Technologie IoT - Analityka Big Data_Michał_Lidwa-Projekt

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Technologie IoT - Analityka Big Data (Projekt)
Temat projektu: Algierskie pożary lasów

O danych: - Zbiór danych obejmuje 244 przypadki, które przegrupowują dane z dwóch regionów Algierii, mianowicie regionu Bejaia położonego w północno-wschodniej Algierii i regionu Sidi Bel-abbes położonego w północno-zachodniej Algierii. - 122 instancje dla każdego regionu. - Okres od czerwca 2012 r. do września 2012 r. - Zestaw danych zawiera 11 atrybutów i 1 atrybut wyjściowy (klasa) - 244 instancje zostały podzielone na klasy fire (138 klas), a not fire (106 klas).

Informacje o atrybutach: - Date: (day/month/year) Dzień, miesiąc (od 'czerwiec' do 'wrzesień'), rok (2012)

- Temp: Temperatura w południe (maksymalna temperatura) w stopniach Celsjusza: 22 do 42
- RH: Wilgotność względna (w %): 21 do 90
- Ws: Prędkość wiatru (w km/h): 6 do 29
- Rain: Całkowity dzień w mm: 0 do 16,8 FWI Komponenty
- Indeks Dokładnego kodu wilgotności paliwa (FFMC) z systemu FWI: 28,6 do 92,5
- Indeks Kodu wilgotności Duffa (DMC) z systemu FWI: 1.1 do 65,9
- Indeks Kodu suszy (DC) z systemu FWI: od 7 do 220,4
- Indeks Początkowego spreadu (ISI) z systemu FWI: 0 do 18,5
- Indeks Budowania (BUI) z systemu FWI: 1.1 do 68
- Indeks Pogody pożarowej (FWI): 0 do 31.1
- Klasy: Fire and not Fire

Importowanie podstawowych bibliotek

[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import geopandas as gpd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import StandardScaler
```

```
from sklearn import metrics
from sklearn.metrics import mean_squared_error, mean_absolute_error,␣
 ↪mean_absolute_percentage_error, r2_score
from sklearn.tree import DecisionTreeClassifier
from sklearn import tree
from sklearn.tree import export_graphviz
from sklearn.metrics import classification_report
from sklearn.metrics import accuracy_score
from sklearn.metrics import ConfusionMatrixDisplay
from sklearn.ensemble import RandomForestRegressor
import sqlite3
import statsmodels.api as sm
```

Odczyt danych z pliku sqlite3

[ ]:
```
poloczenie = sqlite3.connect('Algerian_forest_fires_dataset.db')
```

Przerabianie danych na potrzeby analiz przez bilioteke pandas i zamkniecie bilbioteki

[ ]:
```
dane = pd.read_sql_query("SELECT * FROM Algerian_forest_fires_dataset ",␣
 ↪poloczenie)
```

[ ]:
```
poloczenie.close()
```

Wyswietlenie informacji o danych

[ ]:
```
dane.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 247 entries, 0 to 246
Data columns (total 14 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   day          246 non-null    object
 1   month        245 non-null    object
 2   year         245 non-null    object
 3   Temperature  245 non-null    object
 4   RH           245 non-null    object
 5   Ws           245 non-null    object
 6   Rain         245 non-null    object
 7   FFMC         245 non-null    object
 8   DMC          245 non-null    object
 9   DC           245 non-null    object
 10  ISI          245 non-null    object
 11  BUI          245 non-null    object
 12  FWI          245 non-null    object
 13  Classes      244 non-null    object
dtypes: object(14)
memory usage: 27.1+ KB
```

Wyświetlenie kolumn danych

```
[ ]: dane.columns
```

```
[ ]: Index(['day', 'month', 'year', 'Temperature', 'RH', 'Ws', 'Rain', 'FFMC',
           'DMC', 'DC', 'ISI', 'BUI', 'FWI', 'Classes'],
          dtype='object')
```

Wyświetlenie ilosci danych

```
[ ]: dane.nunique()
```

```
[ ]: day            33
     month           5
     year            2
     Temperature    20
     RH             63
     Ws             19
     Rain           40
     FFMC          174
     DMC           167
     DC            199
     ISI           107
     BUI           175
     FWI           127
     Classes         9
     dtype: int64
```

Wyswietlenie pierwszych 5 wierszy danych

```
[ ]: dane.head()
```

```
[ ]:   day month  year Temperature  RH  Ws  Rain  FFMC  DMC    DC  ISI  BUI  FWI  \
     0   1     6  2012          29  57  18   0.0  65.7  3.4   7.6  1.3  3.4  0.5
     1   2     6  2012          29  61  13   1.3  64.4  4.1   7.6    1  3.9  0.4
     2   3     6  2012          26  82  22  13.1  47.1  2.5   7.1  0.3  2.7  0.1
     3   4     6  2012          25  89  13   2.5  28.6  1.3   6.9    0  1.7    0
     4   5     6  2012          27  77  16   0.0  64.8    3  14.2  1.2  3.9  0.5

           Classes
     0  not fire
     1  not fire
     2  not fire
     3  not fire
     4  not fire
```

Wyświetlenie ostatnich 5 wierszy danych

```
[ ]: dane.tail()
```

[ ]:

```
     day month  year Temperature  RH  Ws Rain  FFMC  DMC    DC  ISI   BUI  FWI  \
242  26     9  2012          30  65  14  0.0  85.4   16  44.5  4.5  16.9  6.5
243  27     9  2012          28  87  15  4.4  41.1  6.5     8  0.1   6.2    0
244  28     9  2012          27  87  29  0.5  45.9  3.5   7.9  0.4   3.4  0.2
245  29     9  2012          24  54  18  0.1  79.7  4.3  15.2  1.7   5.1  0.7
246  30     9  2012          24  64  15  0.2  67.3  3.8  16.5  1.2   4.8  0.5

          Classes
242       fire
243   not fire
244   not fire
245   not fire
246  not fire
```

Wyświetlenie wszystkich danych

[ ]:

```
print(dane.to_string())
```

```
                              day  month  year  Temperature    RH    Ws   Rain
FFMC   DMC      DC   ISI   BUI      FWI        Classes
0                                   1      6  2012           29    57    18    0.0
65.7   3.4     7.6   1.3   3.4      0.5    not fire
1                                   2      6  2012           29    61    13    1.3
64.4   4.1     7.6     1   3.9      0.4    not fire
2                                   3      6  2012           26    82    22   13.1
47.1   2.5     7.1   0.3   2.7      0.1    not fire
3                                   4      6  2012           25    89    13    2.5
28.6   1.3     6.9     0   1.7        0    not fire
4                                   5      6  2012           27    77    16    0.0
64.8     3    14.2   1.2   3.9      0.5    not fire
5                                   6      6  2012           31    67    14    0.0
82.6   5.8    22.2   3.1     7      2.5        fire
6                                   7      6  2012           33    54    13    0.0
88.2   9.9    30.5   6.4  10.9      7.2        fire
7                                   8      6  2012           30    73    15    0.0
86.6  12.1    38.3   5.6  13.5      7.1        fire
8                                   9      6  2012           25    88    13    0.2
52.9   7.9    38.8   0.4  10.5      0.3    not fire
9                                  10      6  2012           28    79    12    0.0
73.2   9.5    46.3   1.3  12.6      0.9    not fire
10                                 11      6  2012           31    65    14    0.0
84.5  12.5    54.3     4  15.8      5.6        fire
11                                 12      6  2012           26    81    19    0.0
84.0  13.8    61.4   4.8  17.7      7.1        fire
12                                 13      6  2012           27    84    21    1.2
50.0   6.7      17   0.5   6.7      0.2    not fire
13                                 14      6  2012           30    78    20    0.5
59.0   4.6     7.8     1   4.4      0.4    not fire
```

14					15	6	2012	28	80	17	3.1	
49.4	3	7.4	0.4	3	0.1	not fire						
15					16	6	2012	29	89	13	0.7	
36.1	1.7	7.6	0	2.2	0	not fire						
16					17	6	2012	30	89	16	0.6	
37.3	1.1	7.8	0	1.6	0	not fire						
17					18	6	2012	31	78	14	0.3	
56.9	1.9	8	0.7	2.4	0.2	not fire						
18					19	6	2012	31	55	16	0.1	
79.9	4.5	16	2.5	5.3	1.4	not fire						
19					20	6	2012	30	80	16	0.4	
59.8	3.4	27.1	0.9	5.1	0.4	not fire						
20					21	6	2012	30	78	14	0.0	
81.0	6.3	31.6	2.6	8.4	2.2	fire						
21					22	6	2012	31	67	17	0.1	
79.1	7	39.5	2.4	9.7	2.3	not fire						
22					23	6	2012	32	62	18	0.1	
81.4	8.2	47.7	3.3	11.5	3.8	fire						
23					24	6	2012	32	66	17	0.0	
85.9	11.2	55.8	5.6	14.9	7.5	fire						
24					25	6	2012	31	64	15	0.0	
86.7	14.2	63.8	5.7	18.3	8.4	fire						
25					26	6	2012	31	64	18	0.0	
86.8	17.8	71.8	6.7	21.6	10.6	fire						
26					27	6	2012	34	53	18	0.0	
89.0	21.6	80.3	9.2	25.8	15	fire						
27					28	6	2012	32	55	14	0.0	
89.1	25.5	88.5	7.6	29.7	13.9	fire						
28					29	6	2012	32	47	13	0.3	
79.9	18.4	84.4	2.2	23.8	3.9	not fire						
29					30	6	2012	33	50	14	0.0	
88.7	22.9	92.8	7.2	28.3	12.9	fire						
30					1	7	2012	29	68	19	1.0	
59.9	2.5	8.6	1.1	2.9	0.4	not fire						
31					2	7	2012	27	75	19	1.2	
55.7	2.4	8.3	0.8	2.8	0.3	not fire						
32					3	7	2012	32	76	20	0.7	
63.1	2.6	9.2	1.3	3	0.5	not fire						
33					4	7	2012	33	78	17	0.0	
80.1	4.6	18.5	2.7	5.7	1.7	not fire						
34					5	7	2012	33	66	14	0.0	
85.9	7.6	27.9	4.8	9.1	4.9	fire						
35					6	7	2012	32	63	14	0.0	
87.0	10.9	37	5.6	12.5	6.8	fire						
36					7	7	2012	35	64	18	0.2	
80.0	9.7	40.4	2.8	12.1	3.2	not fire						
37					8	7	2012	33	68	19	0.0	
85.6	12.5	49.8	6	15.4	8	fire						

```
38                                   9      7  2012          32    68    14    1.4
66.6   7.7     9.2   1.1   7.4      0.6    not fire
39                                  10      7  2012          33    69    13    0.7
66.6     6     9.3   1.1   5.8      0.5    not fire
40                                  11      7  2012          33    76    14    0.0
81.1   8.1    18.7   2.6   8.1      2.2    not fire
41                                  12      7  2012          31    75    13    0.1
75.1   7.9    27.7   1.5   9.2      0.9    not fire
42                                  13      7  2012          34    81    15    0.0
81.8   9.7    37.2     3  11.7      3.4    not fire
43                                  14      7  2012          34    61    13    0.6
73.9   7.8    22.9   1.4   8.4      0.8    not fire
44                                  15      7  2012          30    80    19    0.4
60.7   5.2      17   1.1   5.9      0.5    not fire
45                                  16      7  2012          28    76    21    0.0
72.6     7    25.5   0.7   8.3      0.4    not fire
46                                  17      7  2012          29    70    14    0.0
82.8   9.4    34.1   3.2  11.1      3.6        fire
47                                  18      7  2012          31    68    14    0.0
85.4  12.1    43.1   4.6  14.2        6        fire
48                                  19      7  2012          35    59    17    0.0
88.1    12    52.8   7.7  18.2     10.9        fire
49                                  20      7  2012          33    65    15    0.1
81.4  12.3    62.1   2.8  16.5        4        fire
50                                  21      7  2012          33    70    17    0.0
85.4  18.5    71.5   5.2  22.4      8.8        fire
51                                  22      7  2012          28    79    18    0.1
73.4  16.4    79.9   1.8  21.7      2.8    not fire
52                                  23      7  2012          27    66    22    0.4
68.2  10.5    71.3   1.8  15.4      2.1    not fire
53                                  24      7  2012          28    78    16    0.1
70.0   9.6    79.7   1.4  14.7      1.3    not fire
54                                  25      7  2012          31    65    18    0.0
84.3  12.5    88.7   4.8  18.5      7.3        fire
55                                  26      7  2012          36    53    19    0.0
89.2  17.1    98.6    10  23.9     15.3        fire
56                                  27      7  2012          36    48    13    0.0
90.3  22.2   108.5   8.7  29.4     15.3        fire
57                                  28      7  2012          33    76    15    0.0
86.5  24.4   117.8   5.6  32.1     11.3        fire
58                                  29      7  2012          32    73    15    0.0
86.6  26.7     127   5.6    35     11.9        fire
59                                  30      7  2012          31    79    15    0.0
85.4  28.5     136   4.7  37.4     10.7        fire
60                                  31      7  2012          35    64    17    0.0
87.2  31.9   145.7   6.8  41.2     15.7        fire
61                                   1      8  2012          36    45    14    0.0
78.8   4.8    10.2     2   4.7      0.9    not fire
```

```
62                                      2       8  2012           35    55    12    0.4
78.0   5.8      10   1.7   5.5      0.8    not fire
63                                      3       8  2012           35    63    14    0.3
76.6   5.7      10   1.7   5.5      0.8    not fire
64                                      4       8  2012           34    69    13    0.0
85.0   8.2    19.8     4   8.2      3.9        fire
65                                      5       8  2012           34    65    13    0.0
86.8  11.1    29.7   5.2  11.5      6.1        fire
66                                      6       8  2012           32    75    14    0.0
86.4    13    39.1   5.2  14.2      6.8        fire
67                                      7       8  2012           32    69    16    0.0
86.5  15.5    48.6   5.5  17.2        8        fire
68                                      8       8  2012           32    60    18    0.3
77.1  11.3      47   2.2  14.1      2.6    not fire
69                                      9       8  2012           35    59    17    0.0
87.4  14.8      57   6.9  17.9      9.9        fire
70                                     10       8  2012           35    55    14    0.0
88.9  18.6      67   7.4  21.9     11.6        fire
71                                     11       8  2012           35    63    13    0.0
88.9  21.7      77   7.1  25.5     12.1        fire
72                                     12       8  2012           35    51    13    0.3
81.3  15.6    75.1   2.5  20.7      4.2    not fire
73                                     13       8  2012           35    63    15    0.0
87.0    19    85.1   5.9  24.4     10.2        fire
74                                     14       8  2012           33    66    14    0.0
87.0  21.7    94.7   5.7  27.2     10.6        fire
75                                     15       8  2012           36    55    13    0.3
82.4  15.6    92.5   3.7    22      6.3        fire
76                                     16       8  2012           36    61    18    0.3
80.2  11.7    90.4   2.8  17.6      4.2        fire
77                                     17       8  2012           37    52    18    0.0
89.3    16   100.7   9.7  22.9     14.6        fire
78                                     18       8  2012           36    54    18    0.0
89.4    20   110.9   9.7  27.5     16.1        fire
79                                     19       8  2012           35    62    19    0.0
89.4  23.2   120.9   9.7  31.3     17.2        fire
80                                     20       8  2012           35    68    19    0.0
88.3  25.9   130.6   8.8  34.7     16.8        fire
81                                     21       8  2012           36    58    19    0.0
88.6  29.6   141.1   9.2  38.8     18.4        fire
82                                     22       8  2012           36    55    18    0.0
89.1  33.5   151.3   9.9  43.1     20.4        fire
83                                     23       8  2012           36    53    16    0.0
89.5  37.6   161.5  10.4  47.5     22.3           fire
84                                     24       8  2012           34    64    14    0.0
88.9  40.5   171.3     9  50.9     20.9        fire
85                                     25       8  2012           35    60    15    0.0
88.9  43.9   181.3   8.2  54.7     20.3           fire
```

86					26	8	2012	31	78	18	0.0	
85.8	45.6	190.6	4.7	57.1	13.7	fire						
87					27	8	2012	33	82	21	0.0	
84.9	47	200.2	4.4	59.3	13.2	fire						
88					28	8	2012	34	64	16	0.0	
89.4	50.2	210.4	7.3	62.9	19.9	fire						
89					29	8	2012	35	48	18	0.0	
90.1	54.2	220.4	12.5	67.4	30.2	fire						
90					30	8	2012	35	70	17	0.8	
72.7	25.2	180.4	1.7	37.4	4.2	not fire						
91					31	8	2012	28	80	21	16.8	
52.5	8.7	8.7	0.6	8.3	0.3	not fire						
92					1	9	2012	25	76	17	7.2	
46.0	1.3	7.5	0.2	1.8	0.1	not fire						
93					2	9	2012	22	86	15	10.1	
30.5	0.7	7	0	1.1	0	not fire						
94					3	9	2012	25	78	15	3.8	
42.6	1.2	7.5	0.1	1.7	0	not fire						
95					4	9	2012	29	73	17	0.1	
68.4	1.9	15.7	1.4	2.9	0.5	not fire						
96					5	9	2012	29	75	16	0.0	
80.8	3.4	24	2.8	5.1	1.7	fire						
97					6	9	2012	29	74	19	0.1	
75.8	3.6	32.2	2.1	5.6	0.9	not fire						
98					7	9	2012	31	71	17	0.3	
69.6	3.2	30.1	1.5	5.1	0.6	not fire						
99					8	9	2012	30	73	17	0.9	
62.0	2.6	8.4	1.1	3	0.4	not fire						
100					9	9	2012	30	77	15	1.0	
56.1	2.1	8.4	0.7	2.6	0.2	not fire						
101					10	9	2012	33	73	12	1.8	
59.9	2.2	8.9	0.7	2.7	0.3	not fire						
102					11	9	2012	30	77	21	1.8	
58.5	1.9	8.4	1.1	2.4	0.3	not fire						
103					12	9	2012	29	88	13	0.0	
71.0	2.6	16.6	1.2	3.7	0.5	not fire						
104					13	9	2012	25	86	21	4.6	
40.9	1.3	7.5	0.1	1.8	0	not fire						
105					14	9	2012	22	76	26	8.3	
47.4	1.1	7	0.4	1.6	0.1	not fire						
106					15	9	2012	24	82	15	0.4	
44.9	0.9	7.3	0.2	1.4	0	not fire						
107					16	9	2012	30	65	14	0.0	
78.1	3.2	15.7	1.9	4.2	0.8	not fire						
108					17	9	2012	31	52	14	0.0	
87.7	6.4	24.3	6.2	7.7	5.9	fire						
109					18	9	2012	32	49	11	0.0	
89.4	9.8	33.1	6.8	11.3	7.7	fire						

```
110                                 19      9  2012           29    57    14    0.0
89.3  12.5    41.3   7.8  14.2      9.7        fire
111                                 20      9  2012           28    84    18    0.0
83.8  13.5    49.3   4.5    16      6.3           fire
112                                 21      9  2012           31    55    11    0.0
87.8  16.5    57.9   5.4  19.2      8.3        fire
113                                 22      9  2012           31    50    19    0.6
77.8  10.6    41.4   2.4  12.9      2.8    not fire
114                                 23      9  2012           32    54    11    0.5
73.7   7.9    30.4   1.2   9.6      0.7    not fire
115                                 24      9  2012           29    65    19    0.6
68.3   5.5    15.2   1.5   5.8      0.7    not fire
116                                 25      9  2012           26    81    21    5.8
48.6     3     7.7   0.4     3      0.1    not fire
117                                 26      9  2012           31    54    11    0.0
82.0     6    16.3   2.5   6.2      1.7    not fire
118                                 27      9  2012           31    66    11    0.0
85.7   8.3    24.9     4     9      4.1        fire
119                                 28      9  2012           32    47    14    0.7
77.5   7.1     8.8   1.8   6.8      0.9    not fire
120                                 29      9  2012           26    80    16    1.8
47.4   2.9     7.7   0.3     3      0.1    not fire
121                                 30      9  2012           25    78    14    1.4
45.0   1.9     7.5   0.2   2.4      0.1    not fire
122                            None   None  None         None  None  None   None
None  None    None  None  None     None           None
123  Sidi-Bel Abbes Region Dataset   None  None         None  None  None   None
None  None    None  None  None     None           None
124                              day  month  year  Temperature    RH    Ws  Rain
FFMC   DMC      DC   ISI   BUI      FWI      Classes
125                                  1      6  2012           32    71    12    0.7
57.1   2.5     8.2   0.6   2.8      0.2    not fire
126                                  2      6  2012           30    73    13    4.0
55.7   2.7     7.8   0.6   2.9      0.2    not fire
127                                  3      6  2012           29    80    14    2.0
48.7   2.2     7.6   0.3   2.6      0.1    not fire
128                                  4      6  2012           30    64    14    0.0
79.4   5.2    15.4   2.2   5.6        1    not fire
129                                  5      6  2012           32    60    14    0.2
77.1     6    17.6   1.8   6.5      0.9    not fire
130                                  6      6  2012           35    54    11    0.1
83.7   8.4    26.3   3.1   9.3      3.1        fire
131                                  7      6  2012           35    44    17    0.2
85.6   9.9    28.9   5.4  10.7        6        fire
132                                  8      6  2012           28    51    17    1.3
71.4   7.7     7.4   1.5   7.3      0.8    not fire
133                                  9      6  2012           27    59    18    0.1
78.1   8.5    14.7   2.4   8.3      1.9    not fire
```

134					10	6	2012	30	41	15	0.0	
89.4	13.3	22.5	8.4	13.1	10	fire						
135					11	6	2012	31	42	21	0.0	
90.6	18.2	30.5	13.4	18	16.7	fire						
136					12	6	2012	27	58	17	0.0	
88.9	21.3	37.8	8.7	21.2	12.9	fire						
137					13	6	2012	30	52	15	2.0	
72.3	11.4	7.8	1.4	10.9	0.9	not fire						
138					14	6	2012	27	79	16	0.7	
53.4	6.4	7.3	0.5	6.1	0.3	not fire						
139					15	6	2012	28	90	15	0.0	
66.8	7.2	14.7	1.2	7.1	0.6	not fire						
140					16	6	2012	29	87	15	0.4	
47.4	4.2	8	0.2	4.1	0.1	not fire						
141					17	6	2012	31	69	17	4.7	
62.2	3.9	8	1.1	3.8	0.4	not fire						
142					18	6	2012	33	62	10	8.7	
65.5	4.6	8.3	0.9	4.4	0.4	not fire						
143					19	6	2012	32	67	14	4.5	
64.6	4.4	8.2	1	4.2	0.4	not fire						
144					20	6	2012	31	72	14	0.2	
60.2	3.8	8	0.8	3.7	0.3	not fire						
145					21	6	2012	32	55	14	0.0	
86.2	8.3	18.4	5	8.2	4.9	fire						
146					22	6	2012	33	46	14	1.1	
78.3	8.1	8.3	1.9	7.7	1.2	not fire						
147					23	6	2012	33	59	16	0.8	
74.2	7	8.3	1.6	6.7	0.8	not fire						
148					24	6	2012	35	68	16	0.0	
85.3	10	17	4.9	9.9	5.3	fire						
149					25	6	2012	34	70	16	0.0	
86.0	12.8	25.6	5.4	12.7	6.7	fire						
150					26	6	2012	36	62	16	0.0	
87.8	16.5	34.5	7	16.4	9.5	fire						
151					27	6	2012	36	55	15	0.0	
89.1	20.9	43.3	8	20.8	12	fire						
152					28	6	2012	37	37	13	0.0	
92.5	27.2	52.4	11.7	27.1	18.4	fire						
153					29	6	2012	37	36	13	0.6	
86.2	17.9	36.7	4.8	17.8	7.2	fire						
154					30	6	2012	34	42	15	1.7	
79.7	12	8.5	2.2	11.5	2.2	not fire						
155					1	7	2012	28	58	18	2.2	
63.7	3.2	8.5	1.2	3.3	0.5	not fire						
156					2	7	2012	33	48	16	0.0	
87.6	7.9	17.8	6.8	7.8	6.4	fire						
157					3	7	2012	34	56	17	0.1	
84.7	9.7	27.3	4.7	10.3	5.2	fire						

