# eBridge_CPU_Log

May 22, 2021

## 1 eBridge - Data Preprocessing

### 1.1 Master of Science in Electronics - Emphasis on Embedded Systems

### 1.2 Costa Rica TEC

eBridge Github Page.

Our goal is to identify patterns on CPU load behaviors.

### 1.3 Data Preprocessing

First step is to load the libraries:

[1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
from matplotlib import pyplot as plt
```

#### 1.3.1 Load the dataset

The code below is used to load the dataset.

[2]:
```
CoreData = pd.read_csv("Logs/RPI3-2/coreslog_2021-05-16_08-42.
↪csv",dtype={"Time": "string", "1": np.float64,"2": np.float64,
                                                        "3": np.float64,"4":
↪ np.float64})
```

The following commands allows to have a preview of the dataset.

[3]:
```
CoreData.head()
```

[3]:

| | Time | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | 2021-05-16 08:42:05 | 100.0 | 0.0 | 0.0 | 100.0 |
| 1 | 2021-05-16 08:42:10 | 1.4 | 5.4 | 26.9 | 13.7 |
| 2 | 2021-05-16 08:42:15 | 1.6 | 1.8 | 90.5 | 21.0 |
| 3 | 2021-05-16 08:42:20 | 73.9 | 15.4 | 3.0 | 21.3 |
| 4 | 2021-05-16 08:42:25 | 22.1 | 70.1 | 1.2 | 20.5 |

Convert the time to timestamp

[4]:
```
CoreData['Time'] = pd.to_datetime(CoreData['Time'])
```

[5]:
```
CoreData.describe()
```

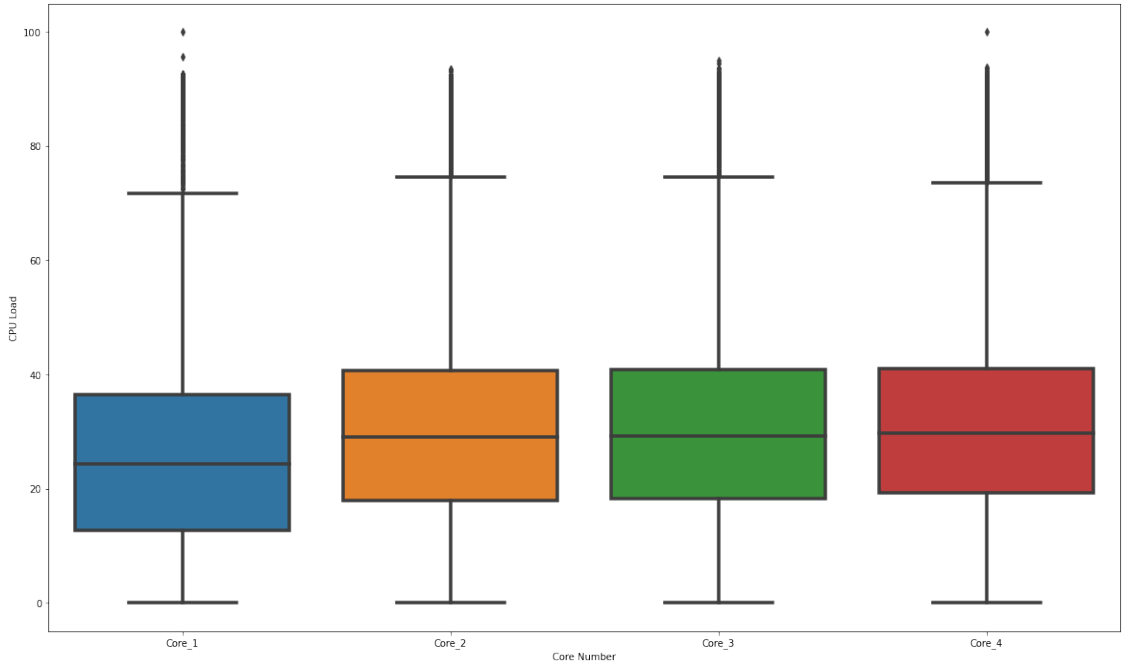
[5]:

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| count | 27708.000000 | 27708.000000 | 27708.000000 | 27708.000000 |
| mean | 25.601306 | 30.027988 | 30.359474 | 30.934763 |
| std | 17.840367 | 18.281985 | 18.222370 | 17.883178 |
| min | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 25% | 12.700000 | 17.900000 | 18.200000 | 19.300000 |
| 50% | 24.400000 | 29.100000 | 29.250000 | 29.800000 |
| 75% | 36.500000 | 40.600000 | 40.800000 | 41.000000 |
| max | 100.000000 | 93.400000 | 94.900000 | 100.000000 |

[6]:
```
CoreData['Time']
```

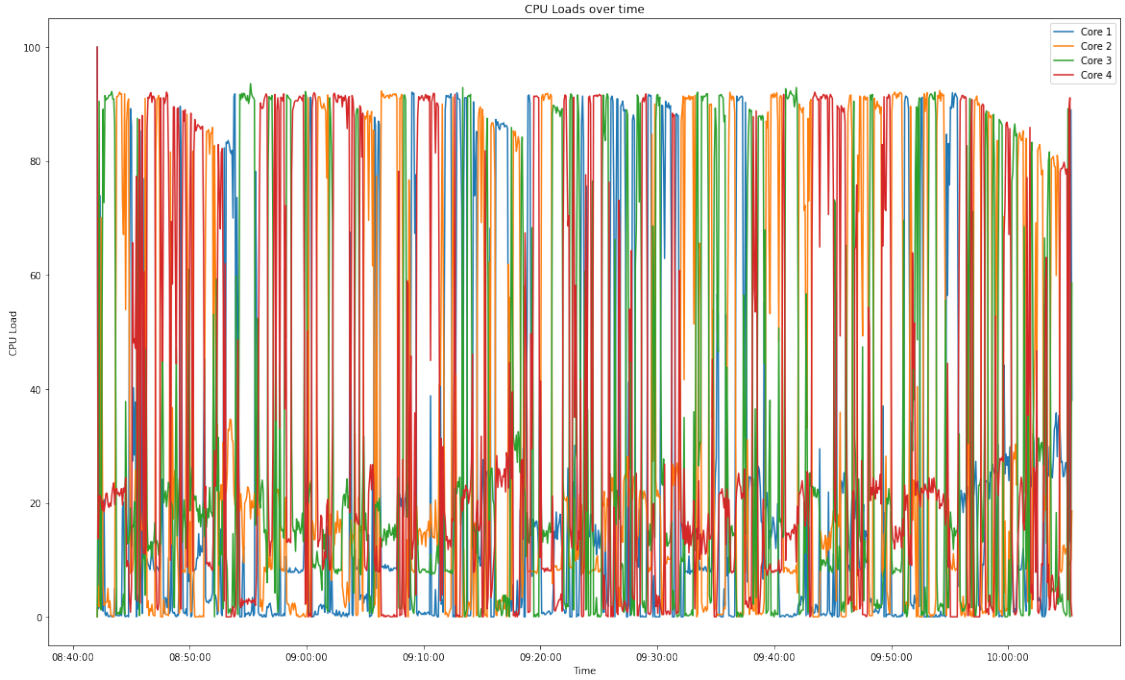
[6]:
```
0       2021-05-16 08:42:05
1       2021-05-16 08:42:10
2       2021-05-16 08:42:15
3       2021-05-16 08:42:20
4       2021-05-16 08:42:25
                  …
27703   2021-05-17 23:13:51
27704   2021-05-17 23:13:56
27705   2021-05-17 23:14:01
27706   2021-05-17 23:14:06
27707   2021-05-17 23:14:11
Name: Time, Length: 27708, dtype: datetime64[ns]
```

[7]:
```
# Create Box Plots for Dataset

Core_Data = [CoreData['1'],CoreData['2'],
             CoreData['3'],CoreData['4']]
plt.figure(figsize=(20,12))
g = sns.boxplot(data=Core_Data, linewidth=3.5).set(xlabel='Core Number',␣
 ↪ylabel='CPU Load')
plt.xticks(ticks = [0,1,2,3], labels = ['Core_1','Core_2','Core_3','Core_4'])
plt.show()
```




[8]:
```
# Scatter Plot

import matplotlib.pyplot as plt
import matplotlib.dates as md

CoreData = CoreData[:999]

plt.figure(figsize=(20,12))
plt.plot(CoreData['Time'], CoreData['1'], label = "Core 1")
plt.plot(CoreData['Time'], CoreData['2'], label = "Core 2")
plt.plot(CoreData['Time'], CoreData['3'], label = "Core 3")
plt.plot(CoreData['Time'], CoreData['4'], label = "Core 4")
plt.xlabel('Time')
ax=plt.gca()
xfmt = md.DateFormatter('%H:%M:%S')
ax.xaxis.set_major_formatter(xfmt)
# Set the y axis label of the current axis.
plt.ylabel('CPU Load')
# Set a title of the current axes.
plt.title('CPU Loads over time')
# show a legend on the plot
plt.legend()
# Display a figure.
plt.show()
```

```
#g=sns.lineplot(data=CoreData)
#(g.set_axis_labels("Time", "CPU Load"))

#plt.show()
```




[ ]: