task-2

May 19, 2024

#Task-2 ”’Load a CSV file into a Pandas DataFrame. Perform operations like filtering data based on conditions, handling missing values, and calculating summary statistics.”’

import pandas as pd

[3]:
```
data = pd.read_csv("01.Data Cleaning and Preprocessing.csv")
```

[4]:
```
type(data)
```

[4]:
```
pandas.core.frame.DataFrame
```

[5]:
```
data.info
```

[5]:
```
<bound method DataFrame.info of     Observation  Y-Kappa  ChipRate  BF-CMratio
BlowFlow  ChipLevel4   \
0      31-00:00    23.10    16.520     121.717  1177.607      169.805
1      31-01:00    27.60    16.810      79.022  1328.360      341.327
2      31-02:00    23.19    16.709      79.562  1329.407      239.161
3      31-03:00    23.60    16.478      81.011  1334.877      213.527
4      31-04:00    22.90    15.618      93.244  1334.168      243.131
..          …       …        …          …        …           …
319    10-16:00    23.75    12.667      93.450  1178.252      276.955
320     9-19:00    19.80    12.558      94.352  1184.119      297.071
321     9-20:00    23.01    12.550      90.842  1188.517      289.826
322     9-21:00    24.32    13.083      88.910  1192.879      318.006
323     9-22:00    25.75    13.417      85.451  1186.342      248.312

     T-upperExt-2   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
0          358.282        329.545  1.443       599.253  …        67.122
1          351.050        329.067  1.549       537.201  …        60.012
2          350.022        329.260  1.600       549.611  …        61.304
3          350.938        331.142  1.604       623.362  …        68.496
4          351.640        332.709    NaN       638.672  …        70.022
..             …              …    …          …  …           …
319        347.286        310.970  1.523       513.956  …        61.141
320        399.135        319.576  1.451       570.058  …        67.667
321        373.633        314.591  1.457       549.306  …        66.446
322        364.081        308.559  1.523       504.852  …        61.054
```

```
323        356.289         310.482  1.474       497.375  …        58.247

     Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   WeakLiquorF   BlackFlow-2   \
0          329.432         303.099      175.964      1127.197      1319.039
1          330.823         304.879      163.202       665.975      1297.317
2          329.140         303.383      164.013       677.534      1327.072
3          328.875         302.254      181.487       767.853      1324.461
4          328.352         300.954      183.929       888.448      1343.424
..             …               …            …             …             …
319        330.117         304.006      148.174      1027.201      1357.271
320        330.848         304.616      165.178       906.962      1311.177
321        330.226         304.686      160.841       887.125      1319.226
322        327.346         304.363      147.589       804.423      1320.225
323        328.092         304.093      144.218       828.328      1320.848

     WeakWashF   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0       257.325         54.612         252.077             NaN
1       241.182         46.603         251.406           29.11
2       237.272         51.795         251.335             NaN
3       239.478         54.846         250.312           29.02
4       215.372         54.186         249.916           29.01
..          …              …              …              …
319     381.643         45.264         252.947           30.86
320      25.494         50.528         252.092           30.70
321       0.638         45.549         252.438             NaN
322       0.000         43.725         253.176           31.13
323       1.276         43.840         253.216             NaN

[324 rows x 23 columns]>
```