```
158                                  4      7  2012           34    58    18    0.0
88.0  13.6    36.8     8  14.1      9.9        fire
159                                  5      7  2012           34    45    18    0.0
90.5  18.7    46.4  11.3  18.7       15        fire
160                                  6      7  2012           35    42    15    0.3
84.7  15.5    45.1   4.3  16.7      6.3        fire
161                                  7      7  2012           38    43    13    0.5
85.0    13    35.4   4.1  13.7      5.2        fire
162                                  8      7  2012           35    47    18    6.0
80.8   9.8     9.7   3.1   9.4        3        fire
163                                  9      7  2012           36    43    15    1.9
82.3   9.4     9.9   3.2     9      3.1        fire
164                                 10      7  2012           34    51    16    3.8
77.5     8     9.5     2   7.7      1.3    not fire
165                                 11      7  2012           34    56    15    2.9
74.8   7.1     9.5   1.6   6.8      0.8    not fire
166                                 12      7  2012           36    44    13    0.0
90.1  12.6    19.4   8.3  12.5      9.6        fire
167                                 13      7  2012           39    45    13    0.6
85.2  11.3    10.4   4.2  10.9      4.7        fire
168                                 14      7  2012           37    37    18    0.2
88.9  12.9  14.6 9  12.5  10.4  fire                 None
169                                 15      7  2012           34    45    17    0.0
90.5    18    24.1  10.9  17.7     14.1        fire
170                                 16      7  2012           31    83    17    0.0
84.5  19.4    33.1   4.7  19.2      7.3        fire
171                                 17      7  2012           32    81    17    0.0
84.6  21.1    42.3   4.7  20.9      7.7        fire
172                                 18      7  2012           33    68    15    0.0
86.1  23.9    51.6   5.2  23.9      9.1        fire
173                                 19      7  2012           34    58    16    0.0
88.1  27.8    61.1   7.3  27.7       13        fire
174                                 20      7  2012           36    50    16    0.0
89.9  32.7      71   9.5  32.6     17.3        fire
175                                 21      7  2012           36    29    18    0.0
93.9  39.6    80.6  18.5  39.5       30        fire
176                                 22      7  2012           32    48    18    0.0
91.5  44.2    90.1  13.2    44     25.4        fire
177                                 23      7  2012           31    71    17    0.0
87.3  46.6      99   6.9  46.5     16.3        fire
178                                 24      7  2012           33    63    17    1.1
72.8  20.9    56.6   1.6  21.7      2.5    not fire
179                                 25      7  2012           39    64     9    1.2
73.8  11.7    15.9   1.1  11.4      0.7    not fire
180                                 26      7  2012           35    58    10    0.2
78.3  10.8    19.7   1.6  10.7        1    not fire
181                                 27      7  2012           29    87    18    0.0
80.0  11.8    28.3   2.8  11.8      3.2    not fire
```

182					28	7	2012		33	57	16	0.0
87.5	15.7	37.6	6.7	15.7	9		fire					
183					29	7	2012		34	59	16	0.0
88.1	19.5	47.2	7.4	19.5	10.9		fire					
184					30	7	2012		36	56	16	0.0
88.9	23.8	57.1	8.2	23.8	13.2		fire					
185					31	7	2012		37	55	15	0.0
89.3	28.3	67.2	8.3	28.3	14.5		fire					
186					1	8	2012		38	52	14	0.0
78.3	4.4	10.5	2	4.4	0.8		not fire					
187					2	8	2012		40	34	14	0.0
93.3	10.8	21.4	13.8	10.6	13.5		fire					
188					3	8	2012		39	33	17	0.0
93.7	17.1	32.1	17.2	16.9	19.5		fire					
189					4	8	2012		38	35	15	0.0
93.8	23	42.7	15.7	22.9	20.9		fire					
190					5	8	2012		34	42	17	0.1
88.3	23.6	52.5	19	23.5	12.6		fire					
191					6	8	2012		30	54	14	3.1
70.5	11	9.1	1.3	10.5	0.8		not fire					
192					7	8	2012		34	63	13	2.9
69.7	7.2	9.8	1.2	6.9	0.6		not fire					
193					8	8	2012		37	56	11	0.0
87.4	11.2	20.2	5.2	11	5.9		fire					
194					9	8	2012		39	43	12	0.0
91.7	16.5	30.9	9.6	16.4	12.7		fire					
195					10	8	2012		39	39	15	0.2
89.3	15.8	35.4	8.2	15.8	10.7		fire					
196					11	8	2012		40	31	15	0.0
94.2	22.5	46.3	16.6	22.4	21.6		fire					
197					12	8	2012		39	21	17	0.4
93.0	18.4	41.5	15.5	18.4	18.8		fire					
198					13	8	2012		35	34	16	0.2
88.3	16.9	45.1	7.5	17.5	10.5		fire					
199					14	8	2012		37	40	13	0.0
91.9	22.3	55.5	10.8	22.3	15.7		fire					
200					15	8	2012		35	46	13	0.3
83.9	16.9	54.2	3.5	19	5.5		fire					
201					16	8	2012		40	41	10	0.1
92.0	22.6	65.1	9.5	24.2	14.8		fire					
202					17	8	2012		42	24	9	0.0
96.0	30.3	76.4	15.7	30.4	24		fire					
203					18	8	2012		37	37	14	0.0
94.3	35.9	86.8	16	35.9	26.3		fire					
204					19	8	2012		35	66	15	0.1
82.7	32.7	96.8	3.3	35.5	7.7		fire					
205					20	8	2012		36	81	15	0.0
83.7	34.4	107	3.8	38.1	9		fire					

206					21	8	2012	36	71	15	0.0	
86.0	36.9	117.1	5.1	41.3	12.2	fire						
207					22	8	2012	37	53	14	0.0	
89.5	41.1	127.5	8	45.5	18.1	fire						
208					23	8	2012	36	43	16	0.0	
91.2	46.1	137.7	11.5	50.2	24.5	fire						
209					24	8	2012	35	38	15	0.0	
92.1	51.3	147.7	12.2	54.9	26.9	fire						
210					25	8	2012	34	40	18	0.0	
92.1	56.3	157.5	14.3	59.5	31.1	fire						
211					26	8	2012	33	37	16	0.0	
92.2	61.3	167.2	13.1	64	30.3	fire						
212					27	8	2012	36	54	14	0.0	
91.0	65.9	177.3	10	68	26.1	fire						
213					28	8	2012	35	56	14	0.4	
79.2	37	166	2.1	30.6	6.1	not fire						
214					29	8	2012	35	53	17	0.5	
80.2	20.7	149.2	2.7	30.6	5.9	fire						
215					30	8	2012	34	49	15	0.0	
89.2	24.8	159.1	8.1	35.7	16	fire						
216					31	8	2012	30	59	19	0.0	
89.1	27.8	168.2	9.8	39.3	19.4	fire						
217					1	9	2012	29	86	16	0.0	
37.9	0.9	8.2	0.1	1.4	0	not fire						
218					2	9	2012	28	67	19	0.0	
75.4	2.9	16.3	2	4	0.8	not fire						
219					3	9	2012	28	75	16	0.0	
82.2	4.4	24.3	3.3	6	2.5	fire						
220					4	9	2012	30	66	15	0.2	
73.5	4.1	26.6	1.5	6	0.7	not fire						
221					5	9	2012	30	58	12	4.1	
66.1	4	8.4	1	3.9	0.4	not fire						
222					6	9	2012	34	71	14	6.5	
64.5	3.3	9.1	1	3.5	0.4	not fire						
223					7	9	2012	31	62	15	0.0	
83.3	5.8	17.7	3.8	6.4	3.2	fire						
224					8	9	2012	30	88	14	0.0	
82.5	6.6	26.1	3	8.1	2.7	fire						
225					9	9	2012	30	80	15	0.0	
83.1	7.9	34.5	3.5	10	3.7	fire						
226					10	9	2012	29	74	15	1.1	
59.5	4.7	8.2	0.8	4.6	0.3	not fire						
227					11	9	2012	30	73	14	0.0	
79.2	6.5	16.6	2.1	6.6	1.2	not fire						
228					12	9	2012	31	72	14	0.0	
84.2	8.3	25.2	3.8	9.1	3.9	fire						
229					13	9	2012	29	49	19	0.0	
88.6	11.5	33.4	9.1	12.4	10.3	fire						

```
230                                14      9  2012          28    81    15    0.0
84.6  12.6    41.5   4.3  14.3      5.7        fire
231                                15      9  2012          32    51    13    0.0
88.7    16    50.2   6.9  17.8      9.8        fire
232                                16      9  2012          33    26    13    0.0
93.9  21.2    59.2  14.2  22.4     19.3        fire
233                                17      9  2012          34    44    12    0.0
92.5  25.2    63.3  11.2  26.2     17.5        fire
234                                18      9  2012          36    33    13    0.1
90.6  25.8    77.8     9  28.2     15.4        fire
235                                19      9  2012          29    41     8    0.1
83.9  24.9      86   2.7  28.9      5.6        fire
236                                20      9  2012          34    58    13    0.2
79.5  18.7      88   2.1  24.4      3.8    not fire
237                                21      9  2012          35    34    17    0.0
92.2  23.6    97.3  13.8  29.4     21.6        fire
238                                22      9  2012          33    64    13    0.0
88.9  26.1   106.3   7.1  32.4     13.7        fire
239                                23      9  2012          35    56    14    0.0
89.0  29.4   115.6   7.5    36     15.2        fire
240                                24      9  2012          26    49     6    2.0
61.3  11.9    28.1   0.6  11.9      0.4    not fire
241                                25      9  2012          28    70    15    0.0
79.9  13.8    36.1   2.4  14.1        3    not fire
242                                26      9  2012          30    65    14    0.0
85.4    16    44.5   4.5  16.9      6.5        fire
243                                27      9  2012          28    87    15    4.4
41.1   6.5       8   0.1   6.2        0    not fire
244                                28      9  2012          27    87    29    0.5
45.9   3.5     7.9   0.4   3.4      0.2    not fire
245                                29      9  2012          24    54    18    0.1
79.7   4.3    15.2   1.7   5.1      0.7    not fire
246                                30      9  2012          24    64    15    0.2
67.3   3.8    16.5   1.2   4.8      0.5   not fire
```

Opis ilosc danych w tabeli kategoriami

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

[ ]:
```
        day  month  year  Temperature   RH   Ws   Rain   FFMC    DMC   DC  \
count   246    245   245          245  245  245  245.0  245.0  245.0  245
unique   33      5     2           20   63   19   40.0  174.0  167.0  199
top       1      7  2012           35   64   14    0.0   88.9    7.9    8
freq      8     62   244           29   10   43  133.0    8.0    5.0    5

          ISI  BUI    FWI  Classes
count   245.0  245  245.0      244
unique  107.0  175  127.0        9
```

```
top       1.1    3    0.4  fire
freq      8.0    5   12.0      131
```

Sprawdzanie wartości które sa puste (null)

[ ]:
```
dane[dane.isnull().any(axis=1)]
```

[ ]:
```
                              day month  year Temperature    RH    Ws  Rain  \
122                          None  None  None         None  None  None  None
123  Sidi-Bel Abbes Region Dataset  None  None         None  None  None  None
168                            14     7  2012           37    37    18   0.2

     FFMC   DMC      DC   ISI   BUI      FWI Classes
122  None  None    None  None  None     None    None
123  None  None    None  None  None     None    None
168  88.9  12.9  14.6 9  12.5  10.4  fire       None
```

Podsumowanie danych ile są puste dla danego atrybutu

[ ]:
```
dane.isnull().sum()
```

[ ]:
```
day            1
month          2
year           2
Temperature    2
RH             2
Ws             2
Rain           2
FFMC           2
DMC            2
DC             2
ISI            2
BUI            2
FWI            2
Classes        3
dtype: int64
```

Usunięcie danych gdzie jest brak danych (null)

[ ]:
```
dane=dane.dropna().reset_index(drop=True)
```

Sprawdzanie danych po usunięciu

[ ]:
```
dane[dane.isnull().any(axis=1)]
```

[ ]:
```
Empty DataFrame
Columns: [day, month, year, Temperature, RH, Ws, Rain, FFMC, DMC, DC, ISI, BUI,
FWI, Classes]
Index: []
```

[ ]:
```
dane.isnull().sum()
```

[ ]:
```
day            0
month          0
year           0
Temperature    0
RH             0
Ws             0
Rain           0
FFMC           0
DMC            0
DC             0
ISI            0
BUI            0
FWI            0
Classes        0
dtype: int64
```

Wyswietlenie wszytkich danych po operacji

[ ]:
```
print(dane.to_string())
```

```
     day  month  year  Temperature   RH   Ws   Rain  FFMC  DMC    DC   ISI
BUI   FWI        Classes
0      1      6  2012           29   57   18    0.0  65.7  3.4   7.6   1.3
3.4   0.5    not fire
1      2      6  2012           29   61   13    1.3  64.4  4.1   7.6     1
3.9   0.4    not fire
2      3      6  2012           26   82   22   13.1  47.1  2.5   7.1   0.3
2.7   0.1    not fire
3      4      6  2012           25   89   13    2.5  28.6  1.3   6.9     0
1.7     0    not fire
4      5      6  2012           27   77   16    0.0  64.8    3  14.2   1.2
3.9   0.5    not fire
5      6      6  2012           31   67   14    0.0  82.6  5.8  22.2   3.1
7   2.5        fire
6      7      6  2012           33   54   13    0.0  88.2  9.9  30.5   6.4
10.9   7.2        fire
7      8      6  2012           30   73   15    0.0  86.6  12.1  38.3   5.6
13.5   7.1        fire
8      9      6  2012           25   88   13    0.2  52.9  7.9  38.8   0.4
10.5   0.3    not fire
9     10      6  2012           28   79   12    0.0  73.2  9.5  46.3   1.3
12.6   0.9    not fire
10    11      6  2012           31   65   14    0.0  84.5  12.5  54.3     4
15.8   5.6        fire
11    12      6  2012           26   81   19    0.0  84.0  13.8  61.4   4.8
17.7   7.1        fire
```

```
12    13      6  2012          27   84   21    1.2  50.0   6.7     17   0.5
6.7   0.2    not fire
13    14      6  2012          30   78   20    0.5  59.0   4.6    7.8     1
4.4   0.4    not fire
14    15      6  2012          28   80   17    3.1  49.4     3    7.4   0.4
3   0.1    not fire
15    16      6  2012          29   89   13    0.7  36.1   1.7    7.6     0
2.2     0    not fire
16    17      6  2012          30   89   16    0.6  37.3   1.1    7.8     0
1.6     0    not fire
17    18      6  2012          31   78   14    0.3  56.9   1.9      8   0.7
2.4   0.2    not fire
18    19      6  2012          31   55   16    0.1  79.9   4.5     16   2.5
5.3   1.4    not fire
19    20      6  2012          30   80   16    0.4  59.8   3.4   27.1   0.9
5.1   0.4    not fire
20    21      6  2012          30   78   14    0.0  81.0   6.3   31.6   2.6
8.4   2.2        fire
21    22      6  2012          31   67   17    0.1  79.1     7   39.5   2.4
9.7   2.3    not fire
22    23      6  2012          32   62   18    0.1  81.4   8.2   47.7   3.3
11.5   3.8        fire
23    24      6  2012          32   66   17    0.0  85.9  11.2   55.8   5.6
14.9   7.5        fire
24    25      6  2012          31   64   15    0.0  86.7  14.2   63.8   5.7
18.3   8.4        fire
25    26      6  2012          31   64   18    0.0  86.8  17.8   71.8   6.7
21.6  10.6        fire
26    27      6  2012          34   53   18    0.0  89.0  21.6   80.3   9.2
25.8    15        fire
27    28      6  2012          32   55   14    0.0  89.1  25.5   88.5   7.6
29.7  13.9        fire
28    29      6  2012          32   47   13    0.3  79.9  18.4   84.4   2.2
23.8   3.9    not fire
29    30      6  2012          33   50   14    0.0  88.7  22.9   92.8   7.2
28.3  12.9        fire
30     1      7  2012          29   68   19    1.0  59.9   2.5    8.6   1.1
2.9   0.4    not fire
31     2      7  2012          27   75   19    1.2  55.7   2.4    8.3   0.8
2.8   0.3    not fire
32     3      7  2012          32   76   20    0.7  63.1   2.6    9.2   1.3
3   0.5    not fire
33     4      7  2012          33   78   17    0.0  80.1   4.6   18.5   2.7
5.7   1.7    not fire
34     5      7  2012          33   66   14    0.0  85.9   7.6   27.9   4.8
9.1   4.9        fire
35     6      7  2012          32   63   14    0.0  87.0  10.9     37   5.6
12.5   6.8        fire
```

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36     7      7  2012          35   64   18    0.2  80.0   9.7   40.4   2.8
12.1   3.2    not fire
37     8      7  2012          33   68   19    0.0  85.6  12.5   49.8     6
15.4     8        fire
38     9      7  2012          32   68   14    1.4  66.6   7.7    9.2   1.1
7.4    0.6    not fire
39    10      7  2012          33   69   13    0.7  66.6     6    9.3   1.1
5.8    0.5    not fire
40    11      7  2012          33   76   14    0.0  81.1   8.1   18.7   2.6
8.1    2.2    not fire
41    12      7  2012          31   75   13    0.1  75.1   7.9   27.7   1.5
9.2    0.9    not fire
42    13      7  2012          34   81   15    0.0  81.8   9.7   37.2     3
11.7   3.4    not fire
43    14      7  2012          34   61   13    0.6  73.9   7.8   22.9   1.4
8.4    0.8    not fire
44    15      7  2012          30   80   19    0.4  60.7   5.2     17   1.1
5.9    0.5    not fire
45    16      7  2012          28   76   21    0.0  72.6     7   25.5   0.7
8.3    0.4    not fire
46    17      7  2012          29   70   14    0.0  82.8   9.4   34.1   3.2
11.1   3.6        fire
47    18      7  2012          31   68   14    0.0  85.4  12.1   43.1   4.6
14.2     6        fire
48    19      7  2012          35   59   17    0.0  88.1    12   52.8   7.7
18.2  10.9        fire
49    20      7  2012          33   65   15    0.1  81.4  12.3   62.1   2.8
16.5     4        fire
50    21      7  2012          33   70   17    0.0  85.4  18.5   71.5   5.2
22.4   8.8        fire
51    22      7  2012          28   79   18    0.1  73.4  16.4   79.9   1.8
21.7   2.8    not fire
52    23      7  2012          27   66   22    0.4  68.2  10.5   71.3   1.8
15.4   2.1    not fire
53    24      7  2012          28   78   16    0.1  70.0   9.6   79.7   1.4
14.7   1.3    not fire
54    25      7  2012          31   65   18    0.0  84.3  12.5   88.7   4.8
18.5   7.3        fire
55    26      7  2012          36   53   19    0.0  89.2  17.1   98.6    10
23.9  15.3        fire
56    27      7  2012          36   48   13    0.0  90.3  22.2  108.5   8.7
29.4  15.3        fire
57    28      7  2012          33   76   15    0.0  86.5  24.4  117.8   5.6
32.1  11.3        fire
58    29      7  2012          32   73   15    0.0  86.6  26.7    127   5.6
35  11.9        fire
59    30      7  2012          31   79   15    0.0  85.4  28.5    136   4.7
37.4  10.7        fire
```

