In [1]:
```
import pandas as pd
import numpy as np
import plotly.express as px
import plotly.graph_objects as go
pd.set_option('max_columns', None)
```

1 IPFS

In [2]:
```
df1 = pd.read_csv('1205_peer_ipfs.txt', sep=' ', header=None)
df1 = df1.rename(columns={0:"a",1:"b",2:"c"})
# get timestamp
df1['timestamp'] = df1['a'].map(str) +" "+ df1['b'].map(str)
df1['timestamp'] = df1['timestamp'].str.strip('[]')
df1['datetime'] = pd.to_datetime(df1['timestamp'])
# get peer
df1['peer'] = df1['c'].apply(lambda x: x.split('/')[-1])
df1 = df1.drop(['a','b','c','timestamp'],axis=1)
df1 = df1.drop_duplicates()
df1.shape
```

Out[2]:
```
(103999, 2)
```

In [3]:
```
df1.head()
```

Out[3]:

	datetime	peer
0	2022-12-04 23:53:01	12D3KooWPe5QvKbaxJ85tNPt735bRVS79iXDyi29kkfPDV...
1	2022-12-04 23:53:01	12D3KooWMTwrnajW6vop4fnZuJA5DCg9yb8kQrX7TLQUsR...
2	2022-12-04 23:53:01	12D3KooWAFGy9f4KBqMSAFjuBB8hQG21g2NTcdFzn4iAXw...
3	2022-12-04 23:53:01	QmZSw8YVbiRsZ5mbdRbZQP7RC3ZZSdnkdZvN4TH7zL1nnK
4	2022-12-04 23:53:01	12D3KooWGhbWq2C8etBmtKodv8X92WyvCaSs1ZL53KAu1R...

In [4]:
```
len(df1['peer'].unique())
```

Out[4]:
```
7688
```

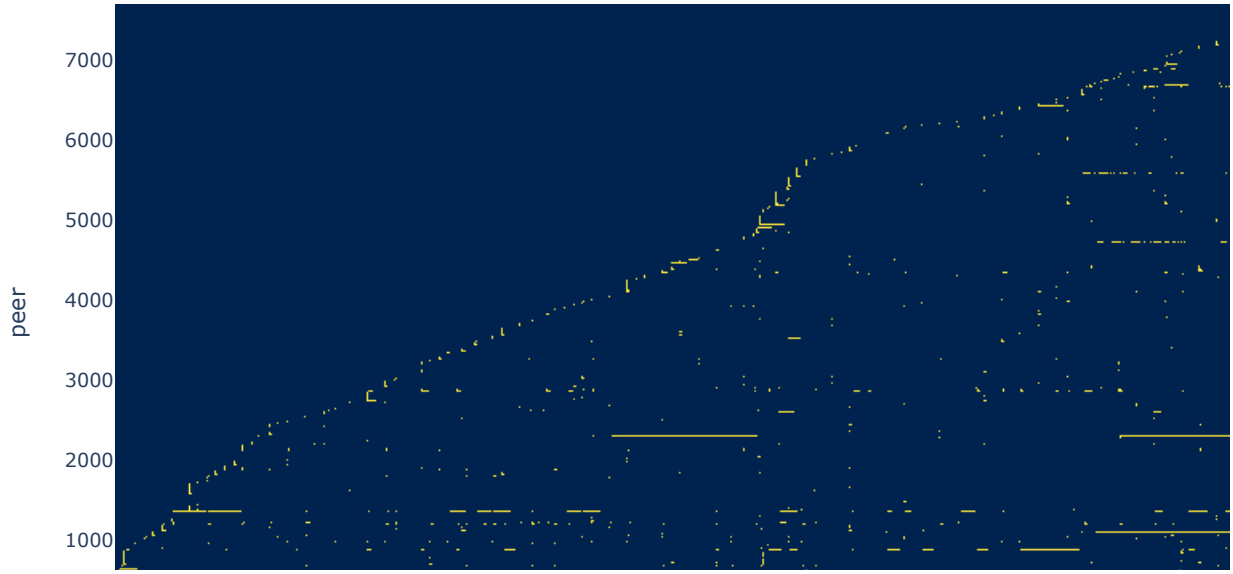
In [5]:
```
def getPivotDataframe(df):
    df1 = df.copy()
    df1['value'] = 1

    df2 = df1.pivot(index='datetime', columns='peer', values='value').T
    df2 = df2.fillna(0)
    # sort peers by order of occurance
    ll = list(df2.columns.strftime('%Y-%m-%d %H:%M:%S'))
    df2 = df2.sort_values(by=ll, axis=0, ascending=False)

    df2 = df2.reset_index()
    df2 = df2.drop(['peer'],axis=1)

    return df2
```

In [6]:
```
df2 = getPivotDataframe(df1)
df2.head()
```

Out[6]:

datetime	2022-12-04 23:53:01	2022-12-04 23:54:01	2022-12-04 23:55:01	2022-12-04 23:56:01	2022-12-04 23:57:01	2022-12-04 23:58:01	2022-12-04 23:59:01	2022-12-05 00:00:01	2022-12-05 00:01:01	2022-12-05 00:02:01	2022-12-05 00:03:01	2022-12-05 00:04:01	0
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	

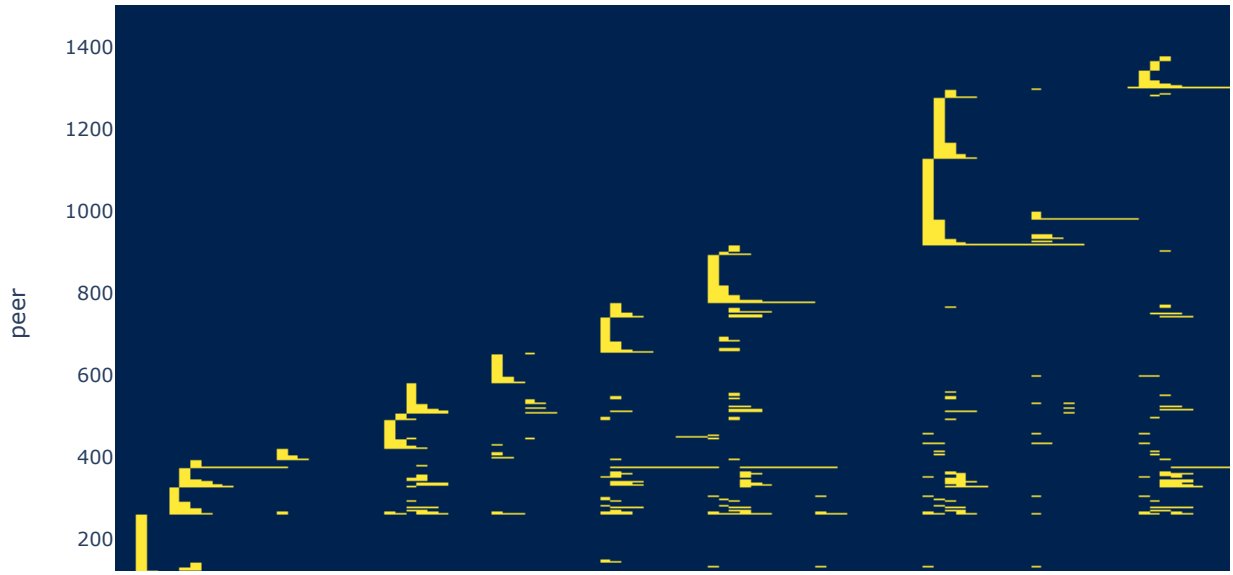
In [7]:
```
fig = px.imshow(df2, color_continuous_scale="Cividis", origin='lower')
fig.update_xaxes(title="timestamp")
fig.update_yaxes(title="peer")
fig.show()
```



In [8]:
```
df1_2 = df1[df1['datetime'].dt.strftime('%H:%M:%S').between('00:00:00','02:00:00')]

df2_2 = getPivotDataframe(df1_2)
df2_2.shape
```

Out[8]:
```
(1503, 120)
```

In [9]:
```
fig = px.imshow(df2_2, color_continuous_scale="Cividis", origin='lower')
fig.update_xaxes(title="timestamp")
fig.update_yaxes(title="peer")
fig.show()
```



2 Swarm

In [10]:
```
df3 = pd.read_csv('1205_peer_swarm.txt', sep=' ', header=None)
df3 = df3.dropna()

df4 = pd.DataFrame(columns=['timestamp', 'peer'])

def func(a, i):
    a[i] = a[i].split('"')[3]

for index, row in df3.iterrows():
    timestamp = (row[0]+" "+row[1]).strip('[]')
    strs = row[2].split('{')[2:]
    list(map(lambda i:func(strs, i), range(0, len(strs))))
    df_temp = pd.DataFrame(strs)
    df_temp = df_temp.rename(columns={0: "peer"})
    df_temp['timestamp'] = timestamp
    df4 = pd.concat([df_temp, df4])

df4['datetime'] = pd.to_datetime(df4['timestamp'])
df4 = df4.drop(['timestamp'],axis=1)
df4.shape
```

Out[10]: (188323, 2)

In [11]:
```
df4.head()
```

Out[11]:

	peer	datetime
0	044601f8bb98e4cfb6a394503020cafe010c6db0066f05...	2022-12-05 23:59:01
1	09d85feba81f7b7fde8858ada4c15c705dde7bcfb2a928...	2022-12-05 23:59:01
2	0c50592a898a3672d049a408893a961b7afe4f1308dcd7...	2022-12-05 23:59:01
3	11f028d16945b70ff6a677363ae13d05a073746ede3047...	2022-12-05 23:59:01
4	140771c0dc4451a833d0d777a0c4f67313c11bc3b5ab16...	2022-12-05 23:59:01