[6]:
```
data.describe()
```

[6]:
```
          Y-Kappa    ChipRate  BF-CMratio     BlowFlow  ChipLevel4   \
count  324.000000  319.000000  307.000000   308.000000   323.000000
mean    20.635370   14.347937   87.464456  1237.837614   258.164483
std      3.070036    1.499095    7.995012   100.593735    87.987452
min     12.170000    9.983000   68.645000     0.000000     0.000000
25%     18.382500   13.358000   81.823000  1193.215250   213.527000
50%     20.845000   14.308000   86.739000  1273.138500   271.792000
75%     23.032500   15.517000   92.372000  1289.196000   321.680000
max     27.600000   16.958000  121.717000  1351.240000   419.014000

       T-upperExt-2   T-lowerExt-2         UCZAA  WhiteFlow-4   AAWhiteSt-4   \
count     322.000000     322.000000  299.000000    323.000000    173.000000
mean      356.904295     324.020180    1.492010    591.732260      6.140410
std         9.209290       7.621402    0.105923     67.016351      0.081609
min       339.168000     284.633000    1.182000    405.111000      5.890000
```

```
25%       350.241250      321.420000    1.431500    540.989500      6.089000
50%       356.843000      325.669000    1.498000    592.895000      6.135000
75%       362.242250      329.175000    1.560500    639.480500      6.199000
max       399.135000      337.012000    1.747000    731.394000      6.340000

       …  SteamFlow-4   Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   \
count  …    323.000000     322.000000     322.000000   323.000000
mean   …     66.668285     325.567820     300.525699   162.222322
std    …      5.708587       4.609862       4.568484    14.160688
min    …     48.568000     318.051000     293.312000   113.922000
25%    …     62.518000     321.385500     296.513250   153.032500
50%    …     67.429000     324.741000     299.126000   163.690000
75%    …     71.522000     329.845250     304.244750   172.555000
max    …     76.147000     333.854000     311.146000   189.268000

       WeakLiquorF   BlackFlow-2   WeakWashF   SteamHeatF-3   T-Top-Chips-4   \
count    323.000000    322.000000  323.000000     322.000000      323.000000
mean     873.828941   1175.917016  263.543068      49.696907      251.240087
std      122.073521    149.334010  163.666942       4.551909        1.283432
min      486.938000    838.948000    0.000000      35.510000      248.359000
25%      792.019500   1044.817500  134.649000      46.389750      250.312000
50%      865.254000   1150.221500  269.193000      50.277000      251.380000
75%      965.286500   1319.021250  405.563000      53.294250      252.323500
max     1226.277000   1395.767000  715.715000      63.332000      254.122000

       SulphidityL-4
count      173.000000
mean        30.411671
std          0.701317
min         29.010000
25%         29.970000
50%         30.370000
75%         30.820000
max         32.840000

[8 rows x 22 columns]
```

[7]:
```
data = data.drop_duplicates()
data
```

[7]:
```
    Observation  Y-Kappa  ChipRate  BF-CMratio  BlowFlow  ChipLevel4   \
0      31-00:00    23.10    16.520     121.717  1177.607      169.805
1      31-01:00    27.60    16.810      79.022  1328.360      341.327
2      31-02:00    23.19    16.709      79.562  1329.407      239.161
3      31-03:00    23.60    16.478      81.011  1334.877      213.527
4      31-04:00    22.90    15.618      93.244  1334.168      243.131
..          …       …        …          …        …            …
```

```
298    12-09:00    20.90    15.167      84.640  1283.706      339.440
299    12-10:00    24.98       NaN      85.034  1278.345      368.564
300    12-11:00    21.00       NaN      88.013  1307.722      278.842
301    12-12:00    21.40       NaN      85.490  1255.986      273.484
307    31-05:00    20.89    14.308      94.172  1327.832      251.120

     T-upperExt-2   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
0         358.282        329.545  1.443       599.253  …        67.122
1         351.050        329.067  1.549       537.201  …        60.012
2         350.022        329.260  1.600       549.611  …        61.304
3         350.938        331.142  1.604       623.362  …        68.496
4         351.640        332.709    NaN       638.672  …        70.022
..            …              …    …           …  …           …
298       354.803        311.041  1.635       532.419  …        65.561
299       357.723        321.387    NaN       520.365  …        65.729
300       357.438        323.757    NaN       553.070  …        65.795
301       361.365        322.689    NaN       590.199  …        71.456
307       351.263        332.485  1.522       631.514  …        71.286

     Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   WeakLiquorF   BlackFlow-2   \
0          329.432        303.099      175.964      1127.197      1319.039
1          330.823        304.879      163.202       665.975      1297.317
2          329.140        303.383      164.013       677.534      1327.072
3          328.875        302.254      181.487       767.853      1324.461
4          328.352        300.954      183.929       888.448      1343.424
..             …              …            …           …           …
298        332.924        307.626      145.299       832.906      1344.708
299        332.523        307.169      151.544       905.639      1344.469
300        331.263        306.400      157.954       908.691      1344.588
301        333.032        308.732      174.069       986.206      1348.747
307        328.699        300.706      180.229       903.605      1323.082

     WeakWashF   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0       257.325         54.612         252.077             NaN
1       241.182         46.603         251.406           29.11
2       237.272         51.795         251.335             NaN
3       239.478         54.846         250.312           29.02
4       215.372         54.186         249.916           29.01
..          …              …              …              …
298     388.911         49.524         251.833           30.29
299     418.979         48.135         251.614           30.47
300     462.712         54.373         251.197             NaN
301     457.313         53.194         251.324           30.46
307     232.729         54.503         250.084             NaN

[301 rows x 23 columns]
```

[8]:
```
data.isnull()
```

[8]:

	Observation	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	ChipLevel4	\
0	False	False	False	False	False	False	
1	False	False	False	False	False	False	
2	False	False	False	False	False	False	
3	False	False	False	False	False	False	
4	False	False	False	False	False	False	
..	…	…	…	…	…	…	
298	False	False	False	False	False	False	
299	False	False	True	False	False	False	
300	False	False	True	False	False	False	
301	False	False	True	False	False	False	
307	False	False	False	False	False	False	

	T-upperExt-2	T-lowerExt-2	UCZAA	WhiteFlow-4	…	SteamFlow-4	\
0	False	False	False	False	…	False	
1	False	False	False	False	…	False	
2	False	False	False	False	…	False	
3	False	False	False	False	…	False	
4	False	False	True	False	…	False	
..	…	…	…	…	…	…	
298	False	False	False	False	…	False	
299	False	False	True	False	…	False	
300	False	False	True	False	…	False	
301	False	False	True	False	…	False	
307	False	False	False	False	…	False	

	Lower-HeatT-3	Upper-HeatT-3	ChipMass-4	WeakLiquorF	BlackFlow-2	\
0	False	False	False	False	False	
1	False	False	False	False	False	
2	False	False	False	False	False	
3	False	False	False	False	False	
4	False	False	False	False	False	
..	…	…	…	…	…	
298	False	False	False	False	False	
299	False	False	False	False	False	
300	False	False	False	False	False	
301	False	False	False	False	False	
307	False	False	False	False	False	

	WeakWashF	SteamHeatF-3	T-Top-Chips-4	SulphidityL-4
0	False	False	False	True
1	False	False	False	False
2	False	False	False	True
3	False	False	False	False
4	False	False	False	False

```
..          …             …             …             …
298       False         False         False         False
299       False         False         False         False
300       False         False         False          True
301       False         False         False         False
307       False         False         False          True

[301 rows x 23 columns]
```

[9]:
```
data.isnull().sum()
```

[9]:
```
Observation          0
Y-Kappa              0
ChipRate             4
BF-CMratio          14
BlowFlow            13
ChipLevel4           1
T-upperExt-2         1
T-lowerExt-2         1
UCZAA               24
WhiteFlow-4          1
AAWhiteSt-4        141
AA-Wood-4            1
ChipMoisture-4       1
SteamFlow-4          1
Lower-HeatT-3        1
Upper-HeatT-3        1
ChipMass-4           1
WeakLiquorF          1
BlackFlow-2          1
WeakWashF            1
SteamHeatF-3         1
T-Top-Chips-4        1
SulphidityL-4      141
dtype: int64
```

[10]:
```
data.isnull().sum()
```

[10]:
```
Observation          0
Y-Kappa              0
ChipRate             4
BF-CMratio          14
BlowFlow            13
ChipLevel4           1
T-upperExt-2         1
T-lowerExt-2         1
UCZAA               24
```

```
WhiteFlow-4          1
AAWhiteSt-4        141
AA-Wood-4            1
ChipMoisture-4       1
SteamFlow-4          1
Lower-HeatT-3        1
Upper-HeatT-3        1
ChipMass-4           1
WeakLiquorF          1
BlackFlow-2          1
WeakWashF            1
SteamHeatF-3         1
T-Top-Chips-4        1
SulphidityL-4      141
dtype: int64
```

[11]:
```
data.isnull().sum().sum()
```

[11]:
```
352
```

[12]:
```
data2 = data.fillna(value=0)
data2
```

[12]:

	Observation	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	ChipLevel4	\
0	31-00:00	23.10	16.520	121.717	1177.607	169.805	
1	31-01:00	27.60	16.810	79.022	1328.360	341.327	
2	31-02:00	23.19	16.709	79.562	1329.407	239.161	
3	31-03:00	23.60	16.478	81.011	1334.877	213.527	
4	31-04:00	22.90	15.618	93.244	1334.168	243.131	
..	…	…	…	…	…	…	
298	12-09:00	20.90	15.167	84.640	1283.706	339.440	
299	12-10:00	24.98	0.000	85.034	1278.345	368.564	
300	12-11:00	21.00	0.000	88.013	1307.722	278.842	
301	12-12:00	21.40	0.000	85.490	1255.986	273.484	
307	31-05:00	20.89	14.308	94.172	1327.832	251.120	

	T-upperExt-2	T-lowerExt-2	UCZAA	WhiteFlow-4	…	SteamFlow-4	\
0	358.282	329.545	1.443	599.253	…	67.122	
1	351.050	329.067	1.549	537.201	…	60.012	
2	350.022	329.260	1.600	549.611	…	61.304	
3	350.938	331.142	1.604	623.362	…	68.496	
4	351.640	332.709	0.000	638.672	…	70.022	
..	…	…	…	…	…	…	
298	354.803	311.041	1.635	532.419	…	65.561	
299	357.723	321.387	0.000	520.365	…	65.729	
300	357.438	323.757	0.000	553.070	…	65.795	
301	361.365	322.689	0.000	590.199	…	71.456	

```
307        351.263         332.485  1.522       631.514  …        71.286

     Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   WeakLiquorF   BlackFlow-2   \
0          329.432         303.099      175.964      1127.197      1319.039
1          330.823         304.879      163.202       665.975      1297.317
2          329.140         303.383      164.013       677.534      1327.072
3          328.875         302.254      181.487       767.853      1324.461
4          328.352         300.954      183.929       888.448      1343.424
..             …               …            …             …             …
298        332.924         307.626      145.299       832.906      1344.708
299        332.523         307.169      151.544       905.639      1344.469
300        331.263         306.400      157.954       908.691      1344.588
301        333.032         308.732      174.069       986.206      1348.747
307        328.699         300.706      180.229       903.605      1323.082

     WeakWashF   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0       257.325         54.612         252.077            0.00
1       241.182         46.603         251.406           29.11
2       237.272         51.795         251.335            0.00
3       239.478         54.846         250.312           29.02
4       215.372         54.186         249.916           29.01
..          …              …               …              …
298     388.911         49.524         251.833           30.29
299     418.979         48.135         251.614           30.47
300     462.712         54.373         251.197            0.00
301     457.313         53.194         251.324           30.46
307     232.729         54.503         250.084            0.00

[301 rows x 23 columns]
```

[13]:
```
data2.isnull().sum().sum()
```

[13]:
```
0
```

[14]:
```
data
```

[14]:
```
     Observation  Y-Kappa  ChipRate  BF-CMratio  BlowFlow  ChipLevel4   \
0      31-00:00    23.10    16.520     121.717  1177.607      169.805
1      31-01:00    27.60    16.810      79.022  1328.360      341.327
2      31-02:00    23.19    16.709      79.562  1329.407      239.161
3      31-03:00    23.60    16.478      81.011  1334.877      213.527
4      31-04:00    22.90    15.618      93.244  1334.168      243.131
..          …       …        …           …         …             …
298    12-09:00    20.90    15.167      84.640  1283.706      339.440
299    12-10:00    24.98       NaN      85.034  1278.345      368.564
300    12-11:00    21.00       NaN      88.013  1307.722      278.842
301    12-12:00    21.40       NaN      85.490  1255.986      273.484
```

```
307    31-05:00    20.89    14.308      94.172  1327.832      251.120

     T-upperExt-2   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
0          358.282        329.545  1.443        599.253  …        67.122
1          351.050        329.067  1.549        537.201  …        60.012
2          350.022        329.260  1.600        549.611  …        61.304
3          350.938        331.142  1.604        623.362  …        68.496
4          351.640        332.709    NaN        638.672  …        70.022
..             …              …    …            …  …           …
298        354.803        311.041  1.635        532.419  …        65.561
299        357.723        321.387    NaN        520.365  …        65.729
300        357.438        323.757    NaN        553.070  …        65.795
301        361.365        322.689    NaN        590.199  …        71.456
307        351.263        332.485  1.522        631.514  …        71.286

     Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   WeakLiquorF   BlackFlow-2   \
0          329.432        303.099      175.964      1127.197      1319.039
1          330.823        304.879      163.202       665.975      1297.317
2          329.140        303.383      164.013       677.534      1327.072
3          328.875        302.254      181.487       767.853      1324.461
4          328.352        300.954      183.929       888.448      1343.424
..             …              …            …            …            …
298        332.924        307.626      145.299       832.906      1344.708
299        332.523        307.169      151.544       905.639      1344.469
300        331.263        306.400      157.954       908.691      1344.588
301        333.032        308.732      174.069       986.206      1348.747
307        328.699        300.706      180.229       903.605      1323.082

     WeakWashF   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0      257.325         54.612         252.077             NaN
1      241.182         46.603         251.406           29.11
2      237.272         51.795         251.335             NaN
3      239.478         54.846         250.312           29.02
4      215.372         54.186         249.916           29.01
..         …              …               …               …
298    388.911         49.524         251.833           30.29
299    418.979         48.135         251.614           30.47
300    462.712         54.373         251.197             NaN
301    457.313         53.194         251.324           30.46
307    232.729         54.503         250.084             NaN

[301 rows x 23 columns]
```

