

# clip-max-ignore-zeros-custom

August 2, 2020

```
[1]: # rank the obtained results using the *.log files
import os
import pandas as pd
import numpy as np
```

```
[2]: source = "7b"
targetdir = '../..data/' + source + "/"
filelist = sorted(os.listdir(targetdir))
```

```
[3]: filelist
```

```
[3]: ['1.data', '2.data', '3.data', '4.data', '5.data', '6.data', '7.data']
```

```
[4]: # Create dataframe from files
df = pd.DataFrame()

for file in filelist:
    filename = targetdir+file
    col_name = [file]
    temp_df = pd.read_csv(filename,names=col_name)
    df = pd.concat([df, temp_df], axis=1)

# Look at the data
df.head()
```

```
[4]:
```

	1.data	2.data	3.data	4.data	5.data	6.data	7.data
0	1.0	0.85	1.00	1.00	0.64	1.00	1.0
1	-1.0	-1.00	-1.00	-1.00	-1.00	-1.00	-1.0
2	-1.0	-1.00	-1.00	-1.00	-1.00	-1.00	-1.0
3	0.8	0.11	0.09	0.12	0.07	0.07	1.0
4	-1.0	0.11	0.09	0.12	0.07	0.07	-1.0

```
[5]: # Clip values > 1 with 1 and ignore non-positive values
df.mask(df > 1, 1, inplace=True)
df.mask(df < 0, np.NaN, inplace=True)
```

```
[6]: # Count NaN values
df.isna().sum()
```

```
[6]: 1.data    369
     2.data    315
     3.data    342
     4.data    342
     5.data    315
     6.data    333
     7.data    369
     dtype: int64
```

```
[7]: # Ignore invalid values by dropping them from the dataframe
df = df.dropna()
```

```
[8]: df
```

```
[8]:
```

	1.data	2.data	3.data	4.data	5.data	6.data	7.data
0	1.00	0.85	1.00	1.00	0.64	1.00	1.00
3	0.80	0.11	0.09	0.12	0.07	0.07	1.00
6	0.80	0.06	0.05	0.06	0.04	0.04	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	0.57	0.49	0.65	0.36	0.39	1.00
..	...	...	...	...	...	...	...
718	0.55	0.47	0.55	0.55	0.35	0.32	0.55
719	0.55	0.47	0.55	0.55	0.35	0.55	0.55
726	1.00	0.85	1.00	1.00	0.64	0.58	1.00
727	1.00	0.85	1.00	1.00	0.64	0.58	1.00
728	1.00	0.85	1.00	1.00	0.64	1.00	1.00

```
[324 rows x 7 columns]
```

```
[9]: # Save processed dataframe as csv file
df.to_csv("../data/processed/" + source + ".csv", index=False)
```

```
[10]: # Creating ranked dataframe
ranked_df = pd.DataFrame()
stats_df = pd.DataFrame()
```

```
[11]: # Creating scenario quantity variable
tao = len(df)
tao
```

```
[11]: 324
```

# 1 Ranking of WWTP

```
[12]: for column in df:
    wwtp = column[0]

    # TODO: get original (pre-analysis) value
    # pending

    # calculate mean
    avg_eff = round(df[column].mean(),3)

    # calculate max
    max_eff = round(df[column].max(),3)

    # calculate min
    min_eff = round(df[column].min(),3)

    # calculate amplitude
    amplitude = round((max_eff - min_eff)*100,2)

    amp_str = "Amplitude (max-min)%"

    # print stats results
    print("WWTP", wwtp, "Mean =", avg_eff, "Maximum =", max_eff, "Minimum",
    ↪ "=", min_eff, amp_str, "=", amplitude)
    stats_df = stats_df.append({ 'WWTP': wwtp, "Mean": avg_eff, "Maximum" :
    ↪ max_eff, "Minimum": min_eff, amp_str: amplitude},ignore_index=True)

    # TODO: Populate statistics dataframe using pd.df.append

    # Calculating Sk sum of factors
    Sk = round(df[column].sum(),3)

    # Calculating ek sum of factors of 1 (or above if errors in calculation)
    ek = df[column] >= 1
    ek = ek.sum()
    print("ek =",ek)

    # Calculating R1k ek/tao
    R1k = round(ek/tao,3)

    # Calculate R2k
    if tao != ek:
        R2k = (Sk - ek)/(tao - ek)
    elif R1k == 1:
```

```

R2k = 0

R2k = round(R2k,3)

# Printing results
print("WWTP", wwtp,"| ek =",ek,"| R1k =",R1k, "| Sk =",Sk, "| R2k =",R2k)

# Populate ranking dataframe using pd.df.append
# Using unicode to name columns with super and subscripts
R1k_col = 'R\u00B9\u2096\u2080'
R2k_col = 'R\u00B2\u2096\u2080'
ranked_df = ranked_df.append({ R2k_col:R2k, R1k_col: R1k,'WWTP':\u2192wwtp},ignore_index=True)