In [12]:
```
len(df4['peer'].unique())
```

Out[12]: 181

In [13]:
```
df5 = getPivotDataframe(df4)
df5.head()
```

Out[13]:

datetime	2022-12-04 23:54:01	2022-12-04 23:55:01	2022-12-04 23:56:01	2022-12-04 23:57:01	2022-12-04 23:58:01	2022-12-04 23:59:01	2022-12-05 00:00:01	2022-12-05 00:01:01	2022-12-05 00:02:01	2022-12-05 00:03:01	2022-12-05 00:04:01	2022-12-05 00:05:01	0
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	

In [14]:
```
fig = px.imshow(df5, color_continuous_scale="Cividis", origin='lower')
fig.update_xaxes(title="timestamp")
fig.update_yaxes(title="peer")
fig.show()
```

In [15]:
```
df4_2 = df4[df4['datetime'].dt.strftime('%H:%M:%S').between('00:00:00','02:00:00')]

df5_2 = getPivotDataframe(df4_2)
df5_2.shape
```

Out[15]:
```
(150, 120)
```

In [16]:
```
fig = px.imshow(df5_2, color_continuous_scale="Cividis", origin='lower')
fig.update_xaxes(title="timestamp")
fig.update_yaxes(title="peer")
fig.show()
```

3 Compare

In [17]:
```
df6 = df1[['peer','datetime']].groupby('datetime').agg('count')
df6 = df6.rename(columns={'peer':'count'})
df6 = df6.reset_index()
df6['node'] = 'ipfs'
```

In [18]:
```
df6.describe()
```

Out[18]:

	count
count	1447.000000
mean	71.872149
std	63.584988
min	7.000000
25%	24.000000
50%	50.000000
75%	98.000000
max	501.000000

In [19]:
```
df7 = df4[['peer','datetime']].groupby('datetime').agg('count')
df7 = df7.rename(columns={'peer':'count'})
df7 = df7.reset_index()
df7['node'] = 'swarm'
```

In [20]:
```
df7.describe()
```

Out[20]:

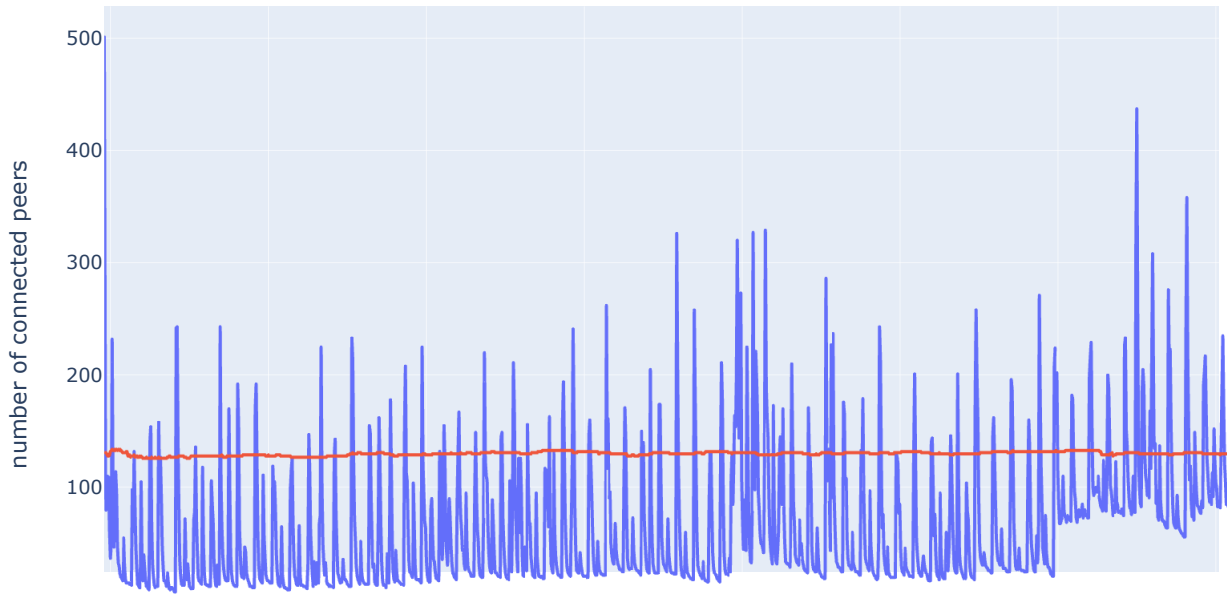
	count
count	1446.000000
mean	130.237206
std	1.608722
min	126.000000
25%	129.000000
50%	130.000000
75%	131.000000
max	134.000000

In [21]:
```
df8 = pd.concat([df6, df7])
df8.head()
```

Out[21]:

	datetime	count	node
0	2022-12-04 23:53:01	501	ipfs
1	2022-12-04 23:54:01	236	ipfs
2	2022-12-04 23:55:01	80	ipfs
3	2022-12-04 23:56:01	83	ipfs
4	2022-12-04 23:57:01	110	ipfs

In [22]:
```
fig = px.line(df8, x='datetime', y='count', color='node')
fig.update_yaxes(title="number of connected peers")
fig.show()
```



In [ ]: