main

August 26, 2023

0.1 Import event log

[1]:
```
import pm4py
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
%matplotlib inline
warnings.filterwarnings('ignore')
```

[2]:
```
domestic_path = 'data/DomesticDeclarations.xes'
international_path = 'data/InternationalDeclarations.xes'

log= pm4py.read_xes(domestic_path);
```

```
parsing log, completed traces ::   0%|          | 0/10500 [00:00<?, ?it/s]
```

0.2 Statistical Analysis of Event Data

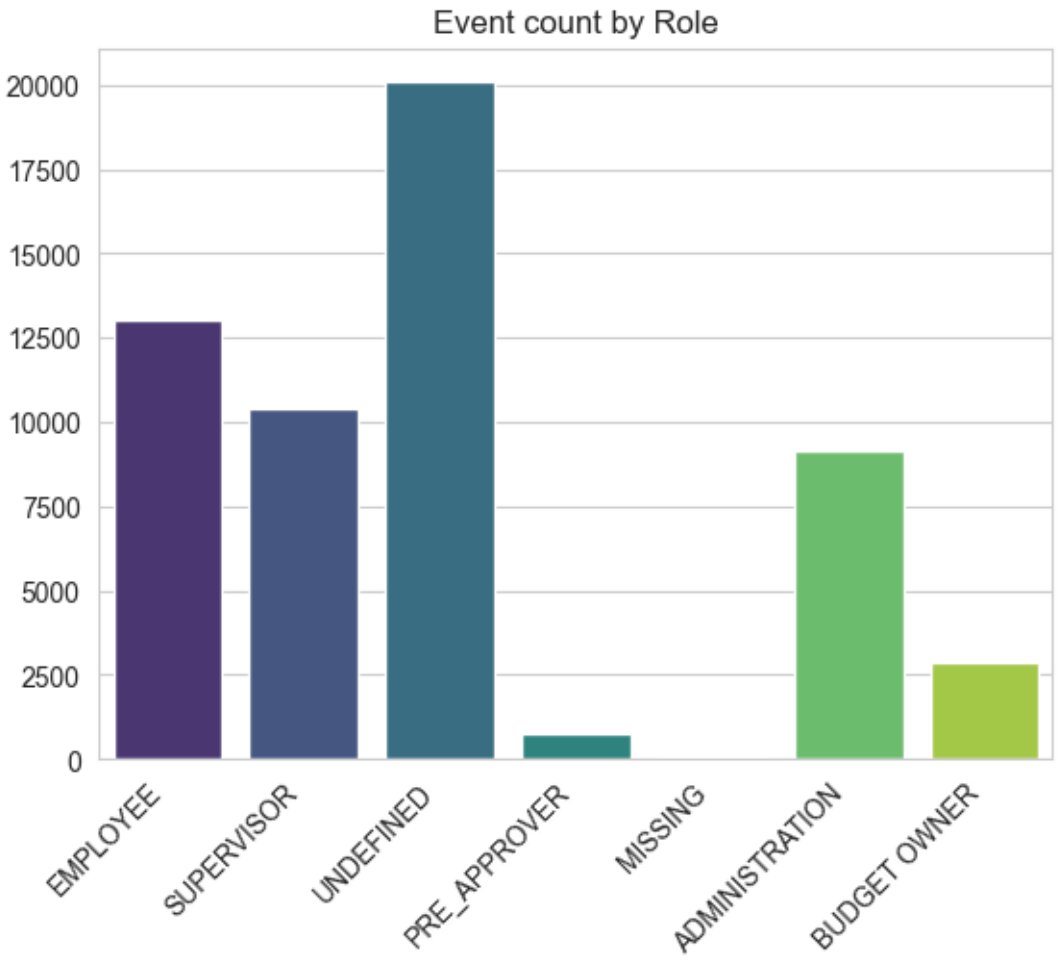
[3]:
```
# log
```

[4]:
```
cases = log['case:id'].unique()
len(cases)
```

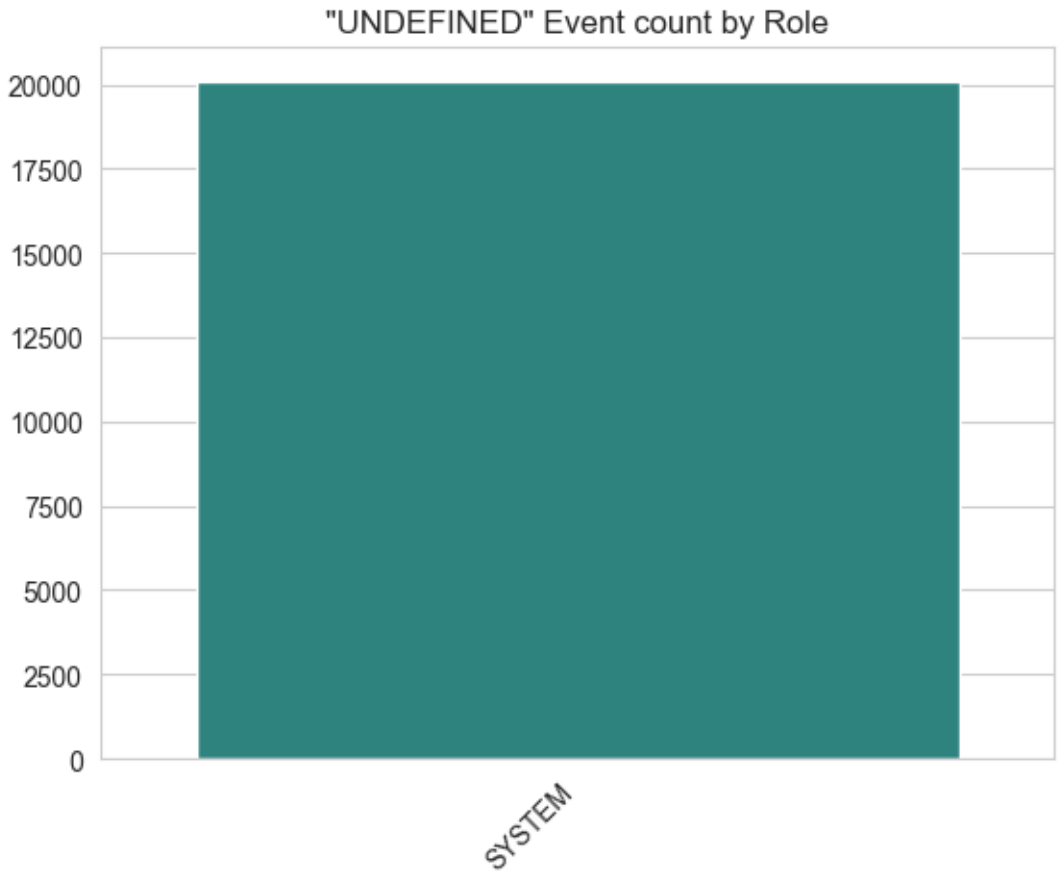
[4]:
```
10500
```

[5]:
```
resources = log['org:resource'].unique()
sns.countplot(x='org:resource', data=log, palette='viridis').set(title='Event␣
 ↪count by Resource', xlabel='', ylabel='');
```

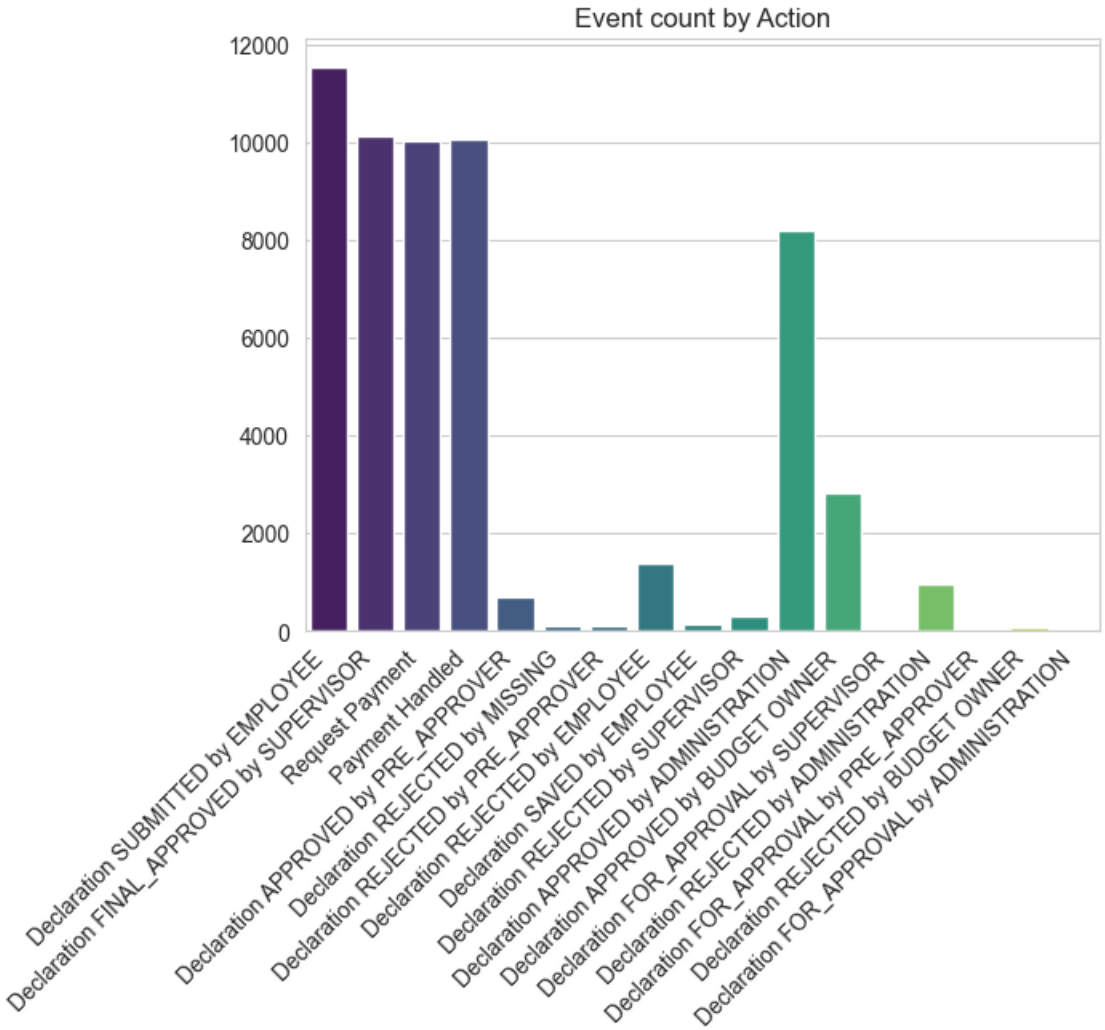
[6]:
```
roles = log['org:role'].unique()
sns.countplot(x='org:role', data=log, palette='viridis').set(title='Event count␣
↪by Role', xlabel='', ylabel='')
plt.xticks(rotation=45, ha='right');
```



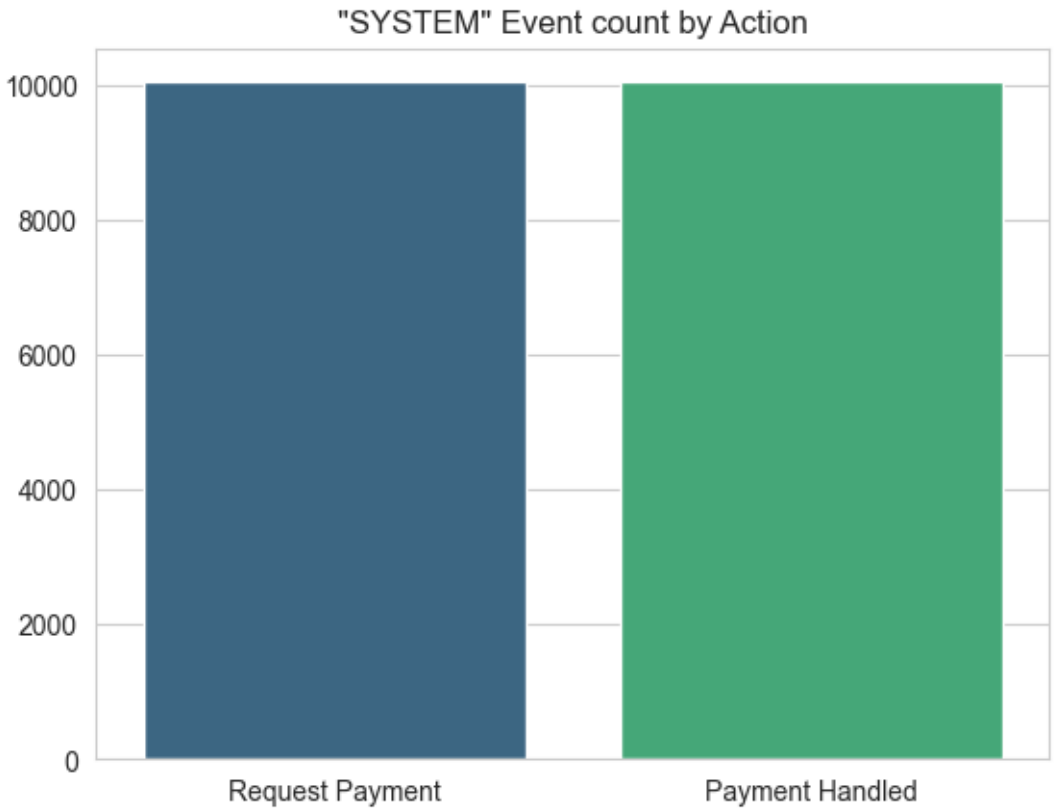
[7]:
```
log_i = log[log['org:role'] == 'UNDEFINED']
sns.countplot(x='org:resource', data=log_i, palette='viridis').
  ↪set(title='"UNDEFINED" Event count by Role', xlabel='', ylabel='')
plt.xticks(rotation=45, ha='right');
```



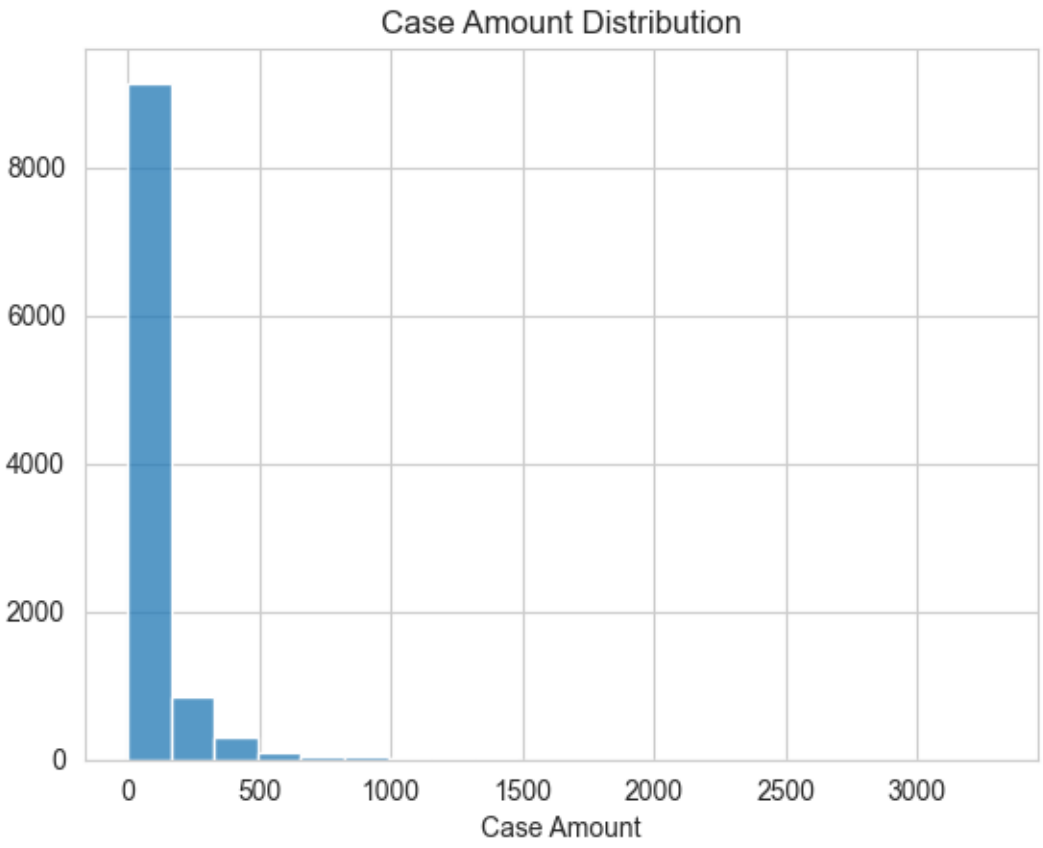
[8]:
```
actions = log['concept:name'].unique()
sns.countplot(x='concept:name', data=log, palette='viridis').set(title='Event␣
 ↪count by Action', xlabel='', ylabel='')
plt.xticks(rotation=45, ha='right');
```



[9]:
```
# System Events
log_s = log[log['org:resource'] == 'SYSTEM']
sns.countplot(x='concept:name', data=log_s, palette='viridis').
  ↪set(title='"SYSTEM" Event count by Action', xlabel='', ylabel='');
```



[10]:
```
# case amount distribution for distinct case:id
distinct_case_amounts = log.groupby('case:id')['case:Amount'].max()
sns.histplot(distinct_case_amounts, kde=False, bins=20).set(title='Case Amount␣
↪Distribution', xlabel='Case Amount', ylabel='');
```



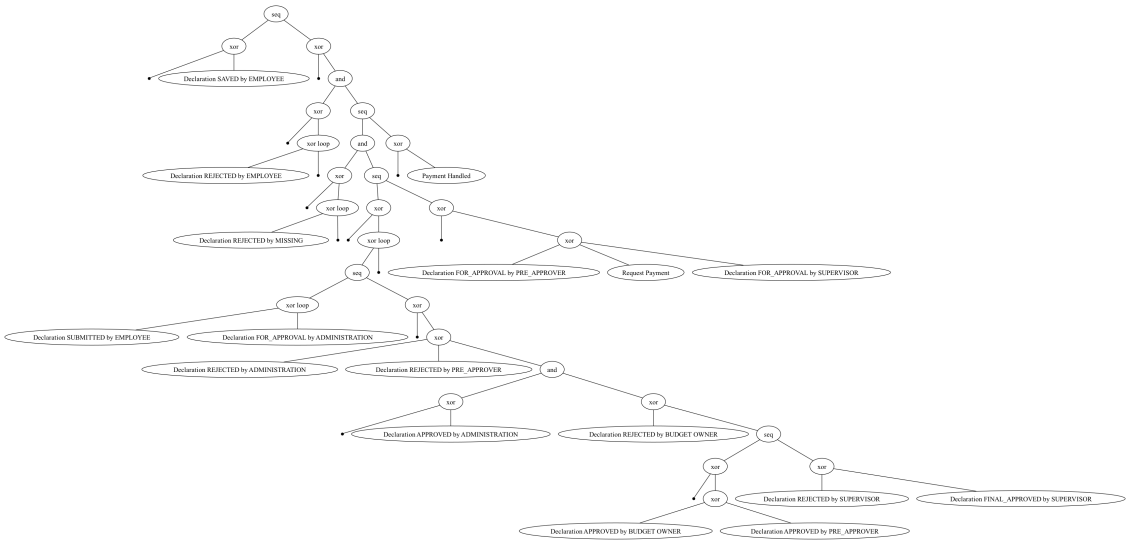
0.3 Process Discovery

[11]:
```
from pm4py.algo.discovery.inductive import algorithm as inductive_miner

tree = inductive_miner.apply(log)
```

0.4 Visualize Process Model

Having mined the model we may vizualize it as a Process Tree or Petri Net.

[12]:
```
from pm4py.visualization.process_tree import visualizer as pt_visualizer

# Visualize the process trees
gviz = pt_visualizer.apply(tree)
pt_visualizer.view(gviz)
```



0.5 Derive Petri Net using inductive mining algorithm

[13]:
```
from pm4py import convert_to_petri_net as pt_converter
from pm4py.visualization.petri_net import visualizer as pn_visualizer

# Convert the process trees into petri nets
net1, initial_marking1, final_marking1 = pt_converter(tree1)
net2, initial_marking2, final_marking2 = pt_converter(tree2)

# Visualize the petri nets
gviz_pn1 = pn_visualizer.apply(net1, initial_marking1, final_marking1)
pn_visualizer.view(gviz_pn1)

gviz_pn2 = pn_visualizer.apply(net2, initial_marking2, final_marking2)
pn_visualizer.view(gviz_pn2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[13], line 5
      2 from pm4py.visualization.petri_net import visualizer as pn_visualizer
      4 # Convert the process trees into petri nets
----> 5 net1, initial_marking1, final_marking1 = pt_converter(tree1)
      6 net2, initial_marking2, final_marking2 = pt_converter(tree2)
      8 # Visualize the petri nets

NameError: name 'tree1' is not defined
```

0.6 Performance Measures

[ ]:
```
from pm4py.statistics.traces import cycle_time
from pm4py.statistics import variants
from pm4py.statistics.start_activities.log import get as start_activities
from pm4py.statistics.end_activities.log import get as end_activities

# Tasks frequency
start_activities_count1 = start_activities.get_start_activities(log_i)
end_activities_count1 = end_activities.get_end_activities(log_i)

start_activities_count2 = start_activities.get_start_activities(log_d)
end_activities_count2 = end_activities.get_end_activities(log_d)

# Case variants

# Inter-case time
```

[ ]:
```
end_activities_count1
```

[ ]:
```
log
```

[ ]:
```
dfg, start_activities, end_activities = pm4py.discover_dfg(log,␣
↪case_id_key='case:id', activity_key='case:concept:name', timestamp_key='time:
↪timestamp')
```

[ ]:
```

```

[ ]:
```

```