↪transparent=False)
```



```
[ ]: # Table of data

     df = df.describe()
     print(df)
```

```
       srcport      dstport  payload_size     shannon        bien       tbien
count    227.0   227.000000    227.000000  227.000000  227.000000  227.000000
mean      80.0  1055.942731    713.193833    0.383637    0.691736    0.972369
std        0.0    14.169370    641.910780    0.097720    0.152791    0.025999
min       80.0  1031.000000      5.000000    0.247437    0.120274    0.860083
25%       80.0  1051.000000     64.000000    0.296204    0.603715    0.975049
50%       80.0  1053.000000    433.000000    0.345913    0.671161    0.978244
75%       80.0  1067.500000   1460.000000    0.476424    0.722633    0.982645
max       80.0  1078.000000   1460.000000    0.546253    0.953186    0.985718
```

```
[ ]: # Exporting new data

     filename = 'Outputs/RFC761/{}{}{}data.csv'.format(proto, encoding, text)
     df.to_csv(filename,',')
```