```

```

WWTP 1 Mean = 0.717 Maximum = 1.0 Minimum = 0.08 Amplitude (max-min)(%) = 92.0
ek = 162
WWTP 1 | ek = 162 | R1k = 0.5 | Sk = 232.38 | R2k = 0.434
WWTP 2 Mean = 0.496 Maximum = 1.0 Minimum = 0.01 Amplitude (max-min)(%) = 99.0
ek = 72
WWTP 2 | ek = 72 | R1k = 0.222 | Sk = 160.68 | R2k = 0.352
WWTP 3 Mean = 0.525 Maximum = 1.0 Minimum = 0.0 Amplitude (max-min)(%) = 100.0
ek = 120
WWTP 3 | ek = 120 | R1k = 0.37 | Sk = 169.98 | R2k = 0.245
WWTP 4 Mean = 0.541 Maximum = 1.0 Minimum = 0.01 Amplitude (max-min)(%) = 99.0
ek = 126
WWTP 4 | ek = 126 | R1k = 0.389 | Sk = 175.14 | R2k = 0.248
WWTP 5 Mean = 0.416 Maximum = 1.0 Minimum = 0.0 Amplitude (max-min)(%) = 100.0
ek = 66
WWTP 5 | ek = 66 | R1k = 0.204 | Sk = 134.94 | R2k = 0.267
WWTP 6 Mean = 0.448 Maximum = 1.0 Minimum = 0.0 Amplitude (max-min)(%) = 100.0
ek = 93
WWTP 6 | ek = 93 | R1k = 0.287 | Sk = 145.29 | R2k = 0.226
WWTP 7 Mean = 0.76 Maximum = 1.0 Minimum = 0.1 Amplitude (max-min)(%) = 90.0
ek = 216
WWTP 7 | ek = 216 | R1k = 0.667 | Sk = 246.24 | R2k = 0.28

```

```

[13]: # Reorder columns to be usable as a results table
ranked_df = ranked_df.reindex(columns=['WWTP',R1k_col, R2k_col])

```

```

[14]: ranked_df

```

```

[14]:   WWTP  R1  R2
0     1  0.500  0.434
1     2  0.222  0.352
2     3  0.370  0.245
3     4  0.389  0.248
4     5  0.204  0.267

```

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5    6    0.287    0.226
6    7    0.667    0.280
```

```
[15]: import os

path = "../../results/" + source + "/"

# Save rankings dataframe as csv file
try:
    ranked_df.to_csv(path + "ranking.csv",index=False)
    print("Save succesful")
except:
    print("Creating folder and saving")
    os.mkdir(path)
    ranked_df.to_csv(path + "ranking.csv",index=False)
```

Creating folder and saving

## 2 Calculate Descriptive Statistics

```
[16]: # Calculate the mean of every column
mean_mean = round(stats_df.Mean.mean(),3)
mean_max = round(stats_df.Maximum.mean(),3)
mean_min = round(stats_df.Minimum.mean(),3)
mean_amp = round(stats_df[amp_str].mean(),3)
```

```
[17]: # Add means to stats dataframe
stats_df = stats_df.append({ 'WWTP': "Mean", "Mean" : mean_mean, "Maximum" : ↵
    ↵mean_max,
                                "Minimum" : mean_min, amp_str : ↵
    ↵mean_amp},ignore_index=True)
```

```
[18]: # Calculate the standard deviation of every column
sd_mean = round(stats_df.Mean.std(),3)
sd_max = round(stats_df.Maximum.std(),3)
sd_min = round(stats_df.Minimum.std(),3)
sd_amp = round(stats_df[amp_str].std(),3)
```

```
[19]: # Add means to stats dataframe
stats_df = stats_df.append({ 'WWTP': "SD", "Mean" : sd_mean, "Maximum" : sd_max,
                                "Minimum" : sd_min, amp_str : ↵
    ↵sd_amp},ignore_index=True)
```

```
[20]: # Reorder columns
stats_df = stats_df.reindex(columns=["WWTP", "Mean", "Maximum", "Minimum", "Amplitude (max-min) (%)", "SD"])
```

```
[21]: stats_df
```

```
[21]:
```

	WWTP	Mean	Maximum	Minimum	Amplitude (max-min) (%)	SD
0	1	0.717	1.0	0.080	92.000	
1	2	0.496	1.0	0.010	99.000	
2	3	0.525	1.0	0.000	100.000	
3	4	0.541	1.0	0.010	99.000	
4	5	0.416	1.0	0.000	100.000	
5	6	0.448	1.0	0.000	100.000	
6	7	0.760	1.0	0.100	90.000	
7	Mean	0.558	1.0	0.029	97.143	
8	SD	0.122	0.0	0.039	3.943	

```
[22]: # Save statistics dataframe as csv file
stats_df.to_csv(path + "statistics.csv", index=False)
```

```
[23]: # Convert Jupyter Notebook to PDF LaTeX file
!jupyter-nbconvert --to pdf "clip-max-ignore-zeros-custom.ipynb" --output-dir ".\
..\results/7b/"
```

```
[NbConvertApp] Converting notebook clip-max-ignore-zeros-custom.ipynb to pdf
[NbConvertApp] Writing 44950 bytes to ./notebook.tex
[NbConvertApp] Building PDF
[NbConvertApp] Running xelatex 3 times: ['xelatex', './notebook.tex', '-quiet']
[NbConvertApp] Running bibtex 1 time: ['bibtex', './notebook']
[NbConvertApp] WARNING | bibtex had problems, most likely because there were no
citations
[NbConvertApp] PDF successfully created
[NbConvertApp] Writing 46841 bytes to ../../results/7a/clip-max-ignore-zeros-
custom.pdf
```