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60    31      7  2012          35   64   17    0.0  87.2  31.9  145.7   6.8
41.2  15.7        fire
61     1      8  2012          36   45   14    0.0  78.8   4.8   10.2     2
4.7   0.9    not fire
62     2      8  2012          35   55   12    0.4  78.0   5.8     10   1.7
5.5   0.8    not fire
63     3      8  2012          35   63   14    0.3  76.6   5.7     10   1.7
5.5   0.8    not fire
64     4      8  2012          34   69   13    0.0  85.0   8.2   19.8     4
8.2   3.9        fire
65     5      8  2012          34   65   13    0.0  86.8  11.1   29.7   5.2
11.5  6.1        fire
66     6      8  2012          32   75   14    0.0  86.4    13   39.1   5.2
14.2  6.8        fire
67     7      8  2012          32   69   16    0.0  86.5  15.5   48.6   5.5
17.2     8        fire
68     8      8  2012          32   60   18    0.3  77.1  11.3     47   2.2
14.1  2.6    not fire
69     9      8  2012          35   59   17    0.0  87.4  14.8     57   6.9
17.9  9.9        fire
70    10      8  2012          35   55   14    0.0  88.9  18.6     67   7.4
21.9  11.6       fire
71    11      8  2012          35   63   13    0.0  88.9  21.7     77   7.1
25.5  12.1       fire
72    12      8  2012          35   51   13    0.3  81.3  15.6   75.1   2.5
20.7   4.2    not fire
73    13      8  2012          35   63   15    0.0  87.0    19   85.1   5.9
24.4  10.2       fire
74    14      8  2012          33   66   14    0.0  87.0  21.7   94.7   5.7
27.2  10.6       fire
75    15      8  2012          36   55   13    0.3  82.4  15.6   92.5   3.7
22   6.3         fire
76    16      8  2012          36   61   18    0.3  80.2  11.7   90.4   2.8
17.6   4.2       fire
77    17      8  2012          37   52   18    0.0  89.3    16  100.7   9.7
22.9  14.6       fire
78    18      8  2012          36   54   18    0.0  89.4    20  110.9   9.7
27.5  16.1       fire
79    19      8  2012          35   62   19    0.0  89.4  23.2  120.9   9.7
31.3  17.2       fire
80    20      8  2012          35   68   19    0.0  88.3  25.9  130.6   8.8
34.7  16.8       fire
81    21      8  2012          36   58   19    0.0  88.6  29.6  141.1   9.2
38.8  18.4       fire
82    22      8  2012          36   55   18    0.0  89.1  33.5  151.3   9.9
43.1  20.4       fire
83    23      8  2012          36   53   16    0.0  89.5  37.6  161.5  10.4
47.5  22.3          fire
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84    24      8  2012          34   64   14    0.0  88.9  40.5  171.3     9
50.9  20.9        fire
85    25      8  2012          35   60   15    0.0  88.9  43.9  181.3   8.2
54.7  20.3           fire
86    26      8  2012          31   78   18    0.0  85.8  45.6  190.6   4.7
57.1  13.7           fire
87    27      8  2012          33   82   21    0.0  84.9    47  200.2   4.4
59.3  13.2           fire
88    28      8  2012          34   64   16    0.0  89.4  50.2  210.4   7.3
62.9  19.9           fire
89    29      8  2012          35   48   18    0.0  90.1  54.2  220.4  12.5
67.4  30.2        fire
90    30      8  2012          35   70   17    0.8  72.7  25.2  180.4   1.7
37.4   4.2    not fire
91    31      8  2012          28   80   21   16.8  52.5   8.7    8.7   0.6
8.3   0.3      not fire
92     1      9  2012          25   76   17    7.2  46.0   1.3    7.5   0.2
1.8   0.1     not fire
93     2      9  2012          22   86   15   10.1  30.5   0.7      7     0
1.1    0      not fire
94     3      9  2012          25   78   15    3.8  42.6   1.2    7.5   0.1
1.7    0    not fire
95     4      9  2012          29   73   17    0.1  68.4   1.9   15.7   1.4
2.9   0.5    not fire
96     5      9  2012          29   75   16    0.0  80.8   3.4     24   2.8
5.1   1.7        fire
97     6      9  2012          29   74   19    0.1  75.8   3.6   32.2   2.1
5.6   0.9    not fire
98     7      9  2012          31   71   17    0.3  69.6   3.2   30.1   1.5
5.1   0.6    not fire
99     8      9  2012          30   73   17    0.9  62.0   2.6    8.4   1.1
3   0.4    not fire
100    9      9  2012          30   77   15    1.0  56.1   2.1    8.4   0.7
2.6   0.2    not fire
101   10      9  2012          33   73   12    1.8  59.9   2.2    8.9   0.7
2.7   0.3    not fire
102   11      9  2012          30   77   21    1.8  58.5   1.9    8.4   1.1
2.4   0.3    not fire
103   12      9  2012          29   88   13    0.0  71.0   2.6   16.6   1.2
3.7   0.5    not fire
104   13      9  2012          25   86   21    4.6  40.9   1.3    7.5   0.1
1.8    0    not fire
105   14      9  2012          22   76   26    8.3  47.4   1.1      7   0.4
1.6   0.1    not fire
106   15      9  2012          24   82   15    0.4  44.9   0.9    7.3   0.2
1.4    0    not fire
107   16      9  2012          30   65   14    0.0  78.1   3.2   15.7   1.9
4.2   0.8    not fire
```

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108   17      9  2012          31   52   14    0.0  87.7   6.4   24.3   6.2
7.7   5.9        fire
109   18      9  2012          32   49   11    0.0  89.4   9.8   33.1   6.8
11.3   7.7        fire
110   19      9  2012          29   57   14    0.0  89.3  12.5   41.3   7.8
14.2   9.7        fire
111   20      9  2012          28   84   18    0.0  83.8  13.5   49.3   4.5
16   6.3           fire
112   21      9  2012          31   55   11    0.0  87.8  16.5   57.9   5.4
19.2   8.3        fire
113   22      9  2012          31   50   19    0.6  77.8  10.6   41.4   2.4
12.9   2.8    not fire
114   23      9  2012          32   54   11    0.5  73.7   7.9   30.4   1.2
9.6   0.7    not fire
115   24      9  2012          29   65   19    0.6  68.3   5.5   15.2   1.5
5.8   0.7    not fire
116   25      9  2012          26   81   21    5.8  48.6     3    7.7   0.4
3   0.1    not fire
117   26      9  2012          31   54   11    0.0  82.0     6   16.3   2.5
6.2   1.7    not fire
118   27      9  2012          31   66   11    0.0  85.7   8.3   24.9     4
9   4.1        fire
119   28      9  2012          32   47   14    0.7  77.5   7.1    8.8   1.8
6.8   0.9    not fire
120   29      9  2012          26   80   16    1.8  47.4   2.9    7.7   0.3
3   0.1    not fire
121   30      9  2012          25   78   14    1.4  45.0   1.9    7.5   0.2
2.4   0.1    not fire
122  day  month  year  Temperature   RH   Ws  Rain   FFMC   DMC     DC   ISI
BUI   FWI      Classes
123    1      6  2012          32   71   12    0.7  57.1   2.5    8.2   0.6
2.8   0.2    not fire
124    2      6  2012          30   73   13    4.0  55.7   2.7    7.8   0.6
2.9   0.2    not fire
125    3      6  2012          29   80   14    2.0  48.7   2.2    7.6   0.3
2.6   0.1    not fire
126    4      6  2012          30   64   14    0.0  79.4   5.2   15.4   2.2
5.6     1    not fire
127    5      6  2012          32   60   14    0.2  77.1     6   17.6   1.8
6.5   0.9    not fire
128    6      6  2012          35   54   11    0.1  83.7   8.4   26.3   3.1
9.3   3.1        fire
129    7      6  2012          35   44   17    0.2  85.6   9.9   28.9   5.4
10.7     6        fire
130    8      6  2012          28   51   17    1.3  71.4   7.7    7.4   1.5
7.3   0.8    not fire
131    9      6  2012          27   59   18    0.1  78.1   8.5   14.7   2.4
8.3   1.9    not fire
```

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132   10      6  2012          30   41   15    0.0  89.4  13.3   22.5   8.4
13.1    10        fire
133   11      6  2012          31   42   21    0.0  90.6  18.2   30.5  13.4
18  16.7        fire
134   12      6  2012          27   58   17    0.0  88.9  21.3   37.8   8.7
21.2  12.9        fire
135   13      6  2012          30   52   15    2.0  72.3  11.4    7.8   1.4
10.9   0.9    not fire
136   14      6  2012          27   79   16    0.7  53.4   6.4    7.3   0.5
6.1   0.3    not fire
137   15      6  2012          28   90   15    0.0  66.8   7.2   14.7   1.2
7.1   0.6    not fire
138   16      6  2012          29   87   15    0.4  47.4   4.2      8   0.2
4.1   0.1    not fire
139   17      6  2012          31   69   17    4.7  62.2   3.9      8   1.1
3.8   0.4    not fire
140   18      6  2012          33   62   10    8.7  65.5   4.6    8.3   0.9
4.4   0.4    not fire
141   19      6  2012          32   67   14    4.5  64.6   4.4    8.2     1
4.2   0.4    not fire
142   20      6  2012          31   72   14    0.2  60.2   3.8      8   0.8
3.7   0.3    not fire
143   21      6  2012          32   55   14    0.0  86.2   8.3   18.4     5
8.2   4.9        fire
144   22      6  2012          33   46   14    1.1  78.3   8.1    8.3   1.9
7.7   1.2    not fire
145   23      6  2012          33   59   16    0.8  74.2     7    8.3   1.6
6.7   0.8    not fire
146   24      6  2012          35   68   16    0.0  85.3    10     17   4.9
9.9   5.3        fire
147   25      6  2012          34   70   16    0.0  86.0  12.8   25.6   5.4
12.7   6.7        fire
148   26      6  2012          36   62   16    0.0  87.8  16.5   34.5     7
16.4   9.5        fire
149   27      6  2012          36   55   15    0.0  89.1  20.9   43.3     8
20.8    12        fire
150   28      6  2012          37   37   13    0.0  92.5  27.2   52.4  11.7
27.1  18.4        fire
151   29      6  2012          37   36   13    0.6  86.2  17.9   36.7   4.8
17.8   7.2        fire
152   30      6  2012          34   42   15    1.7  79.7    12    8.5   2.2
11.5   2.2  not fire
153    1      7  2012          28   58   18    2.2  63.7   3.2    8.5   1.2
3.3   0.5    not fire
154    2      7  2012          33   48   16    0.0  87.6   7.9   17.8   6.8
7.8   6.4        fire
155    3      7  2012          34   56   17    0.1  84.7   9.7   27.3   4.7
10.3   5.2        fire
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156    4      7  2012          34   58   18    0.0  88.0  13.6   36.8     8
14.1   9.9        fire
157    5      7  2012          34   45   18    0.0  90.5  18.7   46.4  11.3
18.7    15        fire
158    6      7  2012          35   42   15    0.3  84.7  15.5   45.1   4.3
16.7   6.3        fire
159    7      7  2012          38   43   13    0.5  85.0    13   35.4   4.1
13.7   5.2        fire
160    8      7  2012          35   47   18    6.0  80.8   9.8    9.7   3.1
9.4     3         fire
161    9      7  2012          36   43   15    1.9  82.3   9.4    9.9   3.2
9   3.1         fire
162   10      7  2012          34   51   16    3.8  77.5     8    9.5     2
7.7   1.3    not fire
163   11      7  2012          34   56   15    2.9  74.8   7.1    9.5   1.6
6.8   0.8    not fire
164   12      7  2012          36   44   13    0.0  90.1  12.6   19.4   8.3
12.5   9.6        fire
165   13      7  2012          39   45   13    0.6  85.2  11.3   10.4   4.2
10.9   4.7        fire
166   15      7  2012          34   45   17    0.0  90.5    18   24.1  10.9
17.7  14.1        fire
167   16      7  2012          31   83   17    0.0  84.5  19.4   33.1   4.7
19.2   7.3        fire
168   17      7  2012          32   81   17    0.0  84.6  21.1   42.3   4.7
20.9   7.7        fire
169   18      7  2012          33   68   15    0.0  86.1  23.9   51.6   5.2
23.9   9.1        fire
170   19      7  2012          34   58   16    0.0  88.1  27.8   61.1   7.3
27.7    13        fire
171   20      7  2012          36   50   16    0.0  89.9  32.7     71   9.5
32.6  17.3        fire
172   21      7  2012          36   29   18    0.0  93.9  39.6   80.6  18.5
39.5    30        fire
173   22      7  2012          32   48   18    0.0  91.5  44.2   90.1  13.2
44  25.4          fire
174   23      7  2012          31   71   17    0.0  87.3  46.6     99   6.9
46.5  16.3        fire
175   24      7  2012          33   63   17    1.1  72.8  20.9   56.6   1.6
21.7   2.5    not fire
176   25      7  2012          39   64    9    1.2  73.8  11.7   15.9   1.1
11.4   0.7    not fire
177   26      7  2012          35   58   10    0.2  78.3  10.8   19.7   1.6
10.7     1    not fire
178   27      7  2012          29   87   18    0.0  80.0  11.8   28.3   2.8
11.8   3.2    not fire
179   28      7  2012          33   57   16    0.0  87.5  15.7   37.6   6.7
15.7     9        fire
```

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180   29      7  2012          34   59   16    0.0  88.1  19.5   47.2   7.4
19.5  10.9        fire
181   30      7  2012          36   56   16    0.0  88.9  23.8   57.1   8.2
23.8  13.2        fire
182   31      7  2012          37   55   15    0.0  89.3  28.3   67.2   8.3
28.3  14.5        fire
183    1      8  2012          38   52   14    0.0  78.3   4.4   10.5     2
4.4   0.8    not fire
184    2      8  2012          40   34   14    0.0  93.3  10.8   21.4  13.8
10.6  13.5        fire
185    3      8  2012          39   33   17    0.0  93.7  17.1   32.1  17.2
16.9  19.5        fire
186    4      8  2012          38   35   15    0.0  93.8    23   42.7  15.7
22.9  20.9        fire
187    5      8  2012          34   42   17    0.1  88.3  23.6   52.5    19
23.5  12.6        fire
188    6      8  2012          30   54   14    3.1  70.5    11    9.1   1.3
10.5   0.8    not fire
189    7      8  2012          34   63   13    2.9  69.7   7.2    9.8   1.2
6.9   0.6    not fire
190    8      8  2012          37   56   11    0.0  87.4  11.2   20.2   5.2
11   5.9        fire
191    9      8  2012          39   43   12    0.0  91.7  16.5   30.9   9.6
16.4  12.7        fire
192   10      8  2012          39   39   15    0.2  89.3  15.8   35.4   8.2
15.8  10.7        fire
193   11      8  2012          40   31   15    0.0  94.2  22.5   46.3  16.6
22.4  21.6        fire
194   12      8  2012          39   21   17    0.4  93.0  18.4   41.5  15.5
18.4  18.8        fire
195   13      8  2012          35   34   16    0.2  88.3  16.9   45.1   7.5
17.5  10.5        fire
196   14      8  2012          37   40   13    0.0  91.9  22.3   55.5  10.8
22.3  15.7        fire
197   15      8  2012          35   46   13    0.3  83.9  16.9   54.2   3.5
19   5.5        fire
198   16      8  2012          40   41   10    0.1  92.0  22.6   65.1   9.5
24.2  14.8        fire
199   17      8  2012          42   24    9    0.0  96.0  30.3   76.4  15.7
30.4    24        fire
200   18      8  2012          37   37   14    0.0  94.3  35.9   86.8    16
35.9  26.3        fire
201   19      8  2012          35   66   15    0.1  82.7  32.7   96.8   3.3
35.5   7.7        fire
202   20      8  2012          36   81   15    0.0  83.7  34.4    107   3.8
38.1     9        fire
203   21      8  2012          36   71   15    0.0  86.0  36.9  117.1   5.1
41.3  12.2        fire
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204   22      8  2012          37   53   14    0.0  89.5  41.1  127.5     8
45.5  18.1        fire
205   23      8  2012          36   43   16    0.0  91.2  46.1  137.7  11.5
50.2  24.5        fire
206   24      8  2012          35   38   15    0.0  92.1  51.3  147.7  12.2
54.9  26.9        fire
207   25      8  2012          34   40   18    0.0  92.1  56.3  157.5  14.3
59.5  31.1        fire
208   26      8  2012          33   37   16    0.0  92.2  61.3  167.2  13.1
64  30.3        fire
209   27      8  2012          36   54   14    0.0  91.0  65.9  177.3    10
68  26.1        fire
210   28      8  2012          35   56   14    0.4  79.2    37    166   2.1
30.6   6.1    not fire
211   29      8  2012          35   53   17    0.5  80.2  20.7  149.2   2.7
30.6   5.9        fire
212   30      8  2012          34   49   15    0.0  89.2  24.8  159.1   8.1
35.7    16        fire
213   31      8  2012          30   59   19    0.0  89.1  27.8  168.2   9.8
39.3  19.4        fire
214    1      9  2012          29   86   16    0.0  37.9   0.9    8.2   0.1
1.4     0    not fire
215    2      9  2012          28   67   19    0.0  75.4   2.9   16.3     2
4   0.8    not fire
216    3      9  2012          28   75   16    0.0  82.2   4.4   24.3   3.3
6   2.5         fire
217    4      9  2012          30   66   15    0.2  73.5   4.1   26.6   1.5
6   0.7    not fire
218    5      9  2012          30   58   12    4.1  66.1     4    8.4     1
3.9   0.4    not fire
219    6      9  2012          34   71   14    6.5  64.5   3.3    9.1     1
3.5   0.4    not fire
220    7      9  2012          31   62   15    0.0  83.3   5.8   17.7   3.8
6.4   3.2        fire
221    8      9  2012          30   88   14    0.0  82.5   6.6   26.1     3
8.1   2.7        fire
222    9      9  2012          30   80   15    0.0  83.1   7.9   34.5   3.5
10   3.7        fire
223   10      9  2012          29   74   15    1.1  59.5   4.7    8.2   0.8
4.6   0.3    not fire
224   11      9  2012          30   73   14    0.0  79.2   6.5   16.6   2.1
6.6   1.2    not fire
225   12      9  2012          31   72   14    0.0  84.2   8.3   25.2   3.8
9.1   3.9        fire
226   13      9  2012          29   49   19    0.0  88.6  11.5   33.4   9.1
12.4  10.3        fire
227   14      9  2012          28   81   15    0.0  84.6  12.6   41.5   4.3
14.3   5.7        fire
```

```
228   15      9  2012          32   51   13    0.0  88.7    16   50.2   6.9
17.8   9.8        fire
229   16      9  2012          33   26   13    0.0  93.9  21.2   59.2  14.2
22.4  19.3        fire
230   17      9  2012          34   44   12    0.0  92.5  25.2   63.3  11.2
26.2  17.5        fire
231   18      9  2012          36   33   13    0.1  90.6  25.8   77.8     9
28.2  15.4        fire
232   19      9  2012          29   41    8    0.1  83.9  24.9     86   2.7
28.9   5.6        fire
233   20      9  2012          34   58   13    0.2  79.5  18.7     88   2.1
24.4   3.8    not fire
234   21      9  2012          35   34   17    0.0  92.2  23.6   97.3  13.8
29.4  21.6        fire
235   22      9  2012          33   64   13    0.0  88.9  26.1  106.3   7.1
32.4  13.7        fire
236   23      9  2012          35   56   14    0.0  89.0  29.4  115.6   7.5
36  15.2        fire
237   24      9  2012          26   49    6    2.0  61.3  11.9   28.1   0.6
11.9   0.4    not fire
238   25      9  2012          28   70   15    0.0  79.9  13.8   36.1   2.4
14.1     3    not fire
239   26      9  2012          30   65   14    0.0  85.4    16   44.5   4.5
16.9   6.5        fire
240   27      9  2012          28   87   15    4.4  41.1   6.5      8   0.1
6.2     0    not fire
241   28      9  2012          27   87   29    0.5  45.9   3.5    7.9   0.4
3.4   0.2    not fire
242   29      9  2012          24   54   18    0.1  79.7   4.3   15.2   1.7
5.1   0.7    not fire
243   30      9  2012          24   64   15    0.2  67.3   3.8   16.5   1.2
4.8   0.5   not fire
```

Podział danych ze względu na region 1 - Bejaia Region 2 - Sidi-Bel Abbes

[ ]:
```
dane.loc[:122, 'Region'] = 1
dane.loc[122:, 'Region'] = 2
dane[['Region']] = dane[['Region']].astype('int64')
```

Wyświetlenie pierwszych 5 dancyh wirszy dla Regionu Bejaia

[ ]:
```
dane.head()
```

[ ]:
```
   day month  year Temperature  RH  Ws  Rain  FFMC  DMC    DC  ISI  BUI  FWI  \
0    1     6  2012          29  57  18   0.0  65.7  3.4   7.6  1.3  3.4  0.5
1    2     6  2012          29  61  13   1.3  64.4  4.1   7.6    1  3.9  0.4
2    3     6  2012          26  82  22  13.1  47.1  2.5   7.1  0.3  2.7  0.1
3    4     6  2012          25  89  13   2.5  28.6  1.3   6.9    0  1.7    0
```

```
4   5     6  2012          27  77  16   0.0  64.8    3  14.2  1.2  3.9  0.5

       Classes  Region
0  not fire          1
1  not fire          1
2  not fire          1
3  not fire          1
4  not fire          1
```

Wyświetlenie pierwszych 5 dancyh wirszy dla Regionu Sidi-Bel Abbes

[ ]:
```
dane.tail()
```

[ ]:
```
     day month  year Temperature  RH  Ws Rain  FFMC  DMC    DC  ISI   BUI  FWI  \
239  26     9  2012          30  65  14  0.0  85.4   16  44.5  4.5  16.9  6.5
240  27     9  2012          28  87  15  4.4  41.1  6.5     8  0.1   6.2    0
241  28     9  2012          27  87  29  0.5  45.9  3.5   7.9  0.4   3.4  0.2
242  29     9  2012          24  54  18  0.1  79.7  4.3  15.2  1.7   5.1  0.7
243  30     9  2012          24  64  15  0.2  67.3  3.8  16.5  1.2   4.8  0.5

           Classes  Region
239        fire          2
240    not fire          2
241    not fire          2
242    not fire          2
243  not fire            2
```

[ ]:
```
print(dane.to_string())
```

```
     day  month  year  Temperature   RH   Ws   Rain  FFMC   DMC     DC   ISI
BUI   FWI        Classes  Region
0      1      6  2012           29   57   18    0.0  65.7   3.4    7.6   1.3
3.4   0.5    not fire          1
1      2      6  2012           29   61   13    1.3  64.4   4.1    7.6     1
3.9   0.4    not fire          1
2      3      6  2012           26   82   22   13.1  47.1   2.5    7.1   0.3
2.7   0.1    not fire          1
3      4      6  2012           25   89   13    2.5  28.6   1.3    6.9     0
1.7     0    not fire          1
4      5      6  2012           27   77   16    0.0  64.8     3   14.2   1.2
3.9   0.5    not fire          1
5      6      6  2012           31   67   14    0.0  82.6   5.8   22.2   3.1
7   2.5        fire          1
6      7      6  2012           33   54   13    0.0  88.2   9.9   30.5   6.4
10.9   7.2        fire          1
7      8      6  2012           30   73   15    0.0  86.6  12.1   38.3   5.6
13.5   7.1        fire          1
8      9      6  2012           25   88   13    0.2  52.9   7.9   38.8   0.4
```

```
10.5   0.3    not fire          1
9     10      6  2012           28   79   12    0.0  73.2   9.5   46.3   1.3
12.6   0.9    not fire          1
10    11      6  2012           31   65   14    0.0  84.5  12.5   54.3     4
15.8   5.6        fire          1
11    12      6  2012           26   81   19    0.0  84.0  13.8   61.4   4.8
17.7   7.1        fire          1
12    13      6  2012           27   84   21    1.2  50.0   6.7     17   0.5
6.7   0.2    not fire          1
13    14      6  2012           30   78   20    0.5  59.0   4.6    7.8     1
4.4   0.4    not fire          1
14    15      6  2012           28   80   17    3.1  49.4     3    7.4   0.4
3   0.1    not fire          1
15    16      6  2012           29   89   13    0.7  36.1   1.7    7.6     0
2.2     0    not fire          1
16    17      6  2012           30   89   16    0.6  37.3   1.1    7.8     0
1.6     0    not fire          1
17    18      6  2012           31   78   14    0.3  56.9   1.9      8   0.7
2.4   0.2    not fire          1
18    19      6  2012           31   55   16    0.1  79.9   4.5     16   2.5
5.3   1.4    not fire          1
19    20      6  2012           30   80   16    0.4  59.8   3.4   27.1   0.9
5.1   0.4    not fire          1
20    21      6  2012           30   78   14    0.0  81.0   6.3   31.6   2.6
8.4   2.2        fire          1
21    22      6  2012           31   67   17    0.1  79.1     7   39.5   2.4
9.7   2.3    not fire          1
22    23      6  2012           32   62   18    0.1  81.4   8.2   47.7   3.3
11.5   3.8        fire          1
23    24      6  2012           32   66   17    0.0  85.9  11.2   55.8   5.6
14.9   7.5        fire          1
24    25      6  2012           31   64   15    0.0  86.7  14.2   63.8   5.7
18.3   8.4        fire          1
25    26      6  2012           31   64   18    0.0  86.8  17.8   71.8   6.7
21.6  10.6        fire          1
26    27      6  2012           34   53   18    0.0  89.0  21.6   80.3   9.2
25.8    15        fire          1
27    28      6  2012           32   55   14    0.0  89.1  25.5   88.5   7.6
29.7  13.9        fire          1
28    29      6  2012           32   47   13    0.3  79.9  18.4   84.4   2.2
23.8   3.9    not fire          1
29    30      6  2012           33   50   14    0.0  88.7  22.9   92.8   7.2
28.3  12.9        fire          1
30     1      7  2012           29   68   19    1.0  59.9   2.5    8.6   1.1
2.9   0.4    not fire          1
31     2      7  2012           27   75   19    1.2  55.7   2.4    8.3   0.8
2.8   0.3    not fire          1
32     3      7  2012           32   76   20    0.7  63.1   2.6    9.2   1.3
```

```
3   0.5    not fire          1
33     4      7  2012          33   78   17    0.0  80.1   4.6   18.5   2.7
5.7   1.7    not fire          1
34     5      7  2012          33   66   14    0.0  85.9   7.6   27.9   4.8
9.1   4.9        fire          1
35     6      7  2012          32   63   14    0.0  87.0  10.9     37   5.6
12.5   6.8        fire          1
36     7      7  2012          35   64   18    0.2  80.0   9.7   40.4   2.8
12.1   3.2    not fire          1
37     8      7  2012          33   68   19    0.0  85.6  12.5   49.8     6
15.4     8        fire          1
38     9      7  2012          32   68   14    1.4  66.6   7.7    9.2   1.1
7.4   0.6    not fire          1
39    10      7  2012          33   69   13    0.7  66.6     6    9.3   1.1
5.8   0.5    not fire          1
40    11      7  2012          33   76   14    0.0  81.1   8.1   18.7   2.6
8.1   2.2    not fire          1
41    12      7  2012          31   75   13    0.1  75.1   7.9   27.7   1.5
9.2   0.9    not fire          1
42    13      7  2012          34   81   15    0.0  81.8   9.7   37.2     3
11.7   3.4    not fire          1
43    14      7  2012          34   61   13    0.6  73.9   7.8   22.9   1.4
8.4   0.8    not fire          1
44    15      7  2012          30   80   19    0.4  60.7   5.2     17   1.1
5.9   0.5    not fire          1
45    16      7  2012          28   76   21    0.0  72.6     7   25.5   0.7
8.3   0.4    not fire          1
46    17      7  2012          29   70   14    0.0  82.8   9.4   34.1   3.2
11.1   3.6        fire          1
47    18      7  2012          31   68   14    0.0  85.4  12.1   43.1   4.6
14.2     6        fire          1
48    19      7  2012          35   59   17    0.0  88.1    12   52.8   7.7
18.2  10.9        fire          1
49    20      7  2012          33   65   15    0.1  81.4  12.3   62.1   2.8
16.5     4        fire          1
50    21      7  2012          33   70   17    0.0  85.4  18.5   71.5   5.2
22.4   8.8        fire          1
51    22      7  2012          28   79   18    0.1  73.4  16.4   79.9   1.8
21.7   2.8    not fire          1
52    23      7  2012          27   66   22    0.4  68.2  10.5   71.3   1.8
15.4   2.1    not fire          1
53    24      7  2012          28   78   16    0.1  70.0   9.6   79.7   1.4
14.7   1.3    not fire          1
54    25      7  2012          31   65   18    0.0  84.3  12.5   88.7   4.8
18.5   7.3        fire          1
55    26      7  2012          36   53   19    0.0  89.2  17.1   98.6    10
23.9  15.3        fire          1
56    27      7  2012          36   48   13    0.0  90.3  22.2  108.5   8.7
```

```
29.4  15.3       fire          1
57    28      7  2012          33   76   15    0.0  86.5  24.4  117.8   5.6
32.1  11.3       fire          1
58    29      7  2012          32   73   15    0.0  86.6  26.7    127   5.6
35  11.9        fire          1
59    30      7  2012          31   79   15    0.0  85.4  28.5    136   4.7
37.4  10.7       fire          1
60    31      7  2012          35   64   17    0.0  87.2  31.9  145.7   6.8
41.2  15.7       fire          1
61     1      8  2012          36   45   14    0.0  78.8   4.8   10.2     2
4.7   0.9    not fire          1
62     2      8  2012          35   55   12    0.4  78.0   5.8     10   1.7
5.5   0.8    not fire          1
63     3      8  2012          35   63   14    0.3  76.6   5.7     10   1.7
5.5   0.8    not fire          1
64     4      8  2012          34   69   13    0.0  85.0   8.2   19.8     4
8.2   3.9        fire          1
65     5      8  2012          34   65   13    0.0  86.8  11.1   29.7   5.2
11.5   6.1       fire          1
66     6      8  2012          32   75   14    0.0  86.4    13   39.1   5.2
14.2   6.8       fire          1
67     7      8  2012          32   69   16    0.0  86.5  15.5   48.6   5.5
17.2     8       fire          1
68     8      8  2012          32   60   18    0.3  77.1  11.3     47   2.2
14.1   2.6    not fire          1
69     9      8  2012          35   59   17    0.0  87.4  14.8     57   6.9
17.9   9.9       fire          1
70    10      8  2012          35   55   14    0.0  88.9  18.6     67   7.4
21.9  11.6       fire          1
71    11      8  2012          35   63   13    0.0  88.9  21.7     77   7.1
25.5  12.1       fire          1
72    12      8  2012          35   51   13    0.3  81.3  15.6   75.1   2.5
20.7   4.2    not fire          1
73    13      8  2012          35   63   15    0.0  87.0    19   85.1   5.9
24.4  10.2       fire          1
74    14      8  2012          33   66   14    0.0  87.0  21.7   94.7   5.7
27.2  10.6       fire          1
75    15      8  2012          36   55   13    0.3  82.4  15.6   92.5   3.7
22   6.3        fire          1
76    16      8  2012          36   61   18    0.3  80.2  11.7   90.4   2.8
17.6   4.2       fire          1
77    17      8  2012          37   52   18    0.0  89.3    16  100.7   9.7
22.9  14.6       fire          1
78    18      8  2012          36   54   18    0.0  89.4    20  110.9   9.7
27.5  16.1       fire          1
79    19      8  2012          35   62   19    0.0  89.4  23.2  120.9   9.7
31.3  17.2       fire          1
80    20      8  2012          35   68   19    0.0  88.3  25.9  130.6   8.8
```

```
34.7  16.8        fire          1
81    21      8  2012          36   58   19    0.0  88.6  29.6  141.1   9.2
38.8  18.4        fire          1
82    22      8  2012          36   55   18    0.0  89.1  33.5  151.3   9.9
43.1  20.4        fire          1
83    23      8  2012          36   53   16    0.0  89.5  37.6  161.5  10.4
47.5  22.3           fire       1
84    24      8  2012          34   64   14    0.0  88.9  40.5  171.3     9
50.9  20.9        fire          1
85    25      8  2012          35   60   15    0.0  88.9  43.9  181.3   8.2
54.7  20.3           fire       1
86    26      8  2012          31   78   18    0.0  85.8  45.6  190.6   4.7
57.1  13.7          fire        1
87    27      8  2012          33   82   21    0.0  84.9    47  200.2   4.4
59.3  13.2           fire       1
88    28      8  2012          34   64   16    0.0  89.4  50.2  210.4   7.3
62.9  19.9          fire        1
89    29      8  2012          35   48   18    0.0  90.1  54.2  220.4  12.5
67.4  30.2        fire          1
90    30      8  2012          35   70   17    0.8  72.7  25.2  180.4   1.7
37.4   4.2    not fire          1
91    31      8  2012          28   80   21   16.8  52.5   8.7    8.7   0.6
8.3   0.3       not fire        1
92     1      9  2012           25   76   17    7.2  46.0   1.3    7.5   0.2
1.8   0.1      not fire         1
93     2      9  2012           22   86   15   10.1  30.5   0.7      7     0
1.1     0       not fire        1
94     3      9  2012           25   78   15    3.8  42.6   1.2    7.5   0.1
1.7     0    not fire           1
95     4      9  2012           29   73   17    0.1  68.4   1.9   15.7   1.4
2.9   0.5    not fire           1
96     5      9  2012           29   75   16    0.0  80.8   3.4     24   2.8
5.1   1.7        fire           1
97     6      9  2012           29   74   19    0.1  75.8   3.6   32.2   2.1
5.6   0.9    not fire           1
98     7      9  2012           31   71   17    0.3  69.6   3.2   30.1   1.5
5.1   0.6    not fire           1
99     8      9  2012           30   73   17    0.9  62.0   2.6    8.4   1.1
3   0.4    not fire          1
100    9      9  2012           30   77   15    1.0  56.1   2.1    8.4   0.7
2.6   0.2    not fire           1
101   10      9  2012           33   73   12    1.8  59.9   2.2    8.9   0.7
2.7   0.3    not fire           1
102   11      9  2012           30   77   21    1.8  58.5   1.9    8.4   1.1
2.4   0.3    not fire           1
103   12      9  2012           29   88   13    0.0  71.0   2.6   16.6   1.2
3.7   0.5    not fire           1
104   13      9  2012           25   86   21    4.6  40.9   1.3    7.5   0.1
```

```
1.8     0    not fire          1
105   14      9  2012          22   76   26    8.3  47.4   1.1      7   0.4
1.6   0.1    not fire          1
106   15      9  2012          24   82   15    0.4  44.9   0.9    7.3   0.2
1.4     0    not fire          1
107   16      9  2012          30   65   14    0.0  78.1   3.2   15.7   1.9
4.2   0.8    not fire          1
108   17      9  2012          31   52   14    0.0  87.7   6.4   24.3   6.2
7.7   5.9        fire          1
109   18      9  2012          32   49   11    0.0  89.4   9.8   33.1   6.8
11.3   7.7        fire          1
110   19      9  2012          29   57   14    0.0  89.3  12.5   41.3   7.8
14.2   9.7        fire          1
111   20      9  2012          28   84   18    0.0  83.8  13.5   49.3   4.5
16   6.3           fire       1
112   21      9  2012          31   55   11    0.0  87.8  16.5   57.9   5.4
19.2   8.3        fire          1
113   22      9  2012          31   50   19    0.6  77.8  10.6   41.4   2.4
12.9   2.8    not fire          1
114   23      9  2012          32   54   11    0.5  73.7   7.9   30.4   1.2
9.6   0.7    not fire          1
115   24      9  2012          29   65   19    0.6  68.3   5.5   15.2   1.5
5.8   0.7    not fire          1
116   25      9  2012          26   81   21    5.8  48.6     3    7.7   0.4
3   0.1    not fire          1
117   26      9  2012          31   54   11    0.0  82.0     6   16.3   2.5
6.2   1.7    not fire          1
118   27      9  2012          31   66   11    0.0  85.7   8.3   24.9     4
9   4.1        fire          1
119   28      9  2012          32   47   14    0.7  77.5   7.1    8.8   1.8
6.8   0.9    not fire          1
120   29      9  2012          26   80   16    1.8  47.4   2.9    7.7   0.3
3   0.1    not fire          1
121   30      9  2012          25   78   14    1.4  45.0   1.9    7.5   0.2
2.4   0.1    not fire          1
122  day  month  year  Temperature   RH   Ws  Rain   FFMC   DMC     DC   ISI
BUI   FWI      Classes          2
123    1      6  2012          32   71   12    0.7  57.1   2.5    8.2   0.6
2.8   0.2    not fire          2
124    2      6  2012          30   73   13    4.0  55.7   2.7    7.8   0.6
2.9   0.2    not fire          2
125    3      6  2012          29   80   14    2.0  48.7   2.2    7.6   0.3
2.6   0.1    not fire          2
126    4      6  2012          30   64   14    0.0  79.4   5.2   15.4   2.2
5.6     1    not fire          2
127    5      6  2012          32   60   14    0.2  77.1     6   17.6   1.8
6.5   0.9    not fire          2
128    6      6  2012          35   54   11    0.1  83.7   8.4   26.3   3.1
```

```
9.3   3.1        fire          2
129    7      6  2012          35   44   17    0.2  85.6   9.9   28.9   5.4
10.7     6        fire          2
130    8      6  2012          28   51   17    1.3  71.4   7.7    7.4   1.5
7.3   0.8    not fire          2
131    9      6  2012          27   59   18    0.1  78.1   8.5   14.7   2.4
8.3   1.9    not fire          2
132   10      6  2012          30   41   15    0.0  89.4  13.3   22.5   8.4
13.1    10        fire          2
133   11      6  2012          31   42   21    0.0  90.6  18.2   30.5  13.4
18  16.7          fire          2
134   12      6  2012          27   58   17    0.0  88.9  21.3   37.8   8.7
21.2  12.9        fire          2
135   13      6  2012          30   52   15    2.0  72.3  11.4    7.8   1.4
10.9   0.9    not fire          2
136   14      6  2012          27   79   16    0.7  53.4   6.4    7.3   0.5
6.1   0.3    not fire          2
137   15      6  2012          28   90   15    0.0  66.8   7.2   14.7   1.2
7.1   0.6    not fire          2
138   16      6  2012          29   87   15    0.4  47.4   4.2      8   0.2
4.1   0.1    not fire          2
139   17      6  2012          31   69   17    4.7  62.2   3.9      8   1.1
3.8   0.4    not fire          2
140   18      6  2012          33   62   10    8.7  65.5   4.6    8.3   0.9
4.4   0.4    not fire          2
141   19      6  2012          32   67   14    4.5  64.6   4.4    8.2     1
4.2   0.4    not fire          2
142   20      6  2012          31   72   14    0.2  60.2   3.8      8   0.8
3.7   0.3    not fire          2
143   21      6  2012          32   55   14    0.0  86.2   8.3   18.4     5
8.2   4.9        fire          2
144   22      6  2012          33   46   14    1.1  78.3   8.1    8.3   1.9
7.7   1.2    not fire          2
145   23      6  2012          33   59   16    0.8  74.2     7    8.3   1.6
6.7   0.8    not fire          2
146   24      6  2012          35   68   16    0.0  85.3    10     17   4.9
9.9   5.3        fire          2
147   25      6  2012          34   70   16    0.0  86.0  12.8   25.6   5.4
12.7   6.7        fire          2
148   26      6  2012          36   62   16    0.0  87.8  16.5   34.5     7
16.4   9.5        fire          2
149   27      6  2012          36   55   15    0.0  89.1  20.9   43.3     8
20.8    12        fire          2
150   28      6  2012          37   37   13    0.0  92.5  27.2   52.4  11.7
27.1  18.4        fire          2
151   29      6  2012          37   36   13    0.6  86.2  17.9   36.7   4.8
17.8   7.2        fire          2
152   30      6  2012          34   42   15    1.7  79.7    12    8.5   2.2
```

```
11.5   2.2  not fire           2
153    1      7  2012          28   58   18    2.2  63.7   3.2    8.5   1.2
3.3   0.5    not fire          2
154    2      7  2012          33   48   16    0.0  87.6   7.9   17.8   6.8
7.8   6.4        fire          2
155    3      7  2012          34   56   17    0.1  84.7   9.7   27.3   4.7
10.3   5.2        fire          2
156    4      7  2012          34   58   18    0.0  88.0  13.6   36.8     8
14.1   9.9        fire          2
157    5      7  2012          34   45   18    0.0  90.5  18.7   46.4  11.3
18.7    15        fire          2
158    6      7  2012          35   42   15    0.3  84.7  15.5   45.1   4.3
16.7   6.3        fire          2
159    7      7  2012          38   43   13    0.5  85.0    13   35.4   4.1
13.7   5.2        fire          2
160    8      7  2012          35   47   18    6.0  80.8   9.8    9.7   3.1
9.4     3        fire          2
161    9      7  2012          36   43   15    1.9  82.3   9.4    9.9   3.2
9   3.1         fire          2
162   10      7  2012          34   51   16    3.8  77.5     8    9.5     2
7.7   1.3    not fire          2
163   11      7  2012          34   56   15    2.9  74.8   7.1    9.5   1.6
6.8   0.8    not fire          2
164   12      7  2012          36   44   13    0.0  90.1  12.6   19.4   8.3
12.5   9.6        fire          2
165   13      7  2012          39   45   13    0.6  85.2  11.3   10.4   4.2
10.9   4.7        fire          2
166   15      7  2012          34   45   17    0.0  90.5    18   24.1  10.9
17.7  14.1        fire          2
167   16      7  2012          31   83   17    0.0  84.5  19.4   33.1   4.7
19.2   7.3        fire          2
168   17      7  2012          32   81   17    0.0  84.6  21.1   42.3   4.7
20.9   7.7        fire          2
169   18      7  2012          33   68   15    0.0  86.1  23.9   51.6   5.2
23.9   9.1        fire          2
170   19      7  2012          34   58   16    0.0  88.1  27.8   61.1   7.3
27.7    13        fire          2
171   20      7  2012          36   50   16    0.0  89.9  32.7     71   9.5
32.6  17.3        fire          2
172   21      7  2012          36   29   18    0.0  93.9  39.6   80.6  18.5
39.5    30        fire          2
173   22      7  2012          32   48   18    0.0  91.5  44.2   90.1  13.2
44  25.4          fire          2
174   23      7  2012          31   71   17    0.0  87.3  46.6     99   6.9
46.5  16.3        fire          2
175   24      7  2012          33   63   17    1.1  72.8  20.9   56.6   1.6
21.7   2.5    not fire          2
176   25      7  2012          39   64    9    1.2  73.8  11.7   15.9   1.1
```

```
11.4   0.7    not fire          2
177   26       7  2012          35   58   10    0.2  78.3  10.8   19.7   1.6
10.7     1    not fire          2
178   27       7  2012          29   87   18    0.0  80.0  11.8   28.3   2.8
11.8   3.2    not fire          2
179   28       7  2012          33   57   16    0.0  87.5  15.7   37.6   6.7
15.7     9        fire          2
180   29       7  2012          34   59   16    0.0  88.1  19.5   47.2   7.4
19.5  10.9        fire          2
181   30       7  2012          36   56   16    0.0  88.9  23.8   57.1   8.2
23.8  13.2        fire          2
182   31       7  2012          37   55   15    0.0  89.3  28.3   67.2   8.3
28.3  14.5        fire          2
183    1       8  2012          38   52   14    0.0  78.3   4.4   10.5     2
4.4   0.8    not fire          2
184    2       8  2012          40   34   14    0.0  93.3  10.8   21.4  13.8
10.6  13.5        fire          2
185    3       8  2012          39   33   17    0.0  93.7  17.1   32.1  17.2
16.9  19.5        fire          2
186    4       8  2012          38   35   15    0.0  93.8    23   42.7  15.7
22.9  20.9        fire          2
187    5       8  2012          34   42   17    0.1  88.3  23.6   52.5    19
23.5  12.6        fire          2
188    6       8  2012          30   54   14    3.1  70.5    11    9.1   1.3
10.5   0.8    not fire          2
189    7       8  2012          34   63   13    2.9  69.7   7.2    9.8   1.2
6.9   0.6    not fire          2
190    8       8  2012          37   56   11    0.0  87.4  11.2   20.2   5.2
11   5.9         fire          2
191    9       8  2012          39   43   12    0.0  91.7  16.5   30.9   9.6
16.4  12.7        fire          2
192   10       8  2012          39   39   15    0.2  89.3  15.8   35.4   8.2
15.8  10.7        fire          2
193   11       8  2012          40   31   15    0.0  94.2  22.5   46.3  16.6
22.4  21.6        fire          2
194   12       8  2012          39   21   17    0.4  93.0  18.4   41.5  15.5
18.4  18.8        fire          2
195   13       8  2012          35   34   16    0.2  88.3  16.9   45.1   7.5
17.5  10.5        fire          2
196   14       8  2012          37   40   13    0.0  91.9  22.3   55.5  10.8
22.3  15.7        fire          2
197   15       8  2012          35   46   13    0.3  83.9  16.9   54.2   3.5
19   5.5         fire          2
198   16       8  2012          40   41   10    0.1  92.0  22.6   65.1   9.5
24.2  14.8        fire          2
199   17       8  2012          42   24    9    0.0  96.0  30.3   76.4  15.7
30.4    24        fire          2
200   18       8  2012          37   37   14    0.0  94.3  35.9   86.8    16
```

```
35.9  26.3        fire          2
201   19      8  2012          35   66   15    0.1  82.7  32.7   96.8   3.3
35.5   7.7        fire          2
202   20      8  2012          36   81   15    0.0  83.7  34.4    107   3.8
38.1     9        fire          2
203   21      8  2012          36   71   15    0.0  86.0  36.9  117.1   5.1
41.3  12.2        fire          2
204   22      8  2012          37   53   14    0.0  89.5  41.1  127.5     8
45.5  18.1        fire          2
205   23      8  2012          36   43   16    0.0  91.2  46.1  137.7  11.5
50.2  24.5        fire          2
206   24      8  2012          35   38   15    0.0  92.1  51.3  147.7  12.2
54.9  26.9        fire          2
207   25      8  2012          34   40   18    0.0  92.1  56.3  157.5  14.3
59.5  31.1        fire          2
208   26      8  2012          33   37   16    0.0  92.2  61.3  167.2  13.1
64  30.3        fire          2
209   27      8  2012          36   54   14    0.0  91.0  65.9  177.3    10
68  26.1        fire          2
210   28      8  2012          35   56   14    0.4  79.2    37    166   2.1
30.6   6.1    not fire          2
211   29      8  2012          35   53   17    0.5  80.2  20.7  149.2   2.7
30.6   5.9        fire          2
212   30      8  2012          34   49   15    0.0  89.2  24.8  159.1   8.1
35.7    16        fire          2
213   31      8  2012          30   59   19    0.0  89.1  27.8  168.2   9.8
39.3  19.4        fire          2
214    1      9  2012          29   86   16    0.0  37.9   0.9    8.2   0.1
1.4     0    not fire          2
215    2      9  2012          28   67   19    0.0  75.4   2.9   16.3     2
4   0.8    not fire          2
216    3      9  2012          28   75   16    0.0  82.2   4.4   24.3   3.3
6   2.5        fire          2
217    4      9  2012          30   66   15    0.2  73.5   4.1   26.6   1.5
6   0.7    not fire          2
218    5      9  2012          30   58   12    4.1  66.1     4    8.4     1
3.9   0.4    not fire          2
219    6      9  2012          34   71   14    6.5  64.5   3.3    9.1     1
3.5   0.4    not fire          2
220    7      9  2012          31   62   15    0.0  83.3   5.8   17.7   3.8
6.4   3.2        fire          2
221    8      9  2012          30   88   14    0.0  82.5   6.6   26.1     3
8.1   2.7        fire          2
222    9      9  2012          30   80   15    0.0  83.1   7.9   34.5   3.5
10   3.7        fire          2
223   10      9  2012          29   74   15    1.1  59.5   4.7    8.2   0.8
4.6   0.3    not fire          2
224   11      9  2012          30   73   14    0.0  79.2   6.5   16.6   2.1
```

```
6.6   1.2    not fire          2
225   12      9  2012           31   72   14    0.0  84.2   8.3   25.2   3.8
9.1   3.9        fire          2
226   13      9  2012           29   49   19    0.0  88.6  11.5   33.4   9.1
12.4  10.3        fire          2
227   14      9  2012           28   81   15    0.0  84.6  12.6   41.5   4.3
14.3   5.7        fire          2
228   15      9  2012           32   51   13    0.0  88.7    16   50.2   6.9
17.8   9.8        fire          2
229   16      9  2012           33   26   13    0.0  93.9  21.2   59.2  14.2
22.4  19.3        fire          2
230   17      9  2012           34   44   12    0.0  92.5  25.2   63.3  11.2
26.2  17.5        fire          2
231   18      9  2012           36   33   13    0.1  90.6  25.8   77.8     9
28.2  15.4        fire          2
232   19      9  2012           29   41    8    0.1  83.9  24.9     86   2.7
28.9   5.6        fire          2
233   20      9  2012           34   58   13    0.2  79.5  18.7     88   2.1
24.4   3.8    not fire          2
234   21      9  2012           35   34   17    0.0  92.2  23.6   97.3  13.8
29.4  21.6        fire          2
235   22      9  2012           33   64   13    0.0  88.9  26.1  106.3   7.1
32.4  13.7        fire          2
236   23      9  2012           35   56   14    0.0  89.0  29.4  115.6   7.5
36  15.2        fire          2
237   24      9  2012           26   49    6    2.0  61.3  11.9   28.1   0.6
11.9   0.4    not fire          2
238   25      9  2012           28   70   15    0.0  79.9  13.8   36.1   2.4
14.1     3    not fire          2
239   26      9  2012           30   65   14    0.0  85.4    16   44.5   4.5
16.9   6.5        fire          2
240   27      9  2012           28   87   15    4.4  41.1   6.5      8   0.1
6.2     0    not fire          2
241   28      9  2012           27   87   29    0.5  45.9   3.5    7.9   0.4
3.4   0.2    not fire          2
242   29      9  2012           24   54   18    0.1  79.7   4.3   15.2   1.7
5.1   0.7    not fire          2
243   30      9  2012           24   64   15    0.2  67.3   3.8   16.5   1.2
4.8   0.5   not fire          2
```

Usuniecie lini 122 ze wzgledu na duplikacje nazw atrybutów

[ ]:
```
dane = dane.drop(122).reset_index(drop=True)
```

Ponowne sprawdzanie danych po operacji

[ ]:
```
print(dane.to_string())
```

```
    day month  year Temperature  RH  Ws  Rain  FFMC   DMC     DC   ISI   BUI
```

```
FWI        Classes  Region
0     1     6  2012          29  57  18   0.0  65.7   3.4    7.6   1.3   3.4
0.5    not fire          1
1     2     6  2012          29  61  13   1.3  64.4   4.1    7.6     1   3.9
0.4    not fire          1
2     3     6  2012          26  82  22  13.1  47.1   2.5    7.1   0.3   2.7
0.1    not fire          1
3     4     6  2012          25  89  13   2.5  28.6   1.3    6.9     0   1.7
0    not fire          1
4     5     6  2012          27  77  16   0.0  64.8     3   14.2   1.2   3.9
0.5    not fire          1
5     6     6  2012          31  67  14   0.0  82.6   5.8   22.2   3.1     7
2.5        fire          1
6     7     6  2012          33  54  13   0.0  88.2   9.9   30.5   6.4  10.9
7.2        fire          1
7     8     6  2012          30  73  15   0.0  86.6  12.1   38.3   5.6  13.5
7.1        fire          1
8     9     6  2012          25  88  13   0.2  52.9   7.9   38.8   0.4  10.5
0.3    not fire          1
9    10     6  2012          28  79  12   0.0  73.2   9.5   46.3   1.3  12.6
0.9    not fire          1
10   11     6  2012          31  65  14   0.0  84.5  12.5   54.3     4  15.8
5.6        fire          1
11   12     6  2012          26  81  19   0.0  84.0  13.8   61.4   4.8  17.7
7.1        fire          1
12   13     6  2012          27  84  21   1.2  50.0   6.7     17   0.5   6.7
0.2    not fire          1
13   14     6  2012          30  78  20   0.5  59.0   4.6    7.8     1   4.4
0.4    not fire          1
14   15     6  2012          28  80  17   3.1  49.4     3    7.4   0.4     3
0.1    not fire          1
15   16     6  2012          29  89  13   0.7  36.1   1.7    7.6     0   2.2
0    not fire          1
16   17     6  2012          30  89  16   0.6  37.3   1.1    7.8     0   1.6
0    not fire          1
17   18     6  2012          31  78  14   0.3  56.9   1.9      8   0.7   2.4
0.2    not fire          1
18   19     6  2012          31  55  16   0.1  79.9   4.5     16   2.5   5.3
1.4    not fire          1
19   20     6  2012          30  80  16   0.4  59.8   3.4   27.1   0.9   5.1
0.4    not fire          1
20   21     6  2012          30  78  14   0.0  81.0   6.3   31.6   2.6   8.4
2.2        fire          1
21   22     6  2012          31  67  17   0.1  79.1     7   39.5   2.4   9.7
2.3    not fire          1
22   23     6  2012          32  62  18   0.1  81.4   8.2   47.7   3.3  11.5
3.8        fire          1
23   24     6  2012          32  66  17   0.0  85.9  11.2   55.8   5.6  14.9
```

```
7.5        fire          1
24   25     6  2012          31  64  15   0.0  86.7  14.2   63.8   5.7  18.3
8.4        fire          1
25   26     6  2012          31  64  18   0.0  86.8  17.8   71.8   6.7  21.6
10.6        fire          1
26   27     6  2012          34  53  18   0.0  89.0  21.6   80.3   9.2  25.8
15         fire          1
27   28     6  2012          32  55  14   0.0  89.1  25.5   88.5   7.6  29.7
13.9        fire          1
28   29     6  2012          32  47  13   0.3  79.9  18.4   84.4   2.2  23.8
3.9    not fire          1
29   30     6  2012          33  50  14   0.0  88.7  22.9   92.8   7.2  28.3
12.9        fire          1
30    1     7  2012          29  68  19   1.0  59.9   2.5    8.6   1.1   2.9
0.4    not fire          1
31    2     7  2012          27  75  19   1.2  55.7   2.4    8.3   0.8   2.8
0.3    not fire          1
32    3     7  2012          32  76  20   0.7  63.1   2.6    9.2   1.3     3
0.5    not fire          1
33    4     7  2012          33  78  17   0.0  80.1   4.6   18.5   2.7   5.7
1.7    not fire          1
34    5     7  2012          33  66  14   0.0  85.9   7.6   27.9   4.8   9.1
4.9        fire          1
35    6     7  2012          32  63  14   0.0  87.0  10.9     37   5.6  12.5
6.8        fire          1
36    7     7  2012          35  64  18   0.2  80.0   9.7   40.4   2.8  12.1
3.2    not fire          1
37    8     7  2012          33  68  19   0.0  85.6  12.5   49.8     6  15.4
8         fire          1
38    9     7  2012          32  68  14   1.4  66.6   7.7    9.2   1.1   7.4
0.6    not fire          1
39   10     7  2012          33  69  13   0.7  66.6     6    9.3   1.1   5.8
0.5    not fire          1
40   11     7  2012          33  76  14   0.0  81.1   8.1   18.7   2.6   8.1
2.2    not fire          1
41   12     7  2012          31  75  13   0.1  75.1   7.9   27.7   1.5   9.2
0.9    not fire          1
42   13     7  2012          34  81  15   0.0  81.8   9.7   37.2     3  11.7
3.4    not fire          1
43   14     7  2012          34  61  13   0.6  73.9   7.8   22.9   1.4   8.4
0.8    not fire          1
44   15     7  2012          30  80  19   0.4  60.7   5.2     17   1.1   5.9
0.5    not fire          1
45   16     7  2012          28  76  21   0.0  72.6     7   25.5   0.7   8.3
0.4    not fire          1
46   17     7  2012          29  70  14   0.0  82.8   9.4   34.1   3.2  11.1
3.6        fire          1
47   18     7  2012          31  68  14   0.0  85.4  12.1   43.1   4.6  14.2
```

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6        fire          1
48   19     7  2012          35  59  17   0.0  88.1    12   52.8   7.7  18.2
10.9        fire          1
49   20     7  2012          33  65  15   0.1  81.4  12.3   62.1   2.8  16.5
4        fire          1
50   21     7  2012          33  70  17   0.0  85.4  18.5   71.5   5.2  22.4
8.8        fire          1
51   22     7  2012          28  79  18   0.1  73.4  16.4   79.9   1.8  21.7
2.8    not fire          1
52   23     7  2012          27  66  22   0.4  68.2  10.5   71.3   1.8  15.4
2.1    not fire          1
53   24     7  2012          28  78  16   0.1  70.0   9.6   79.7   1.4  14.7
1.3    not fire          1
54   25     7  2012          31  65  18   0.0  84.3  12.5   88.7   4.8  18.5
7.3        fire          1
55   26     7  2012          36  53  19   0.0  89.2  17.1   98.6    10  23.9
15.3        fire          1
56   27     7  2012          36  48  13   0.0  90.3  22.2  108.5   8.7  29.4
15.3        fire          1
57   28     7  2012          33  76  15   0.0  86.5  24.4  117.8   5.6  32.1
11.3        fire          1
58   29     7  2012          32  73  15   0.0  86.6  26.7    127   5.6    35
11.9        fire          1
59   30     7  2012          31  79  15   0.0  85.4  28.5    136   4.7  37.4
10.7        fire          1
60   31     7  2012          35  64  17   0.0  87.2  31.9  145.7   6.8  41.2
15.7        fire          1
61    1     8  2012          36  45  14   0.0  78.8   4.8   10.2     2   4.7
0.9    not fire          1
62    2     8  2012          35  55  12   0.4  78.0   5.8     10   1.7   5.5
0.8    not fire          1
63    3     8  2012          35  63  14   0.3  76.6   5.7     10   1.7   5.5
0.8    not fire          1
64    4     8  2012          34  69  13   0.0  85.0   8.2   19.8     4   8.2
3.9        fire          1
65    5     8  2012          34  65  13   0.0  86.8  11.1   29.7   5.2  11.5
6.1        fire          1
66    6     8  2012          32  75  14   0.0  86.4    13   39.1   5.2  14.2
6.8        fire          1
67    7     8  2012          32  69  16   0.0  86.5  15.5   48.6   5.5  17.2
8        fire          1
68    8     8  2012          32  60  18   0.3  77.1  11.3     47   2.2  14.1
2.6    not fire          1
69    9     8  2012          35  59  17   0.0  87.4  14.8     57   6.9  17.9
9.9        fire          1
70   10     8  2012          35  55  14   0.0  88.9  18.6     67   7.4  21.9
11.6        fire          1
71   11     8  2012          35  63  13   0.0  88.9  21.7     77   7.1  25.5
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12.1        fire          1
72   12     8  2012          35  51  13   0.3  81.3  15.6   75.1   2.5  20.7
4.2    not fire          1
73   13     8  2012          35  63  15   0.0  87.0    19   85.1   5.9  24.4
10.2        fire          1
74   14     8  2012          33  66  14   0.0  87.0  21.7   94.7   5.7  27.2
10.6        fire          1
75   15     8  2012          36  55  13   0.3  82.4  15.6   92.5   3.7    22
6.3        fire          1
76   16     8  2012          36  61  18   0.3  80.2  11.7   90.4   2.8  17.6
4.2        fire          1
77   17     8  2012          37  52  18   0.0  89.3    16  100.7   9.7  22.9
14.6        fire          1
78   18     8  2012          36  54  18   0.0  89.4    20  110.9   9.7  27.5
16.1        fire          1
79   19     8  2012          35  62  19   0.0  89.4  23.2  120.9   9.7  31.3
17.2        fire          1
80   20     8  2012          35  68  19   0.0  88.3  25.9  130.6   8.8  34.7
16.8        fire          1
81   21     8  2012          36  58  19   0.0  88.6  29.6  141.1   9.2  38.8
18.4        fire          1
82   22     8  2012          36  55  18   0.0  89.1  33.5  151.3   9.9  43.1
20.4        fire          1
83   23     8  2012          36  53  16   0.0  89.5  37.6  161.5  10.4  47.5
22.3           fire       1
84   24     8  2012          34  64  14   0.0  88.9  40.5  171.3     9  50.9
20.9        fire          1
85   25     8  2012          35  60  15   0.0  88.9  43.9  181.3   8.2  54.7
20.3           fire       1
86   26     8  2012          31  78  18   0.0  85.8  45.6  190.6   4.7  57.1
13.7          fire        1
87   27     8  2012          33  82  21   0.0  84.9    47  200.2   4.4  59.3
13.2           fire       1
88   28     8  2012          34  64  16   0.0  89.4  50.2  210.4   7.3  62.9
19.9          fire        1
89   29     8  2012          35  48  18   0.0  90.1  54.2  220.4  12.5  67.4
30.2        fire          1
90   30     8  2012          35  70  17   0.8  72.7  25.2  180.4   1.7  37.4
4.2    not fire          1
91   31     8  2012          28  80  21  16.8  52.5   8.7    8.7   0.6   8.3
0.3       not fire       1
92    1     9  2012          25  76  17   7.2  46.0   1.3    7.5   0.2   1.8
0.1       not fire       1
93    2     9  2012          22  86  15  10.1  30.5   0.7      7     0   1.1
0       not fire       1
94    3     9  2012          25  78  15   3.8  42.6   1.2    7.5   0.1   1.7
0    not fire          1
95    4     9  2012          29  73  17   0.1  68.4   1.9   15.7   1.4   2.9
```

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0.5    not fire          1
96    5     9  2012          29  75  16   0.0  80.8   3.4     24   2.8   5.1
1.7         fire          1
97    6     9  2012          29  74  19   0.1  75.8   3.6   32.2   2.1   5.6
0.9    not fire          1
98    7     9  2012          31  71  17   0.3  69.6   3.2   30.1   1.5   5.1
0.6    not fire          1
99    8     9  2012          30  73  17   0.9  62.0   2.6    8.4   1.1     3
0.4    not fire          1
100   9     9  2012          30  77  15   1.0  56.1   2.1    8.4   0.7   2.6
0.2    not fire          1
101  10     9  2012          33  73  12   1.8  59.9   2.2    8.9   0.7   2.7
0.3    not fire          1
102  11     9  2012          30  77  21   1.8  58.5   1.9    8.4   1.1   2.4
0.3    not fire          1
103  12     9  2012          29  88  13   0.0  71.0   2.6   16.6   1.2   3.7
0.5    not fire          1
104  13     9  2012          25  86  21   4.6  40.9   1.3    7.5   0.1   1.8
0    not fire          1
105  14     9  2012          22  76  26   8.3  47.4   1.1      7   0.4   1.6
0.1    not fire          1
106  15     9  2012          24  82  15   0.4  44.9   0.9    7.3   0.2   1.4
0    not fire          1
107  16     9  2012          30  65  14   0.0  78.1   3.2   15.7   1.9   4.2
0.8    not fire          1
108  17     9  2012          31  52  14   0.0  87.7   6.4   24.3   6.2   7.7
5.9         fire          1
109  18     9  2012          32  49  11   0.0  89.4   9.8   33.1   6.8  11.3
7.7         fire          1
110  19     9  2012          29  57  14   0.0  89.3  12.5   41.3   7.8  14.2
9.7         fire          1
111  20     9  2012          28  84  18   0.0  83.8  13.5   49.3   4.5    16
6.3           fire          1
112  21     9  2012          31  55  11   0.0  87.8  16.5   57.9   5.4  19.2
8.3         fire          1
113  22     9  2012          31  50  19   0.6  77.8  10.6   41.4   2.4  12.9
2.8    not fire          1
114  23     9  2012          32  54  11   0.5  73.7   7.9   30.4   1.2   9.6
0.7    not fire          1
115  24     9  2012          29  65  19   0.6  68.3   5.5   15.2   1.5   5.8
0.7    not fire          1
116  25     9  2012          26  81  21   5.8  48.6     3    7.7   0.4     3
0.1    not fire          1
117  26     9  2012          31  54  11   0.0  82.0     6   16.3   2.5   6.2
1.7    not fire          1
118  27     9  2012          31  66  11   0.0  85.7   8.3   24.9     4     9
4.1         fire          1
119  28     9  2012          32  47  14   0.7  77.5   7.1    8.8   1.8   6.8
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0.9    not fire          1
120  29     9  2012          26  80  16   1.8  47.4   2.9    7.7   0.3     3
0.1    not fire          1
121  30     9  2012          25  78  14   1.4  45.0   1.9    7.5   0.2   2.4
0.1    not fire          1
122   1     6  2012          32  71  12   0.7  57.1   2.5    8.2   0.6   2.8
0.2    not fire          2
123   2     6  2012          30  73  13   4.0  55.7   2.7    7.8   0.6   2.9
0.2    not fire          2
124   3     6  2012          29  80  14   2.0  48.7   2.2    7.6   0.3   2.6
0.1    not fire          2
125   4     6  2012          30  64  14   0.0  79.4   5.2   15.4   2.2   5.6
1    not fire          2
126   5     6  2012          32  60  14   0.2  77.1     6   17.6   1.8   6.5
0.9    not fire          2
127   6     6  2012          35  54  11   0.1  83.7   8.4   26.3   3.1   9.3
3.1        fire          2
128   7     6  2012          35  44  17   0.2  85.6   9.9   28.9   5.4  10.7
6        fire          2
129   8     6  2012          28  51  17   1.3  71.4   7.7    7.4   1.5   7.3
0.8    not fire          2
130   9     6  2012          27  59  18   0.1  78.1   8.5   14.7   2.4   8.3
1.9    not fire          2
131  10     6  2012          30  41  15   0.0  89.4  13.3   22.5   8.4  13.1
10        fire          2
132  11     6  2012          31  42  21   0.0  90.6  18.2   30.5  13.4    18
16.7        fire          2
133  12     6  2012          27  58  17   0.0  88.9  21.3   37.8   8.7  21.2
12.9        fire          2
134  13     6  2012          30  52  15   2.0  72.3  11.4    7.8   1.4  10.9
0.9    not fire          2
135  14     6  2012          27  79  16   0.7  53.4   6.4    7.3   0.5   6.1
0.3    not fire          2
136  15     6  2012          28  90  15   0.0  66.8   7.2   14.7   1.2   7.1
0.6    not fire          2
137  16     6  2012          29  87  15   0.4  47.4   4.2      8   0.2   4.1
0.1    not fire          2
138  17     6  2012          31  69  17   4.7  62.2   3.9      8   1.1   3.8
0.4    not fire          2
139  18     6  2012          33  62  10   8.7  65.5   4.6    8.3   0.9   4.4
0.4    not fire          2
140  19     6  2012          32  67  14   4.5  64.6   4.4    8.2     1   4.2
0.4    not fire          2
141  20     6  2012          31  72  14   0.2  60.2   3.8      8   0.8   3.7
0.3    not fire          2
142  21     6  2012          32  55  14   0.0  86.2   8.3   18.4     5   8.2
4.9        fire          2
143  22     6  2012          33  46  14   1.1  78.3   8.1    8.3   1.9   7.7
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1.2    not fire          2
144  23     6  2012          33  59  16   0.8  74.2     7    8.3   1.6   6.7
0.8    not fire          2
145  24     6  2012          35  68  16   0.0  85.3    10     17   4.9   9.9
5.3        fire          2
146  25     6  2012          34  70  16   0.0  86.0  12.8   25.6   5.4  12.7
6.7        fire          2
147  26     6  2012          36  62  16   0.0  87.8  16.5   34.5     7  16.4
9.5        fire          2
148  27     6  2012          36  55  15   0.0  89.1  20.9   43.3     8  20.8
12         fire          2
149  28     6  2012          37  37  13   0.0  92.5  27.2   52.4  11.7  27.1
18.4       fire          2
150  29     6  2012          37  36  13   0.6  86.2  17.9   36.7   4.8  17.8
7.2        fire          2
151  30     6  2012          34  42  15   1.7  79.7    12    8.5   2.2  11.5
2.2  not fire            2
152   1     7  2012          28  58  18   2.2  63.7   3.2    8.5   1.2   3.3
0.5    not fire          2
153   2     7  2012          33  48  16   0.0  87.6   7.9   17.8   6.8   7.8
6.4        fire          2
154   3     7  2012          34  56  17   0.1  84.7   9.7   27.3   4.7  10.3
5.2        fire          2
155   4     7  2012          34  58  18   0.0  88.0  13.6   36.8     8  14.1
9.9        fire          2
156   5     7  2012          34  45  18   0.0  90.5  18.7   46.4  11.3  18.7
15         fire          2
157   6     7  2012          35  42  15   0.3  84.7  15.5   45.1   4.3  16.7
6.3        fire          2
158   7     7  2012          38  43  13   0.5  85.0    13   35.4   4.1  13.7
5.2        fire          2
159   8     7  2012          35  47  18   6.0  80.8   9.8    9.7   3.1   9.4
3          fire          2
160   9     7  2012          36  43  15   1.9  82.3   9.4    9.9   3.2     9
3.1        fire          2
161  10     7  2012          34  51  16   3.8  77.5     8    9.5     2   7.7
1.3    not fire          2
162  11     7  2012          34  56  15   2.9  74.8   7.1    9.5   1.6   6.8
0.8    not fire          2
163  12     7  2012          36  44  13   0.0  90.1  12.6   19.4   8.3  12.5
9.6        fire          2
164  13     7  2012          39  45  13   0.6  85.2  11.3   10.4   4.2  10.9
4.7        fire          2
165  15     7  2012          34  45  17   0.0  90.5    18   24.1  10.9  17.7
14.1       fire          2
166  16     7  2012          31  83  17   0.0  84.5  19.4   33.1   4.7  19.2
7.3        fire          2
167  17     7  2012          32  81  17   0.0  84.6  21.1   42.3   4.7  20.9
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7.7        fire          2
168  18     7  2012          33  68  15   0.0  86.1  23.9   51.6   5.2  23.9
9.1        fire          2
169  19     7  2012          34  58  16   0.0  88.1  27.8   61.1   7.3  27.7
13        fire          2
170  20     7  2012          36  50  16   0.0  89.9  32.7     71   9.5  32.6
17.3        fire          2
171  21     7  2012          36  29  18   0.0  93.9  39.6   80.6  18.5  39.5
30        fire          2
172  22     7  2012          32  48  18   0.0  91.5  44.2   90.1  13.2    44
25.4        fire          2
173  23     7  2012          31  71  17   0.0  87.3  46.6     99   6.9  46.5
16.3        fire          2
174  24     7  2012          33  63  17   1.1  72.8  20.9   56.6   1.6  21.7
2.5    not fire          2
175  25     7  2012          39  64   9   1.2  73.8  11.7   15.9   1.1  11.4
0.7    not fire          2
176  26     7  2012          35  58  10   0.2  78.3  10.8   19.7   1.6  10.7
1    not fire          2
177  27     7  2012          29  87  18   0.0  80.0  11.8   28.3   2.8  11.8
3.2    not fire          2
178  28     7  2012          33  57  16   0.0  87.5  15.7   37.6   6.7  15.7
9        fire          2
179  29     7  2012          34  59  16   0.0  88.1  19.5   47.2   7.4  19.5
10.9        fire          2
180  30     7  2012          36  56  16   0.0  88.9  23.8   57.1   8.2  23.8
13.2        fire          2
181  31     7  2012          37  55  15   0.0  89.3  28.3   67.2   8.3  28.3
14.5        fire          2
182   1     8  2012          38  52  14   0.0  78.3   4.4   10.5     2   4.4
0.8    not fire          2
183   2     8  2012          40  34  14   0.0  93.3  10.8   21.4  13.8  10.6
13.5        fire          2
184   3     8  2012          39  33  17   0.0  93.7  17.1   32.1  17.2  16.9
19.5        fire          2
185   4     8  2012          38  35  15   0.0  93.8    23   42.7  15.7  22.9
20.9        fire          2
186   5     8  2012          34  42  17   0.1  88.3  23.6   52.5    19  23.5
12.6        fire          2
187   6     8  2012          30  54  14   3.1  70.5    11    9.1   1.3  10.5
0.8    not fire          2
188   7     8  2012          34  63  13   2.9  69.7   7.2    9.8   1.2   6.9
0.6    not fire          2
189   8     8  2012          37  56  11   0.0  87.4  11.2   20.2   5.2    11
5.9        fire          2
190   9     8  2012          39  43  12   0.0  91.7  16.5   30.9   9.6  16.4
12.7        fire          2
191  10     8  2012          39  39  15   0.2  89.3  15.8   35.4   8.2  15.8
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10.7        fire          2
192  11     8  2012          40  31  15   0.0  94.2  22.5   46.3  16.6  22.4
21.6        fire          2
193  12     8  2012          39  21  17   0.4  93.0  18.4   41.5  15.5  18.4
18.8        fire          2
194  13     8  2012          35  34  16   0.2  88.3  16.9   45.1   7.5  17.5
10.5        fire          2
195  14     8  2012          37  40  13   0.0  91.9  22.3   55.5  10.8  22.3
15.7        fire          2
196  15     8  2012          35  46  13   0.3  83.9  16.9   54.2   3.5    19
5.5        fire          2
197  16     8  2012          40  41  10   0.1  92.0  22.6   65.1   9.5  24.2
14.8        fire          2
198  17     8  2012          42  24   9   0.0  96.0  30.3   76.4  15.7  30.4
24         fire          2
199  18     8  2012          37  37  14   0.0  94.3  35.9   86.8    16  35.9
26.3        fire          2
200  19     8  2012          35  66  15   0.1  82.7  32.7   96.8   3.3  35.5
7.7        fire          2
201  20     8  2012          36  81  15   0.0  83.7  34.4    107   3.8  38.1
9         fire          2
202  21     8  2012          36  71  15   0.0  86.0  36.9  117.1   5.1  41.3
12.2        fire          2
203  22     8  2012          37  53  14   0.0  89.5  41.1  127.5     8  45.5
18.1        fire          2
204  23     8  2012          36  43  16   0.0  91.2  46.1  137.7  11.5  50.2
24.5        fire          2
205  24     8  2012          35  38  15   0.0  92.1  51.3  147.7  12.2  54.9
26.9        fire          2
206  25     8  2012          34  40  18   0.0  92.1  56.3  157.5  14.3  59.5
31.1        fire          2
207  26     8  2012          33  37  16   0.0  92.2  61.3  167.2  13.1    64
30.3        fire          2
208  27     8  2012          36  54  14   0.0  91.0  65.9  177.3    10    68
26.1        fire          2
209  28     8  2012          35  56  14   0.4  79.2    37    166   2.1  30.6
6.1    not fire          2
210  29     8  2012          35  53  17   0.5  80.2  20.7  149.2   2.7  30.6
5.9        fire          2
211  30     8  2012          34  49  15   0.0  89.2  24.8  159.1   8.1  35.7
16         fire          2
212  31     8  2012          30  59  19   0.0  89.1  27.8  168.2   9.8  39.3
19.4        fire          2
213   1     9  2012          29  86  16   0.0  37.9   0.9    8.2   0.1   1.4
0    not fire          2
214   2     9  2012          28  67  19   0.0  75.4   2.9   16.3     2     4
0.8    not fire          2
215   3     9  2012          28  75  16   0.0  82.2   4.4   24.3   3.3     6
```

```
2.5        fire          2
216   4     9  2012          30  66  15   0.2  73.5   4.1   26.6   1.5      6
0.7    not fire          2
217   5     9  2012          30  58  12   4.1  66.1     4    8.4     1    3.9
0.4    not fire          2
218   6     9  2012          34  71  14   6.5  64.5   3.3    9.1     1    3.5
0.4    not fire          2
219   7     9  2012          31  62  15   0.0  83.3   5.8   17.7   3.8    6.4
3.2        fire          2
220   8     9  2012          30  88  14   0.0  82.5   6.6   26.1     3    8.1
2.7        fire          2
221   9     9  2012          30  80  15   0.0  83.1   7.9   34.5   3.5     10
3.7        fire          2
222  10     9  2012          29  74  15   1.1  59.5   4.7    8.2   0.8    4.6
0.3    not fire          2
223  11     9  2012          30  73  14   0.0  79.2   6.5   16.6   2.1    6.6
1.2    not fire          2
224  12     9  2012          31  72  14   0.0  84.2   8.3   25.2   3.8    9.1
3.9        fire          2
225  13     9  2012          29  49  19   0.0  88.6  11.5   33.4   9.1   12.4
10.3        fire          2
226  14     9  2012          28  81  15   0.0  84.6  12.6   41.5   4.3   14.3
5.7        fire          2
227  15     9  2012          32  51  13   0.0  88.7    16   50.2   6.9   17.8
9.8        fire          2
228  16     9  2012          33  26  13   0.0  93.9  21.2   59.2  14.2   22.4
19.3        fire          2
229  17     9  2012          34  44  12   0.0  92.5  25.2   63.3  11.2   26.2
17.5        fire          2
230  18     9  2012          36  33  13   0.1  90.6  25.8   77.8     9   28.2
15.4        fire          2
231  19     9  2012          29  41   8   0.1  83.9  24.9     86   2.7   28.9
5.6        fire          2
232  20     9  2012          34  58  13   0.2  79.5  18.7     88   2.1   24.4
3.8    not fire          2
233  21     9  2012          35  34  17   0.0  92.2  23.6   97.3  13.8   29.4
21.6        fire          2
234  22     9  2012          33  64  13   0.0  88.9  26.1  106.3   7.1   32.4
13.7        fire          2
235  23     9  2012          35  56  14   0.0  89.0  29.4  115.6   7.5     36
15.2        fire          2
236  24     9  2012          26  49   6   2.0  61.3  11.9   28.1   0.6   11.9
0.4    not fire          2
237  25     9  2012          28  70  15   0.0  79.9  13.8   36.1   2.4   14.1
3    not fire          2
238  26     9  2012          30  65  14   0.0  85.4    16   44.5   4.5   16.9
6.5        fire          2
239  27     9  2012          28  87  15   4.4  41.1   6.5      8   0.1    6.2
```

```
0    not fire          2
240  28     9  2012          27  87  29   0.5  45.9   3.5    7.9   0.4   3.4
0.2    not fire          2
241  29     9  2012          24  54  18   0.1  79.7   4.3   15.2   1.7   5.1
0.7    not fire          2
242  30     9  2012          24  64  15   0.2  67.3   3.8   16.5   1.2   4.8
0.5    not fire          2
```