[15]:
```
data3 = data.fillna(method='pad')
data3
```

[15]:

	Observation	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	ChipLevel4	\
0	31-00:00	23.10	16.520	121.717	1177.607	169.805	
1	31-01:00	27.60	16.810	79.022	1328.360	341.327	
2	31-02:00	23.19	16.709	79.562	1329.407	239.161	
3	31-03:00	23.60	16.478	81.011	1334.877	213.527	
4	31-04:00	22.90	15.618	93.244	1334.168	243.131	
..	…	…	…	…	…	…	
298	12-09:00	20.90	15.167	84.640	1283.706	339.440	
299	12-10:00	24.98	15.167	85.034	1278.345	368.564	
300	12-11:00	21.00	15.167	88.013	1307.722	278.842	
301	12-12:00	21.40	15.167	85.490	1255.986	273.484	
307	31-05:00	20.89	14.308	94.172	1327.832	251.120	

	T-upperExt-2	T-lowerExt-2	UCZAA	WhiteFlow-4	…	SteamFlow-4	\
0	358.282	329.545	1.443	599.253	…	67.122	
1	351.050	329.067	1.549	537.201	…	60.012	
2	350.022	329.260	1.600	549.611	…	61.304	
3	350.938	331.142	1.604	623.362	…	68.496	
4	351.640	332.709	1.604	638.672	…	70.022	
..	…	…	…	…	…	…	
298	354.803	311.041	1.635	532.419	…	65.561	
299	357.723	321.387	1.635	520.365	…	65.729	
300	357.438	323.757	1.635	553.070	…	65.795	
301	361.365	322.689	1.635	590.199	…	71.456	
307	351.263	332.485	1.522	631.514	…	71.286	

	Lower-HeatT-3	Upper-HeatT-3	ChipMass-4	WeakLiquorF	BlackFlow-2	\
0	329.432	303.099	175.964	1127.197	1319.039	
1	330.823	304.879	163.202	665.975	1297.317	
2	329.140	303.383	164.013	677.534	1327.072	
3	328.875	302.254	181.487	767.853	1324.461	
4	328.352	300.954	183.929	888.448	1343.424	
..	…	…	…	…	…	
298	332.924	307.626	145.299	832.906	1344.708	
299	332.523	307.169	151.544	905.639	1344.469	
300	331.263	306.400	157.954	908.691	1344.588	
301	333.032	308.732	174.069	986.206	1348.747	
307	328.699	300.706	180.229	903.605	1323.082	

	WeakWashF	SteamHeatF-3	T-Top-Chips-4	SulphidityL-4
0	257.325	54.612	252.077	NaN
1	241.182	46.603	251.406	29.11
2	237.272	51.795	251.335	29.11
3	239.478	54.846	250.312	29.02
4	215.372	54.186	249.916	29.01
..	…	…	…	…
298	388.911	49.524	251.833	30.29

```
299     418.979         48.135         251.614           30.47
300     462.712         54.373         251.197           30.47
301     457.313         53.194         251.324           30.46
307     232.729         54.503         250.084           30.46

[301 rows x 23 columns]
```

[16]:
```
data4 = data.fillna(method='bfill')
data4
```

[16]:
```
    Observation  Y-Kappa  ChipRate  BF-CMratio  BlowFlow  ChipLevel4   \
0      31-00:00    23.10    16.520     121.717  1177.607      169.805
1      31-01:00    27.60    16.810      79.022  1328.360      341.327
2      31-02:00    23.19    16.709      79.562  1329.407      239.161
3      31-03:00    23.60    16.478      81.011  1334.877      213.527
4      31-04:00    22.90    15.618      93.244  1334.168      243.131
..          …       …        …           …         …            …
298    12-09:00    20.90    15.167      84.640  1283.706      339.440
299    12-10:00    24.98    14.308      85.034  1278.345      368.564
300    12-11:00    21.00    14.308      88.013  1307.722      278.842
301    12-12:00    21.40    14.308      85.490  1255.986      273.484
307    31-05:00    20.89    14.308      94.172  1327.832      251.120

     T-upperExt-2   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
0          358.282        329.545  1.443        599.253  …        67.122
1          351.050        329.067  1.549        537.201  …        60.012
2          350.022        329.260  1.600        549.611  …        61.304
3          350.938        331.142  1.604        623.362  …        68.496
4          351.640        332.709  1.436        638.672  …        70.022
..             …              …    …            …  …  …           …
298        354.803        311.041  1.635        532.419  …        65.561
299        357.723        321.387  1.522        520.365  …        65.729
300        357.438        323.757  1.522        553.070  …        65.795
301        361.365        322.689  1.522        590.199  …        71.456
307        351.263        332.485  1.522        631.514  …        71.286

     Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   WeakLiquorF   BlackFlow-2   \
0          329.432        303.099      175.964      1127.197      1319.039
1          330.823        304.879      163.202       665.975      1297.317
2          329.140        303.383      164.013       677.534      1327.072
3          328.875        302.254      181.487       767.853      1324.461
4          328.352        300.954      183.929       888.448      1343.424
..             …              …            …             …            …
298        332.924        307.626      145.299       832.906      1344.708
299        332.523        307.169      151.544       905.639      1344.469
300        331.263        306.400      157.954       908.691      1344.588
301        333.032        308.732      174.069       986.206      1348.747
```

```
307        328.699         300.706      180.229       903.605      1323.082

     WeakWashF   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0       257.325         54.612         252.077           29.11
1       241.182         46.603         251.406           29.11
2       237.272         51.795         251.335           29.02
3       239.478         54.846         250.312           29.02
4       215.372         54.186         249.916           29.01
..          …            …              …               …
298     388.911         49.524         251.833           30.29
299     418.979         48.135         251.614           30.47
300     462.712         54.373         251.197           30.46
301     457.313         53.194         251.324           30.46
307     232.729         54.503         250.084             NaN

[301 rows x 23 columns]
```

[17]:
```
import numpy as np
import matplotlib.pyplot as plt
import scipy as stats
```

[18]:
```
#detecting the outliers using IQR
data2.columns
```

[18]:
```
Index(['Observation', 'Y-Kappa', 'ChipRate', 'BF-CMratio', 'BlowFlow',
       'ChipLevel4 ', 'T-upperExt-2 ', 'T-lowerExt-2  ', 'UCZAA',
       'WhiteFlow-4 ', 'AAWhiteSt-4 ', 'AA-Wood-4  ', 'ChipMoisture-4 ',
       'SteamFlow-4 ', 'Lower-HeatT-3', 'Upper-HeatT-3 ', 'ChipMass-4 ',
       'WeakLiquorF ', 'BlackFlow-2 ', 'WeakWashF ', 'SteamHeatF-3 ',
       'T-Top-Chips-4 ', 'SulphidityL-4 '],
      dtype='object')
```

[19]:
```
data2.drop(['Observation'], axis=1, inplace=True)
data2.columns
```

[19]:
```
Index(['Y-Kappa', 'ChipRate', 'BF-CMratio', 'BlowFlow', 'ChipLevel4 ',
       'T-upperExt-2 ', 'T-lowerExt-2  ', 'UCZAA', 'WhiteFlow-4 ',
       'AAWhiteSt-4 ', 'AA-Wood-4  ', 'ChipMoisture-4 ', 'SteamFlow-4 ',
       'Lower-HeatT-3', 'Upper-HeatT-3 ', 'ChipMass-4 ', 'WeakLiquorF ',
       'BlackFlow-2 ', 'WeakWashF ', 'SteamHeatF-3 ', 'T-Top-Chips-4 ',
       'SulphidityL-4 '],
      dtype='object')
```

[20]:
```
Q1= data2.quantile(0.25)
Q3= data2.quantile(0.75)
IQR=Q3-Q1
print(IQR)
```

```
Y-Kappa              4.550
ChipRate             2.233
BF-CMratio          10.912
BlowFlow            96.766
ChipLevel4         105.868
T-upperExt-2        11.994
T-lowerExt-2         7.609
UCZAA                0.152
WhiteFlow-4        100.098
AAWhiteSt-4          6.143
AA-Wood-4            1.486
ChipMoisture-4       2.186
SteamFlow-4          8.840
Lower-HeatT-3        8.585
Upper-HeatT-3        7.852
ChipMass-4          19.347
WeakLiquorF        180.613
BlackFlow-2        280.829
WeakWashF          267.219
SteamHeatF-3         6.903
T-Top-Chips-4        2.044
SulphidityL-4       30.420
dtype: float64
```

[21]:
```
data2=data2[~((data2<(Q1-1.5*IQR))|(data2>(Q3+1.5*IQR))).any(axis=1)]
data2
```

[21]:

	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	ChipLevel4	T-upperExt-2	\
1	27.60	16.810	79.022	1328.360	341.327	351.050	
2	23.19	16.709	79.562	1329.407	239.161	350.022	
3	23.60	16.478	81.011	1334.877	213.527	350.938	
5	14.23	15.350	85.518	1171.604	198.538	344.014	
6	13.49	13.700	98.186	1243.688	116.275	346.208	
..	…	…	…	…	…	…	
276	22.70	15.517	83.008	1288.010	306.886	350.155	
296	20.50	13.358	97.662	1304.597	377.678	347.672	
297	20.40	14.233	89.790	1278.006	379.458	354.290	
298	20.90	15.167	84.640	1283.706	339.440	354.803	
307	20.89	14.308	94.172	1327.832	251.120	351.263	

	T-lowerExt-2	UCZAA	WhiteFlow-4	AAWhiteSt-4	…	SteamFlow-4	\
1	329.067	1.549	537.201	6.076	…	60.012	
2	329.260	1.600	549.611	0.000	…	61.304	
3	331.142	1.604	623.362	6.054	…	68.496	
5	325.195	1.436	628.245	6.020	…	65.225	
6	326.982	1.434	696.766	0.000	…	72.989	
..	…	…	…	…	…	…	

```
276         322.485  1.590       568.752         6.170  …        67.678
296         313.147  1.546       496.460         6.340  …        60.119
297         315.558  1.515       491.374         0.000  …        60.424
298         311.041  1.635       532.419         6.340  …        65.561
307         332.485  1.522       631.514         0.000  …        71.286

     Lower-HeatT-3  Upper-HeatT-3   ChipMass-4   WeakLiquorF   BlackFlow-2   \
1          330.823        304.879      163.202       665.975      1297.317
2          329.140        303.383      164.013       677.534      1327.072
3          328.875        302.254      181.487       767.853      1324.461
5          322.103        298.517      165.814       826.243       907.641
6          322.982        296.080      182.018       784.281       929.527
..             …              …            …             …            …
276        331.854        309.346      160.061       910.013      1381.389
296        332.615        308.575      141.076       997.904      1334.703
297        331.980        308.078      140.301       975.016      1344.835
298        332.924        307.626      145.299       832.906      1344.708
307        328.699        300.706      180.229       903.605      1323.082

     WeakWashF   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
1       241.182         46.603         251.406           29.11
2       237.272         51.795         251.335            0.00
3       239.478         54.846         250.312           29.02
5       595.875         52.807         249.580           30.34
6       201.272         58.118         248.741            0.00
..          …              …              …              …
276     441.934         51.466         252.216           29.59
296     389.497         46.206         252.423           30.43
297     388.676         47.803         252.311            0.00
298     388.911         49.524         251.833           30.29
307     232.729         54.503         250.084            0.00

[226 rows x 22 columns]
```

[ ]:
```
data2.describe()
```