Przerabianie danych na dataframe na potrzeby analizy

[ ]:
```
dane.shape
```

[ ]:
```
(243, 15)
```

[ ]:
```
dane[dane.isnull().any(axis=1)]
```

[ ]:
```
Empty DataFrame
Columns: [day, month, year, Temperature, RH, Ws, Rain, FFMC, DMC, DC, ISI, BUI,
FWI, Classes, Region]
Index: []
```

Wyświetlenie danych na dataframe

[ ]:
```
print(dane.to_string)
```

```
<bound method DataFrame.to_string of     day month  year Temperature  RH  Ws
Rain  FFMC  DMC    DC  ISI   BUI  \
0     1     6  2012          29  57  18   0.0  65.7  3.4   7.6  1.3   3.4
1     2     6  2012          29  61  13   1.3  64.4  4.1   7.6    1   3.9
2     3     6  2012          26  82  22  13.1  47.1  2.5   7.1  0.3   2.7
3     4     6  2012          25  89  13   2.5  28.6  1.3   6.9    0   1.7
4     5     6  2012          27  77  16   0.0  64.8    3  14.2  1.2   3.9
..   ..   ...   ...         ...  ..  ..   ...   ...  ...   ...  ...   ...
238  26     9  2012          30  65  14   0.0  85.4   16  44.5  4.5  16.9
239  27     9  2012          28  87  15   4.4  41.1  6.5     8  0.1   6.2
240  28     9  2012          27  87  29   0.5  45.9  3.5   7.9  0.4   3.4
241  29     9  2012          24  54  18   0.1  79.7  4.3  15.2  1.7   5.1
242  30     9  2012          24  64  15   0.2  67.3  3.8  16.5  1.2   4.8

     FWI       Classes  Region
0    0.5   not fire          1
1    0.4   not fire          1
2    0.1   not fire          1
3      0   not fire          1
4    0.5   not fire          1
..   ...           ...     ...
238  6.5       fire          2
239    0   not fire          2
240  0.2   not fire          2
```

```
241  0.7   not fire          2
242  0.5  not fire           2

[243 rows x 15 columns]>
```

Naprawa kolumn

[ ]:
```
dane.columns
```

[ ]:
```
Index(['day', 'month', 'year', 'Temperature', 'RH', 'Ws', 'Rain', 'FFMC',
       'DMC', 'DC', 'ISI', 'BUI', 'FWI', 'Classes', 'Region'],
      dtype='object')
```

[ ]:
```
dane.columns = dane.columns.str.strip()
```

[ ]:
```
dane.columns
```

[ ]:
```
Index(['day', 'month', 'year', 'Temperature', 'RH', 'Ws', 'Rain', 'FFMC',
       'DMC', 'DC', 'ISI', 'BUI', 'FWI', 'Classes', 'Region'],
      dtype='object')
```

Sprawdzanie danych po naprawie kolumn

[ ]:
```
print(dane.to_string())
```

```
    day month  year Temperature  RH  Ws  Rain  FFMC   DMC     DC   ISI   BUI
FWI        Classes  Region
0     1     6  2012          29  57  18   0.0  65.7   3.4    7.6   1.3   3.4
0.5    not fire          1
1     2     6  2012          29  61  13   1.3  64.4   4.1    7.6     1   3.9
0.4    not fire          1
2     3     6  2012          26  82  22  13.1  47.1   2.5    7.1   0.3   2.7
0.1    not fire          1
3     4     6  2012          25  89  13   2.5  28.6   1.3    6.9     0   1.7
0    not fire          1
4     5     6  2012          27  77  16   0.0  64.8     3   14.2   1.2   3.9
0.5    not fire          1
5     6     6  2012          31  67  14   0.0  82.6   5.8   22.2   3.1     7
2.5        fire          1
6     7     6  2012          33  54  13   0.0  88.2   9.9   30.5   6.4  10.9
7.2        fire          1
7     8     6  2012          30  73  15   0.0  86.6  12.1   38.3   5.6  13.5
7.1        fire          1
8     9     6  2012          25  88  13   0.2  52.9   7.9   38.8   0.4  10.5
0.3    not fire          1
9    10     6  2012          28  79  12   0.0  73.2   9.5   46.3   1.3  12.6
0.9    not fire          1
10   11     6  2012          31  65  14   0.0  84.5  12.5   54.3     4  15.8
5.6        fire          1
```

```
11   12     6  2012          26  81  19   0.0  84.0  13.8   61.4   4.8  17.7
7.1        fire          1
12   13     6  2012          27  84  21   1.2  50.0   6.7     17   0.5   6.7
0.2    not fire          1
13   14     6  2012          30  78  20   0.5  59.0   4.6    7.8     1   4.4
0.4    not fire          1
14   15     6  2012          28  80  17   3.1  49.4     3    7.4   0.4     3
0.1    not fire          1
15   16     6  2012          29  89  13   0.7  36.1   1.7    7.6     0   2.2
0    not fire          1
16   17     6  2012          30  89  16   0.6  37.3   1.1    7.8     0   1.6
0    not fire          1
17   18     6  2012          31  78  14   0.3  56.9   1.9      8   0.7   2.4
0.2    not fire          1
18   19     6  2012          31  55  16   0.1  79.9   4.5     16   2.5   5.3
1.4    not fire          1
19   20     6  2012          30  80  16   0.4  59.8   3.4   27.1   0.9   5.1
0.4    not fire          1
20   21     6  2012          30  78  14   0.0  81.0   6.3   31.6   2.6   8.4
2.2        fire          1
21   22     6  2012          31  67  17   0.1  79.1     7   39.5   2.4   9.7
2.3    not fire          1
22   23     6  2012          32  62  18   0.1  81.4   8.2   47.7   3.3  11.5
3.8        fire          1
23   24     6  2012          32  66  17   0.0  85.9  11.2   55.8   5.6  14.9
7.5        fire          1
24   25     6  2012          31  64  15   0.0  86.7  14.2   63.8   5.7  18.3
8.4        fire          1
25   26     6  2012          31  64  18   0.0  86.8  17.8   71.8   6.7  21.6
10.6        fire          1
26   27     6  2012          34  53  18   0.0  89.0  21.6   80.3   9.2  25.8
15        fire          1
27   28     6  2012          32  55  14   0.0  89.1  25.5   88.5   7.6  29.7
13.9        fire          1
28   29     6  2012          32  47  13   0.3  79.9  18.4   84.4   2.2  23.8
3.9    not fire          1
29   30     6  2012          33  50  14   0.0  88.7  22.9   92.8   7.2  28.3
12.9        fire          1
30    1     7  2012          29  68  19   1.0  59.9   2.5    8.6   1.1   2.9
0.4    not fire          1
31    2     7  2012          27  75  19   1.2  55.7   2.4    8.3   0.8   2.8
0.3    not fire          1
32    3     7  2012          32  76  20   0.7  63.1   2.6    9.2   1.3     3
0.5    not fire          1
33    4     7  2012          33  78  17   0.0  80.1   4.6   18.5   2.7   5.7
1.7    not fire          1
34    5     7  2012          33  66  14   0.0  85.9   7.6   27.9   4.8   9.1
4.9        fire          1
```

```
35    6     7  2012          32  63  14   0.0  87.0  10.9     37   5.6  12.5
6.8        fire          1
36    7     7  2012          35  64  18   0.2  80.0   9.7   40.4   2.8  12.1
3.2     not fire          1
37    8     7  2012          33  68  19   0.0  85.6  12.5   49.8     6  15.4
8         fire          1
38    9     7  2012          32  68  14   1.4  66.6   7.7    9.2   1.1   7.4
0.6     not fire          1
39   10     7  2012          33  69  13   0.7  66.6     6    9.3   1.1   5.8
0.5     not fire          1
40   11     7  2012          33  76  14   0.0  81.1   8.1   18.7   2.6   8.1
2.2     not fire          1
41   12     7  2012          31  75  13   0.1  75.1   7.9   27.7   1.5   9.2
0.9     not fire          1
42   13     7  2012          34  81  15   0.0  81.8   9.7   37.2     3  11.7
3.4     not fire          1
43   14     7  2012          34  61  13   0.6  73.9   7.8   22.9   1.4   8.4
0.8     not fire          1
44   15     7  2012          30  80  19   0.4  60.7   5.2     17   1.1   5.9
0.5     not fire          1
45   16     7  2012          28  76  21   0.0  72.6     7   25.5   0.7   8.3
0.4     not fire          1
46   17     7  2012          29  70  14   0.0  82.8   9.4   34.1   3.2  11.1
3.6        fire          1
47   18     7  2012          31  68  14   0.0  85.4  12.1   43.1   4.6  14.2
6         fire          1
48   19     7  2012          35  59  17   0.0  88.1    12   52.8   7.7  18.2
10.9        fire          1
49   20     7  2012          33  65  15   0.1  81.4  12.3   62.1   2.8  16.5
4         fire          1
50   21     7  2012          33  70  17   0.0  85.4  18.5   71.5   5.2  22.4
8.8        fire          1
51   22     7  2012          28  79  18   0.1  73.4  16.4   79.9   1.8  21.7
2.8     not fire          1
52   23     7  2012          27  66  22   0.4  68.2  10.5   71.3   1.8  15.4
2.1     not fire          1
53   24     7  2012          28  78  16   0.1  70.0   9.6   79.7   1.4  14.7
1.3     not fire          1
54   25     7  2012          31  65  18   0.0  84.3  12.5   88.7   4.8  18.5
7.3        fire          1
55   26     7  2012          36  53  19   0.0  89.2  17.1   98.6    10  23.9
15.3        fire          1
56   27     7  2012          36  48  13   0.0  90.3  22.2  108.5   8.7  29.4
15.3        fire          1
57   28     7  2012          33  76  15   0.0  86.5  24.4  117.8   5.6  32.1
11.3        fire          1
58   29     7  2012          32  73  15   0.0  86.6  26.7    127   5.6    35
11.9        fire          1
```

```
59   30     7  2012          31  79  15   0.0  85.4  28.5    136   4.7  37.4
10.7        fire          1
60   31     7  2012          35  64  17   0.0  87.2  31.9  145.7   6.8  41.2
15.7        fire          1
61    1     8  2012          36  45  14   0.0  78.8   4.8   10.2     2   4.7
0.9     not fire          1
62    2     8  2012          35  55  12   0.4  78.0   5.8     10   1.7   5.5
0.8     not fire          1
63    3     8  2012          35  63  14   0.3  76.6   5.7     10   1.7   5.5
0.8     not fire          1
64    4     8  2012          34  69  13   0.0  85.0   8.2   19.8     4   8.2
3.9         fire          1
65    5     8  2012          34  65  13   0.0  86.8  11.1   29.7   5.2  11.5
6.1         fire          1
66    6     8  2012          32  75  14   0.0  86.4    13   39.1   5.2  14.2
6.8         fire          1
67    7     8  2012          32  69  16   0.0  86.5  15.5   48.6   5.5  17.2
8         fire          1
68    8     8  2012          32  60  18   0.3  77.1  11.3     47   2.2  14.1
2.6     not fire          1
69    9     8  2012          35  59  17   0.0  87.4  14.8     57   6.9  17.9
9.9         fire          1
70   10     8  2012          35  55  14   0.0  88.9  18.6     67   7.4  21.9
11.6        fire          1
71   11     8  2012          35  63  13   0.0  88.9  21.7     77   7.1  25.5
12.1        fire          1
72   12     8  2012          35  51  13   0.3  81.3  15.6   75.1   2.5  20.7
4.2     not fire          1
73   13     8  2012          35  63  15   0.0  87.0    19   85.1   5.9  24.4
10.2        fire          1
74   14     8  2012          33  66  14   0.0  87.0  21.7   94.7   5.7  27.2
10.6        fire          1
75   15     8  2012          36  55  13   0.3  82.4  15.6   92.5   3.7    22
6.3         fire          1
76   16     8  2012          36  61  18   0.3  80.2  11.7   90.4   2.8  17.6
4.2         fire          1
77   17     8  2012          37  52  18   0.0  89.3    16  100.7   9.7  22.9
14.6        fire          1
78   18     8  2012          36  54  18   0.0  89.4    20  110.9   9.7  27.5
16.1        fire          1
79   19     8  2012          35  62  19   0.0  89.4  23.2  120.9   9.7  31.3
17.2        fire          1
80   20     8  2012          35  68  19   0.0  88.3  25.9  130.6   8.8  34.7
16.8        fire          1
81   21     8  2012          36  58  19   0.0  88.6  29.6  141.1   9.2  38.8
18.4        fire          1
82   22     8  2012          36  55  18   0.0  89.1  33.5  151.3   9.9  43.1
20.4        fire          1
```

```
83   23     8  2012          36  53  16   0.0  89.5  37.6  161.5  10.4  47.5
22.3           fire       1
84   24     8  2012          34  64  14   0.0  88.9  40.5  171.3     9  50.9
20.9         fire         1
85   25     8  2012          35  60  15   0.0  88.9  43.9  181.3   8.2  54.7
20.3           fire       1
86   26     8  2012          31  78  18   0.0  85.8  45.6  190.6   4.7  57.1
13.7          fire        1
87   27     8  2012          33  82  21   0.0  84.9    47  200.2   4.4  59.3
13.2           fire       1
88   28     8  2012          34  64  16   0.0  89.4  50.2  210.4   7.3  62.9
19.9          fire        1
89   29     8  2012          35  48  18   0.0  90.1  54.2  220.4  12.5  67.4
30.2         fire         1
90   30     8  2012          35  70  17   0.8  72.7  25.2  180.4   1.7  37.4
4.2    not fire           1
91   31     8  2012          28  80  21  16.8  52.5   8.7    8.7   0.6   8.3
0.3       not fire        1
92    1     9  2012          25  76  17   7.2  46.0   1.3    7.5   0.2   1.8
0.1      not fire         1
93    2     9  2012          22  86  15  10.1  30.5   0.7      7     0   1.1
0        not fire        1
94    3     9  2012          25  78  15   3.8  42.6   1.2    7.5   0.1   1.7
0    not fire           1
95    4     9  2012          29  73  17   0.1  68.4   1.9   15.7   1.4   2.9
0.5    not fire           1
96    5     9  2012          29  75  16   0.0  80.8   3.4     24   2.8   5.1
1.7         fire           1
97    6     9  2012          29  74  19   0.1  75.8   3.6   32.2   2.1   5.6
0.9    not fire           1
98    7     9  2012          31  71  17   0.3  69.6   3.2   30.1   1.5   5.1
0.6    not fire           1
99    8     9  2012          30  73  17   0.9  62.0   2.6    8.4   1.1     3
0.4    not fire           1
100   9     9  2012          30  77  15   1.0  56.1   2.1    8.4   0.7   2.6
0.2    not fire           1
101  10     9  2012          33  73  12   1.8  59.9   2.2    8.9   0.7   2.7
0.3    not fire           1
102  11     9  2012          30  77  21   1.8  58.5   1.9    8.4   1.1   2.4
0.3    not fire           1
103  12     9  2012          29  88  13   0.0  71.0   2.6   16.6   1.2   3.7
0.5    not fire           1
104  13     9  2012          25  86  21   4.6  40.9   1.3    7.5   0.1   1.8
0    not fire           1
105  14     9  2012          22  76  26   8.3  47.4   1.1      7   0.4   1.6
0.1    not fire           1
106  15     9  2012          24  82  15   0.4  44.9   0.9    7.3   0.2   1.4
0    not fire           1
```

```
107  16     9  2012          30  65  14   0.0  78.1   3.2   15.7   1.9   4.2
0.8    not fire          1
108  17     9  2012          31  52  14   0.0  87.7   6.4   24.3   6.2   7.7
5.9         fire          1
109  18     9  2012          32  49  11   0.0  89.4   9.8   33.1   6.8  11.3
7.7         fire          1
110  19     9  2012          29  57  14   0.0  89.3  12.5   41.3   7.8  14.2
9.7         fire          1
111  20     9  2012          28  84  18   0.0  83.8  13.5   49.3   4.5    16
6.3           fire          1
112  21     9  2012          31  55  11   0.0  87.8  16.5   57.9   5.4  19.2
8.3         fire          1
113  22     9  2012          31  50  19   0.6  77.8  10.6   41.4   2.4  12.9
2.8    not fire          1
114  23     9  2012          32  54  11   0.5  73.7   7.9   30.4   1.2   9.6
0.7    not fire          1
115  24     9  2012          29  65  19   0.6  68.3   5.5   15.2   1.5   5.8
0.7    not fire          1
116  25     9  2012          26  81  21   5.8  48.6     3    7.7   0.4     3
0.1    not fire          1
117  26     9  2012          31  54  11   0.0  82.0     6   16.3   2.5   6.2
1.7    not fire          1
118  27     9  2012          31  66  11   0.0  85.7   8.3   24.9     4     9
4.1         fire          1
119  28     9  2012          32  47  14   0.7  77.5   7.1    8.8   1.8   6.8
0.9    not fire          1
120  29     9  2012          26  80  16   1.8  47.4   2.9    7.7   0.3     3
0.1    not fire          1
121  30     9  2012          25  78  14   1.4  45.0   1.9    7.5   0.2   2.4
0.1    not fire          1
122   1     6  2012          32  71  12   0.7  57.1   2.5    8.2   0.6   2.8
0.2    not fire          2
123   2     6  2012          30  73  13   4.0  55.7   2.7    7.8   0.6   2.9
0.2    not fire          2
124   3     6  2012          29  80  14   2.0  48.7   2.2    7.6   0.3   2.6
0.1    not fire          2
125   4     6  2012          30  64  14   0.0  79.4   5.2   15.4   2.2   5.6
1    not fire          2
126   5     6  2012          32  60  14   0.2  77.1     6   17.6   1.8   6.5
0.9    not fire          2
127   6     6  2012          35  54  11   0.1  83.7   8.4   26.3   3.1   9.3
3.1         fire          2
128   7     6  2012          35  44  17   0.2  85.6   9.9   28.9   5.4  10.7
6        fire          2
129   8     6  2012          28  51  17   1.3  71.4   7.7    7.4   1.5   7.3
0.8    not fire          2
130   9     6  2012          27  59  18   0.1  78.1   8.5   14.7   2.4   8.3
1.9    not fire          2
```

```
131  10     6  2012          30  41  15   0.0  89.4  13.3   22.5   8.4  13.1
10        fire          2
132  11     6  2012          31  42  21   0.0  90.6  18.2   30.5  13.4    18
16.7        fire          2
133  12     6  2012          27  58  17   0.0  88.9  21.3   37.8   8.7  21.2
12.9        fire          2
134  13     6  2012          30  52  15   2.0  72.3  11.4    7.8   1.4  10.9
0.9    not fire          2
135  14     6  2012          27  79  16   0.7  53.4   6.4    7.3   0.5   6.1
0.3    not fire          2
136  15     6  2012          28  90  15   0.0  66.8   7.2   14.7   1.2   7.1
0.6    not fire          2
137  16     6  2012          29  87  15   0.4  47.4   4.2      8   0.2   4.1
0.1    not fire          2
138  17     6  2012          31  69  17   4.7  62.2   3.9      8   1.1   3.8
0.4    not fire          2
139  18     6  2012          33  62  10   8.7  65.5   4.6    8.3   0.9   4.4
0.4    not fire          2
140  19     6  2012          32  67  14   4.5  64.6   4.4    8.2     1   4.2
0.4    not fire          2
141  20     6  2012          31  72  14   0.2  60.2   3.8      8   0.8   3.7
0.3    not fire          2
142  21     6  2012          32  55  14   0.0  86.2   8.3   18.4     5   8.2
4.9        fire          2
143  22     6  2012          33  46  14   1.1  78.3   8.1    8.3   1.9   7.7
1.2    not fire          2
144  23     6  2012          33  59  16   0.8  74.2     7    8.3   1.6   6.7
0.8    not fire          2
145  24     6  2012          35  68  16   0.0  85.3    10     17   4.9   9.9
5.3        fire          2
146  25     6  2012          34  70  16   0.0  86.0  12.8   25.6   5.4  12.7
6.7        fire          2
147  26     6  2012          36  62  16   0.0  87.8  16.5   34.5     7  16.4
9.5        fire          2
148  27     6  2012          36  55  15   0.0  89.1  20.9   43.3     8  20.8
12        fire          2
149  28     6  2012          37  37  13   0.0  92.5  27.2   52.4  11.7  27.1
18.4        fire          2
150  29     6  2012          37  36  13   0.6  86.2  17.9   36.7   4.8  17.8
7.2        fire          2
151  30     6  2012          34  42  15   1.7  79.7    12    8.5   2.2  11.5
2.2  not fire          2
152   1     7  2012          28  58  18   2.2  63.7   3.2    8.5   1.2   3.3
0.5    not fire          2
153   2     7  2012          33  48  16   0.0  87.6   7.9   17.8   6.8   7.8
6.4        fire          2
154   3     7  2012          34  56  17   0.1  84.7   9.7   27.3   4.7  10.3
5.2        fire          2
```

```
155   4     7  2012          34  58  18   0.0  88.0  13.6   36.8     8  14.1
9.9        fire          2
156   5     7  2012          34  45  18   0.0  90.5  18.7   46.4  11.3  18.7
15         fire          2
157   6     7  2012          35  42  15   0.3  84.7  15.5   45.1   4.3  16.7
6.3        fire          2
158   7     7  2012          38  43  13   0.5  85.0    13   35.4   4.1  13.7
5.2        fire          2
159   8     7  2012          35  47  18   6.0  80.8   9.8    9.7   3.1   9.4
3         fire          2
160   9     7  2012          36  43  15   1.9  82.3   9.4    9.9   3.2     9
3.1        fire          2
161  10     7  2012          34  51  16   3.8  77.5     8    9.5     2   7.7
1.3    not fire          2
162  11     7  2012          34  56  15   2.9  74.8   7.1    9.5   1.6   6.8
0.8    not fire          2
163  12     7  2012          36  44  13   0.0  90.1  12.6   19.4   8.3  12.5
9.6        fire          2
164  13     7  2012          39  45  13   0.6  85.2  11.3   10.4   4.2  10.9
4.7        fire          2
165  15     7  2012          34  45  17   0.0  90.5    18   24.1  10.9  17.7
14.1        fire          2
166  16     7  2012          31  83  17   0.0  84.5  19.4   33.1   4.7  19.2
7.3        fire          2
167  17     7  2012          32  81  17   0.0  84.6  21.1   42.3   4.7  20.9
7.7        fire          2
168  18     7  2012          33  68  15   0.0  86.1  23.9   51.6   5.2  23.9
9.1        fire          2
169  19     7  2012          34  58  16   0.0  88.1  27.8   61.1   7.3  27.7
13         fire          2
170  20     7  2012          36  50  16   0.0  89.9  32.7     71   9.5  32.6
17.3        fire          2
171  21     7  2012          36  29  18   0.0  93.9  39.6   80.6  18.5  39.5
30         fire          2
172  22     7  2012          32  48  18   0.0  91.5  44.2   90.1  13.2    44
25.4        fire          2
173  23     7  2012          31  71  17   0.0  87.3  46.6     99   6.9  46.5
16.3        fire          2
174  24     7  2012          33  63  17   1.1  72.8  20.9   56.6   1.6  21.7
2.5    not fire          2
175  25     7  2012          39  64   9   1.2  73.8  11.7   15.9   1.1  11.4
0.7    not fire          2
176  26     7  2012          35  58  10   0.2  78.3  10.8   19.7   1.6  10.7
1    not fire          2
177  27     7  2012          29  87  18   0.0  80.0  11.8   28.3   2.8  11.8
3.2    not fire          2
178  28     7  2012          33  57  16   0.0  87.5  15.7   37.6   6.7  15.7
9         fire          2
```

```
179  29     7  2012          34  59  16   0.0  88.1  19.5   47.2   7.4  19.5
10.9        fire          2
180  30     7  2012          36  56  16   0.0  88.9  23.8   57.1   8.2  23.8
13.2        fire          2
181  31     7  2012          37  55  15   0.0  89.3  28.3   67.2   8.3  28.3
14.5        fire          2
182   1     8  2012          38  52  14   0.0  78.3   4.4   10.5     2   4.4
0.8     not fire          2
183   2     8  2012          40  34  14   0.0  93.3  10.8   21.4  13.8  10.6
13.5        fire          2
184   3     8  2012          39  33  17   0.0  93.7  17.1   32.1  17.2  16.9
19.5        fire          2
185   4     8  2012          38  35  15   0.0  93.8    23   42.7  15.7  22.9
20.9        fire          2
186   5     8  2012          34  42  17   0.1  88.3  23.6   52.5    19  23.5
12.6        fire          2
187   6     8  2012          30  54  14   3.1  70.5    11    9.1   1.3  10.5
0.8     not fire          2
188   7     8  2012          34  63  13   2.9  69.7   7.2    9.8   1.2   6.9
0.6     not fire          2
189   8     8  2012          37  56  11   0.0  87.4  11.2   20.2   5.2    11
5.9         fire          2
190   9     8  2012          39  43  12   0.0  91.7  16.5   30.9   9.6  16.4
12.7        fire          2
191  10     8  2012          39  39  15   0.2  89.3  15.8   35.4   8.2  15.8
10.7        fire          2
192  11     8  2012          40  31  15   0.0  94.2  22.5   46.3  16.6  22.4
21.6        fire          2
193  12     8  2012          39  21  17   0.4  93.0  18.4   41.5  15.5  18.4
18.8        fire          2
194  13     8  2012          35  34  16   0.2  88.3  16.9   45.1   7.5  17.5
10.5        fire          2
195  14     8  2012          37  40  13   0.0  91.9  22.3   55.5  10.8  22.3
15.7        fire          2
196  15     8  2012          35  46  13   0.3  83.9  16.9   54.2   3.5    19
5.5         fire          2
197  16     8  2012          40  41  10   0.1  92.0  22.6   65.1   9.5  24.2
14.8        fire          2
198  17     8  2012          42  24   9   0.0  96.0  30.3   76.4  15.7  30.4
24         fire          2
199  18     8  2012          37  37  14   0.0  94.3  35.9   86.8    16  35.9
26.3        fire          2
200  19     8  2012          35  66  15   0.1  82.7  32.7   96.8   3.3  35.5
7.7         fire          2
201  20     8  2012          36  81  15   0.0  83.7  34.4    107   3.8  38.1
9         fire          2
202  21     8  2012          36  71  15   0.0  86.0  36.9  117.1   5.1  41.3
12.2        fire          2
```

```
203  22     8  2012          37  53  14   0.0  89.5  41.1  127.5     8  45.5
18.1        fire          2
204  23     8  2012          36  43  16   0.0  91.2  46.1  137.7  11.5  50.2
24.5        fire          2
205  24     8  2012          35  38  15   0.0  92.1  51.3  147.7  12.2  54.9
26.9        fire          2
206  25     8  2012          34  40  18   0.0  92.1  56.3  157.5  14.3  59.5
31.1        fire          2
207  26     8  2012          33  37  16   0.0  92.2  61.3  167.2  13.1    64
30.3        fire          2
208  27     8  2012          36  54  14   0.0  91.0  65.9  177.3    10    68
26.1        fire          2
209  28     8  2012          35  56  14   0.4  79.2    37    166   2.1  30.6
6.1    not fire          2
210  29     8  2012          35  53  17   0.5  80.2  20.7  149.2   2.7  30.6
5.9        fire          2
211  30     8  2012          34  49  15   0.0  89.2  24.8  159.1   8.1  35.7
16         fire          2
212  31     8  2012          30  59  19   0.0  89.1  27.8  168.2   9.8  39.3
19.4        fire          2
213   1     9  2012          29  86  16   0.0  37.9   0.9    8.2   0.1   1.4
0    not fire          2
214   2     9  2012          28  67  19   0.0  75.4   2.9   16.3     2     4
0.8    not fire          2
215   3     9  2012          28  75  16   0.0  82.2   4.4   24.3   3.3     6
2.5        fire          2
216   4     9  2012          30  66  15   0.2  73.5   4.1   26.6   1.5     6
0.7    not fire          2
217   5     9  2012          30  58  12   4.1  66.1     4    8.4     1   3.9
0.4    not fire          2
218   6     9  2012          34  71  14   6.5  64.5   3.3    9.1     1   3.5
0.4    not fire          2
219   7     9  2012          31  62  15   0.0  83.3   5.8   17.7   3.8   6.4
3.2        fire          2
220   8     9  2012          30  88  14   0.0  82.5   6.6   26.1     3   8.1
2.7        fire          2
221   9     9  2012          30  80  15   0.0  83.1   7.9   34.5   3.5    10
3.7        fire          2
222  10     9  2012          29  74  15   1.1  59.5   4.7    8.2   0.8   4.6
0.3    not fire          2
223  11     9  2012          30  73  14   0.0  79.2   6.5   16.6   2.1   6.6
1.2    not fire          2
224  12     9  2012          31  72  14   0.0  84.2   8.3   25.2   3.8   9.1
3.9        fire          2
225  13     9  2012          29  49  19   0.0  88.6  11.5   33.4   9.1  12.4
10.3        fire          2
226  14     9  2012          28  81  15   0.0  84.6  12.6   41.5   4.3  14.3
5.7        fire          2
```

```
227  15     9  2012          32  51  13   0.0  88.7    16   50.2   6.9  17.8
9.8        fire          2
228  16     9  2012          33  26  13   0.0  93.9  21.2   59.2  14.2  22.4
19.3        fire          2
229  17     9  2012          34  44  12   0.0  92.5  25.2   63.3  11.2  26.2
17.5        fire          2
230  18     9  2012          36  33  13   0.1  90.6  25.8   77.8     9  28.2
15.4        fire          2
231  19     9  2012          29  41   8   0.1  83.9  24.9     86   2.7  28.9
5.6         fire          2
232  20     9  2012          34  58  13   0.2  79.5  18.7     88   2.1  24.4
3.8     not fire          2
233  21     9  2012          35  34  17   0.0  92.2  23.6   97.3  13.8  29.4
21.6        fire          2
234  22     9  2012          33  64  13   0.0  88.9  26.1  106.3   7.1  32.4
13.7        fire          2
235  23     9  2012          35  56  14   0.0  89.0  29.4  115.6   7.5    36
15.2        fire          2
236  24     9  2012          26  49   6   2.0  61.3  11.9   28.1   0.6  11.9
0.4     not fire          2
237  25     9  2012          28  70  15   0.0  79.9  13.8   36.1   2.4  14.1
3    not fire          2
238  26     9  2012          30  65  14   0.0  85.4    16   44.5   4.5  16.9
6.5         fire          2
239  27     9  2012          28  87  15   4.4  41.1   6.5      8   0.1   6.2
0    not fire          2
240  28     9  2012          27  87  29   0.5  45.9   3.5    7.9   0.4   3.4
0.2     not fire          2
241  29     9  2012          24  54  18   0.1  79.7   4.3   15.2   1.7   5.1
0.7     not fire          2
242  30     9  2012          24  64  15   0.2  67.3   3.8   16.5   1.2   4.8
0.5    not fire          2
```

Zmiana typów danych na wymagane typy danych dla odpowiednich funkcji do analizy

[ ]:
```
dane[['month','day','year','Temperature','RH','Ws']]=dane[['month','day','year','Temperature',
 ↪astype('int64')
```

[ ]:
```
obkiekty=[noweobiekty for noweobiekty in dane.columns if dane[noweobiekty].
 ↪dtypes=='O']
```

[ ]:
```
for i in obkiekty:
    if i!='Classes':
        dane[i]=dane[i].astype(float)
```

Wyświetlenie danych po operacjach

[ ]:
```
dane.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 243 entries, 0 to 242
Data columns (total 15 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   day          243 non-null    int64  
 1   month        243 non-null    int64  
 2   year         243 non-null    int64  
 3   Temperature  243 non-null    int64  
 4   RH           243 non-null    int64  
 5   Ws           243 non-null    int64  
 6   Rain         243 non-null    float64
 7   FFMC         243 non-null    float64
 8   DMC          243 non-null    float64
 9   DC           243 non-null    float64
 10  ISI          243 non-null    float64
 11  BUI          243 non-null    float64
 12  FWI          243 non-null    float64
 13  Classes      243 non-null    object 
 14  Region       243 non-null    int64  
dtypes: float64(7), int64(7), object(1)
memory usage: 28.6+ KB
```

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

[ ]:

	day	month	year	Temperature	RH	Ws	\
count	243.000000	243.000000	243.0	243.000000	243.000000	243.000000	
mean	15.761317	7.502058	2012.0	32.152263	62.041152	15.493827	
std	8.842552	1.114793	0.0	3.628039	14.828160	2.811385	
min	1.000000	6.000000	2012.0	22.000000	21.000000	6.000000	
25%	8.000000	7.000000	2012.0	30.000000	52.500000	14.000000	
50%	16.000000	8.000000	2012.0	32.000000	63.000000	15.000000	
75%	23.000000	8.000000	2012.0	35.000000	73.500000	17.000000	
max	31.000000	9.000000	2012.0	42.000000	90.000000	29.000000	

	Rain	FFMC	DMC	DC	ISI	BUI	\
count	243.000000	243.000000	243.000000	243.000000	243.000000	243.000000	
mean	0.762963	77.842387	14.680658	49.430864	4.742387	16.690535	
std	2.003207	14.349641	12.393040	47.665606	4.154234	14.228421	
min	0.000000	28.600000	0.700000	6.900000	0.000000	1.100000	
25%	0.000000	71.850000	5.800000	12.350000	1.400000	6.000000	
50%	0.000000	83.300000	11.300000	33.100000	3.500000	12.400000	
75%	0.500000	88.300000	20.800000	69.100000	7.250000	22.650000	
max	16.800000	96.000000	65.900000	220.400000	19.000000	68.000000	

	FWI	Region
count	243.000000	243.000000

```
mean      7.035391    1.497942
std       7.440568    0.501028
min       0.000000    1.000000
25%       0.700000    1.000000
50%       4.200000    1.000000
75%      11.450000    2.000000
max      31.100000    2.000000
```

Ustawnie klasyfikacji dla klas

[ ]:
```
dane["Classes"].value_counts()
```

[ ]:
```
fire            131
not fire        101
fire              4
fire              2
not fire          2
not fire          1
not fire          1
not fire          1
Name: Classes, dtype: int64
```

[ ]:
```
dane.Classes = dane.Classes.str.strip()
```

[ ]:
```
dane["Classes"].value_counts()
```

[ ]:
```
fire        137
not fire    106
Name: Classes, dtype: int64
```

Ustawienie klasy: - not fire na 0 - fire na 1

[ ]:
```
dane['Classes']= np.where(dane['Classes']== 'not fire',0,1)
```

[ ]:
```
dane.Classes.value_counts()
```

[ ]:
```
1    137
0    106
Name: Classes, dtype: int64
```

Wyświetlenie korelacji

[ ]:
```
dane.corr(numeric_only=True)
```

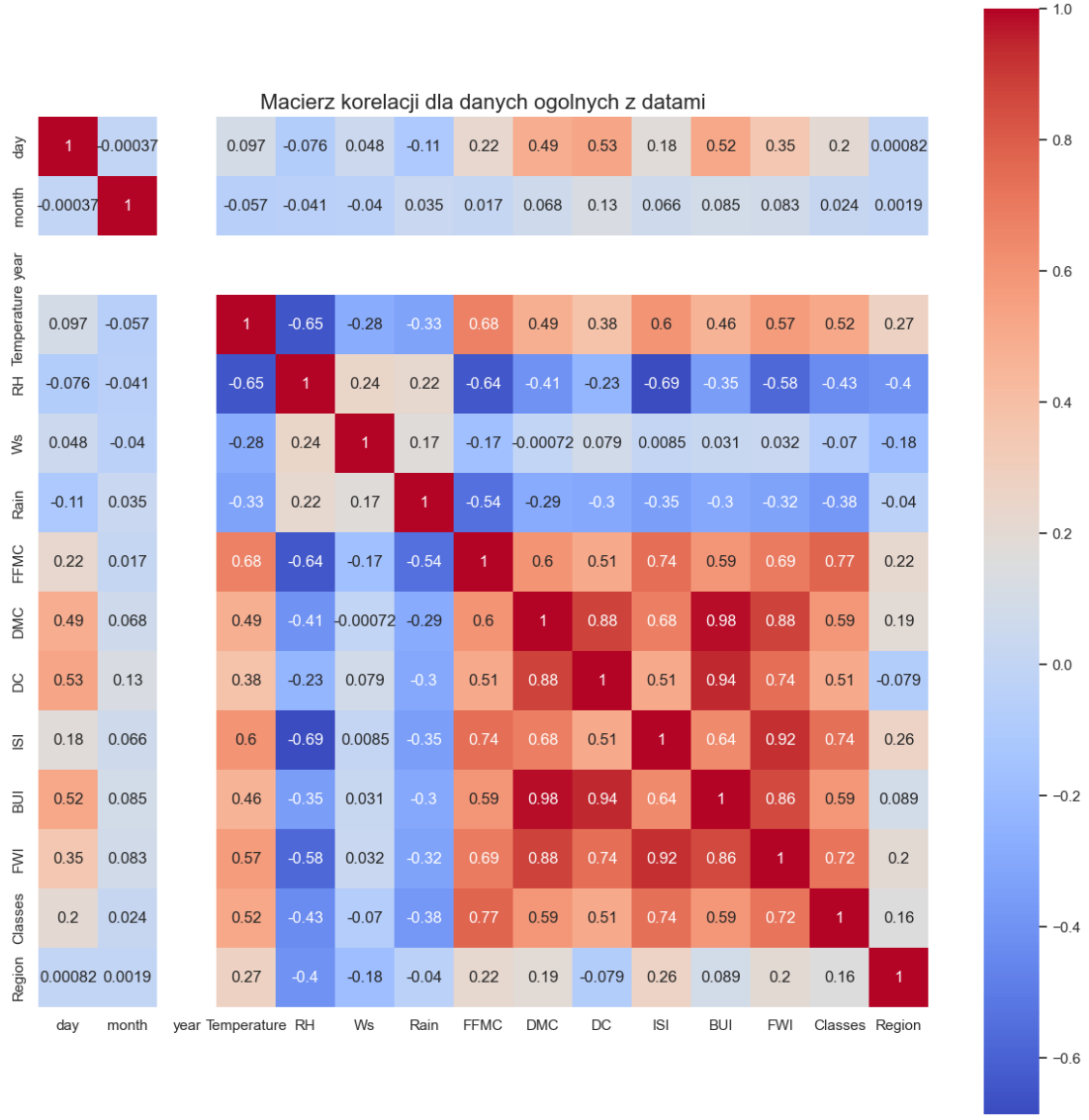
[ ]:
```
                day     month  year  Temperature        RH        Ws  \
day          1.000000 -0.000369   NaN     0.097227 -0.076034  0.047812
month       -0.000369  1.000000   NaN    -0.056781 -0.041252 -0.039880
year              NaN       NaN   NaN          NaN       NaN       NaN
Temperature  0.097227 -0.056781   NaN     1.000000 -0.651400 -0.284510
```

```
RH          -0.076034 -0.041252   NaN    -0.651400  1.000000  0.244048
Ws           0.047812 -0.039880   NaN    -0.284510  0.244048  1.000000
Rain        -0.112523  0.034822   NaN    -0.326492  0.222356  0.171506
FFMC         0.224956  0.017030   NaN     0.676568 -0.644873 -0.166548
DMC          0.491514  0.067943   NaN     0.485687 -0.408519 -0.000721
DC           0.527952  0.126511   NaN     0.376284 -0.226941  0.079135
ISI          0.180543  0.065608   NaN     0.603871 -0.686667  0.008532
BUI          0.517117  0.085073   NaN     0.459789 -0.353841  0.031438
FWI          0.350781  0.082639   NaN     0.566670 -0.580957  0.032368
Classes      0.202840  0.024004   NaN     0.516015 -0.432161 -0.069964
Region       0.000821  0.001857   NaN     0.269555 -0.402682 -0.181160

                Rain      FFMC       DMC        DC       ISI       BUI  \
day         -0.112523  0.224956  0.491514  0.527952  0.180543  0.517117
month        0.034822  0.017030  0.067943  0.126511  0.065608  0.085073
year              NaN       NaN       NaN       NaN       NaN       NaN
Temperature -0.326492  0.676568  0.485687  0.376284  0.603871  0.459789
RH           0.222356 -0.644873 -0.408519 -0.226941 -0.686667 -0.353841
Ws           0.171506 -0.166548 -0.000721  0.079135  0.008532  0.031438
Rain         1.000000 -0.543906 -0.288773 -0.298023 -0.347484 -0.299852
FFMC        -0.543906  1.000000  0.603608  0.507397  0.740007  0.592011
DMC         -0.288773  0.603608  1.000000  0.875925  0.680454  0.982248
DC          -0.298023  0.507397  0.875925  1.000000  0.508643  0.941988
ISI         -0.347484  0.740007  0.680454  0.508643  1.000000  0.644093
BUI         -0.299852  0.592011  0.982248  0.941988  0.644093  1.000000
FWI         -0.324422  0.691132  0.875864  0.739521  0.922895  0.857973
Classes     -0.379097  0.769492  0.585658  0.511123  0.735197  0.586639
Region      -0.040013  0.222241  0.192089 -0.078734  0.263197  0.089408

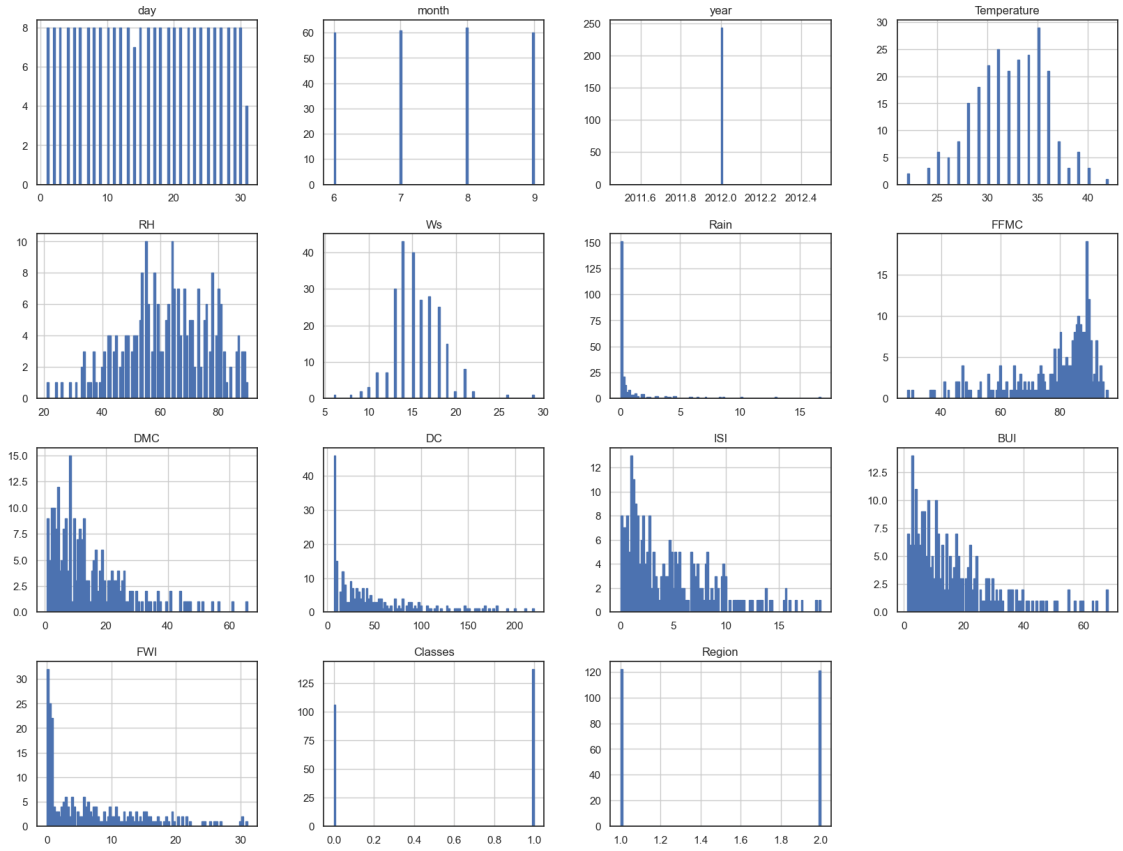
                FWI   Classes    Region
day          0.350781  0.202840  0.000821
month        0.082639  0.024004  0.001857
year              NaN       NaN       NaN
Temperature  0.566670  0.516015  0.269555
RH          -0.580957 -0.432161 -0.402682
Ws           0.032368 -0.069964 -0.181160
Rain        -0.324422 -0.379097 -0.040013
FFMC         0.691132  0.769492  0.222241
DMC          0.875864  0.585658  0.192089
DC           0.739521  0.511123 -0.078734
ISI          0.922895  0.735197  0.263197
BUI          0.857973  0.586639  0.089408
FWI          1.000000  0.719216  0.197102
Classes      0.719216  1.000000  0.162347
Region       0.197102  0.162347  1.000000
```

[ ]:
```
sns.set(style="white")
korelacja = dane.corr(numeric_only=True)
plt.figure(figsize=(15, 15))
sns.heatmap(korelacja, annot=True, cmap='coolwarm', square=True)
plt.title('Macierz korelacji dla danych ogolnych z datami', fontsize=16)
plt.show()
```



Wyświetlenie histogramu

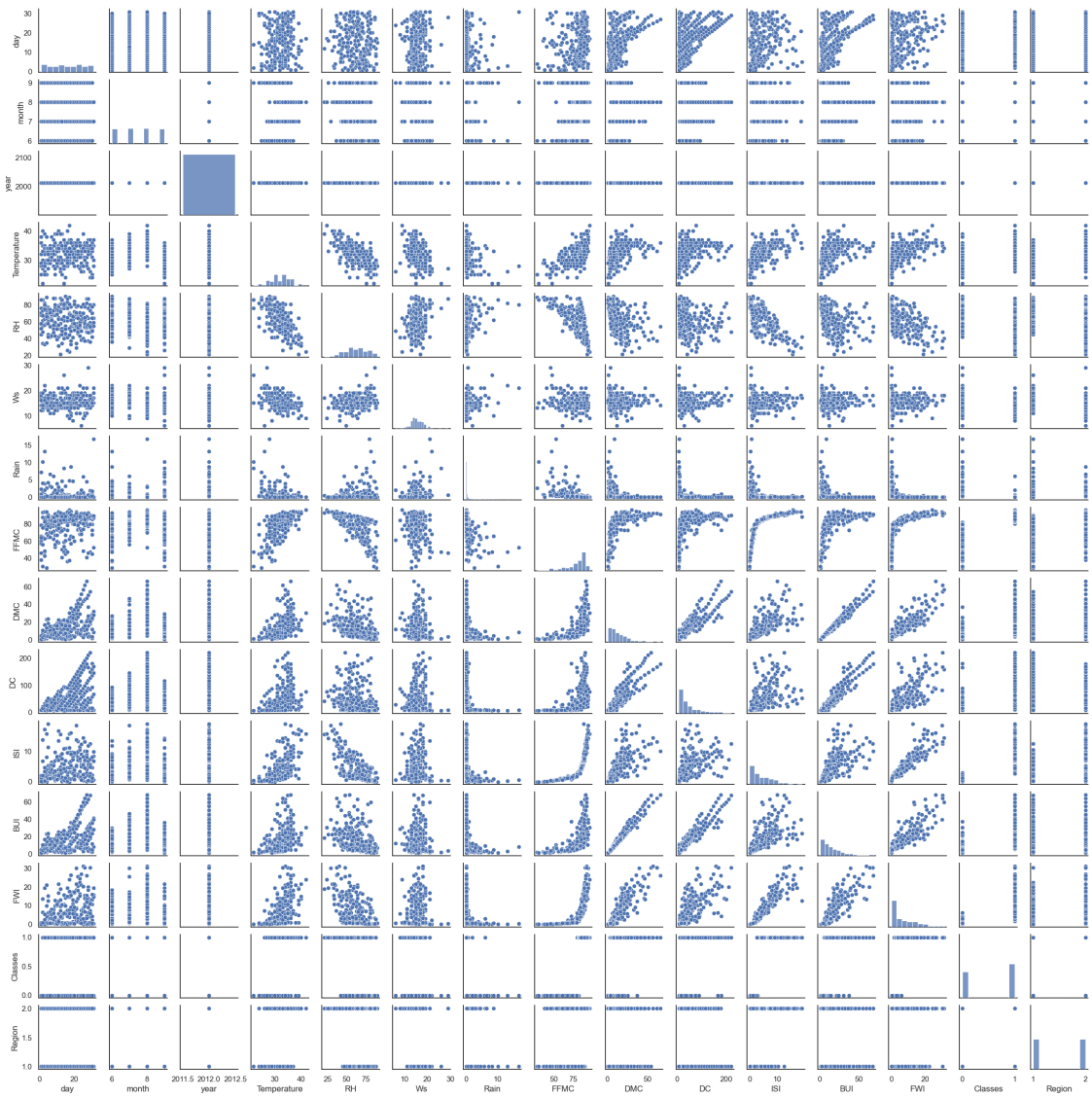
[ ]:
```
dane.hist(bins=100, figsize=(20, 15), ec='b')
plt.show()
```



Wykresy rozrzutów

[ ]:
```
sns.pairplot(dane, height=1.5,
             aspect=1,)
```

[ ]: <seaborn.axisgrid.PairGrid at 0x1fd6ca81a10>



Procent porżarów według klasy

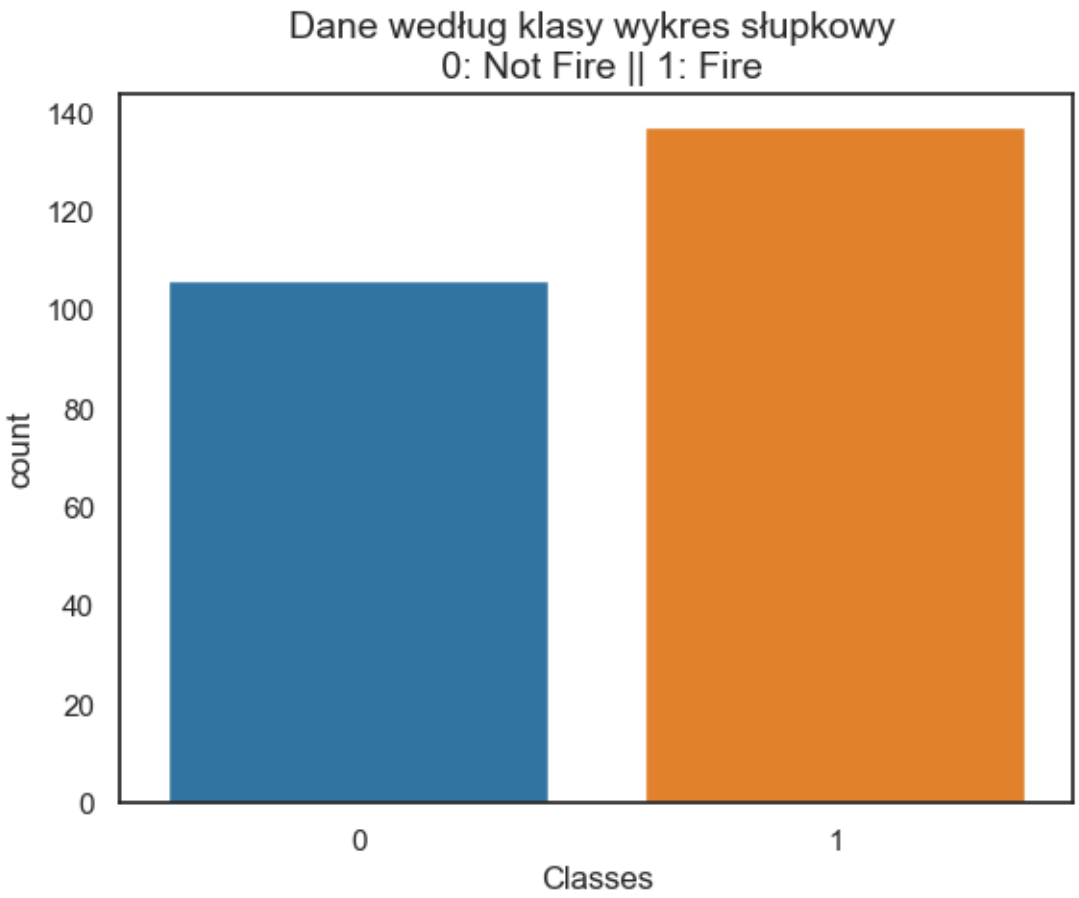
[ ]:
```
procent = dane.Classes.value_counts(normalize=True)*100
procent
```

[ ]:
```
1    56.378601
0    43.621399
Name: Classes, dtype: float64
```

Analiza pożarów dla Algerii - klasa 0 - Not Fire - klasa 1 - Fire

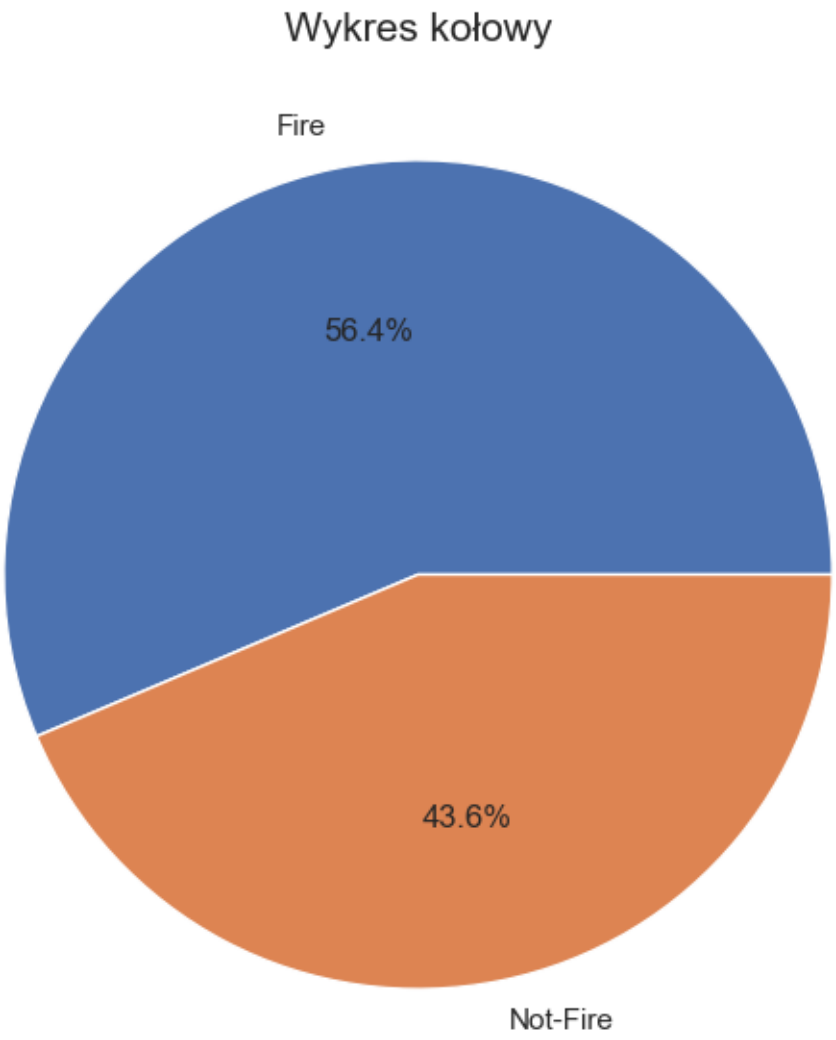
[ ]:
```
sns.countplot(x='Classes', data=dane, palette="tab10")
plt.title('Dane według klasy wykres słupkowy \n 0: Not Fire || 1: Fire',␣
 ↪fontsize=14)
```

[ ]: Text(0.5, 1.0, 'Dane według klasy wykres słupkowy \n 0: Not Fire || 1: Fire')



Wykres kołowy

[ ]:
```
classeslabels = ["Fire", "Not-Fire"]
plt.figure(figsize=(12, 7))
plt.pie(procent, labels=classeslabels, autopct='%1.1f%%')
plt.title("Wykres kołowy", fontsize=15)
plt.show()
```



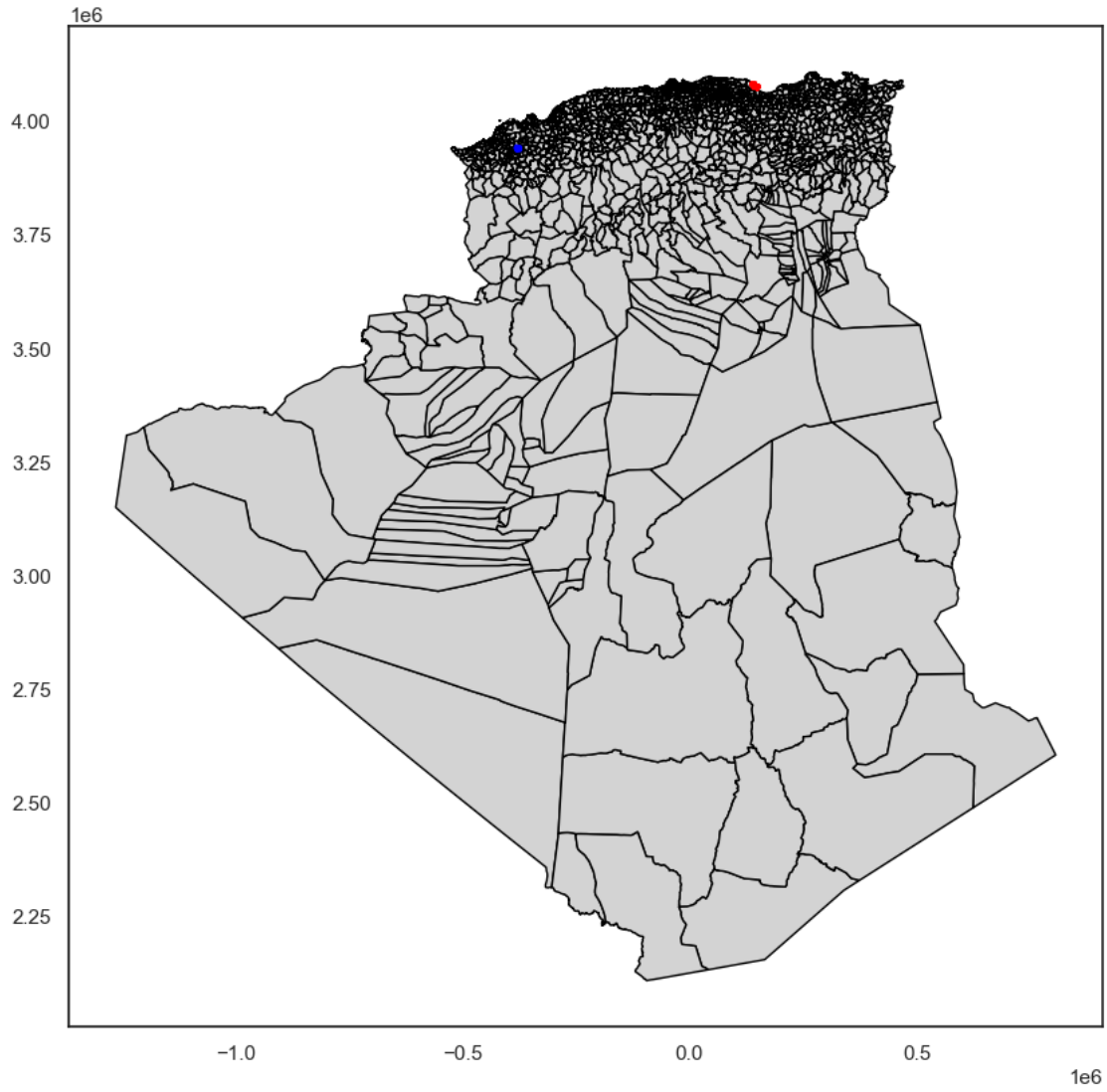
Zaznaczenie regionów gdzie są pożary: - Kolor czerowny - Bejaia - Kolor niebieski - Sidi Bel Abbes

[ ]:
```
mapaalgerii = gpd.read_file(
    r'.\dza_admbnda_unhcr2020_shp\dza_admbnda_adm2_unhcr_20200120.shp')
bejaia = mapaalgerii.loc[mapaalgerii['ADM2_EN'] == 'Bejaia'].to_crs(epsg=32632)
sidi_bel_abbes = mapaalgerii.loc[mapaalgerii['ADM2_EN']
                                 == 'Sidi Bel Abbes'].to_crs(epsg=32632)

fig, ax = plt.subplots(figsize=(10, 10))
mapaalgerii.to_crs(epsg=32632).plot(
    ax=ax, color='lightgray', edgecolor='black')
bejaia.boundary.plot(ax=ax, color='red', linewidth=2)
sidi_bel_abbes.boundary.plot(ax=ax, color='blue', linewidth=2)
```

```
ax.annotate('', xy=(bejaia.centroid.x.iloc[0], bejaia.centroid.y.iloc[0]),
            color='red', fontsize=12, ha='center')
ax.annotate('', xy=(sidi_bel_abbes.centroid.x.iloc[0],
            sidi_bel_abbes.centroid.y.iloc[0]), color='blue', fontsize=12,␣
 ↪ha='center')

plt.show()
```



Analiza pożarów dla Algerii dla danego regionu - klasa 0 - Not Fire - klasa 1 - Fire

[ ]:
```
etykietyklasy = ['Not Fire', 'Fire']
```

```
mapabejaia = '.\dza_admbnda_unhcr2020_shp\dza_admbnda_adm2_unhcr_20200120.shp'
danemapy = gpd.read_file(mapabejaia)

bejaia = danemapy[danemapy['ADM2_EN'] == 'Bejaia']


bejaia_pozar = dane[dane['Region'] == 1]

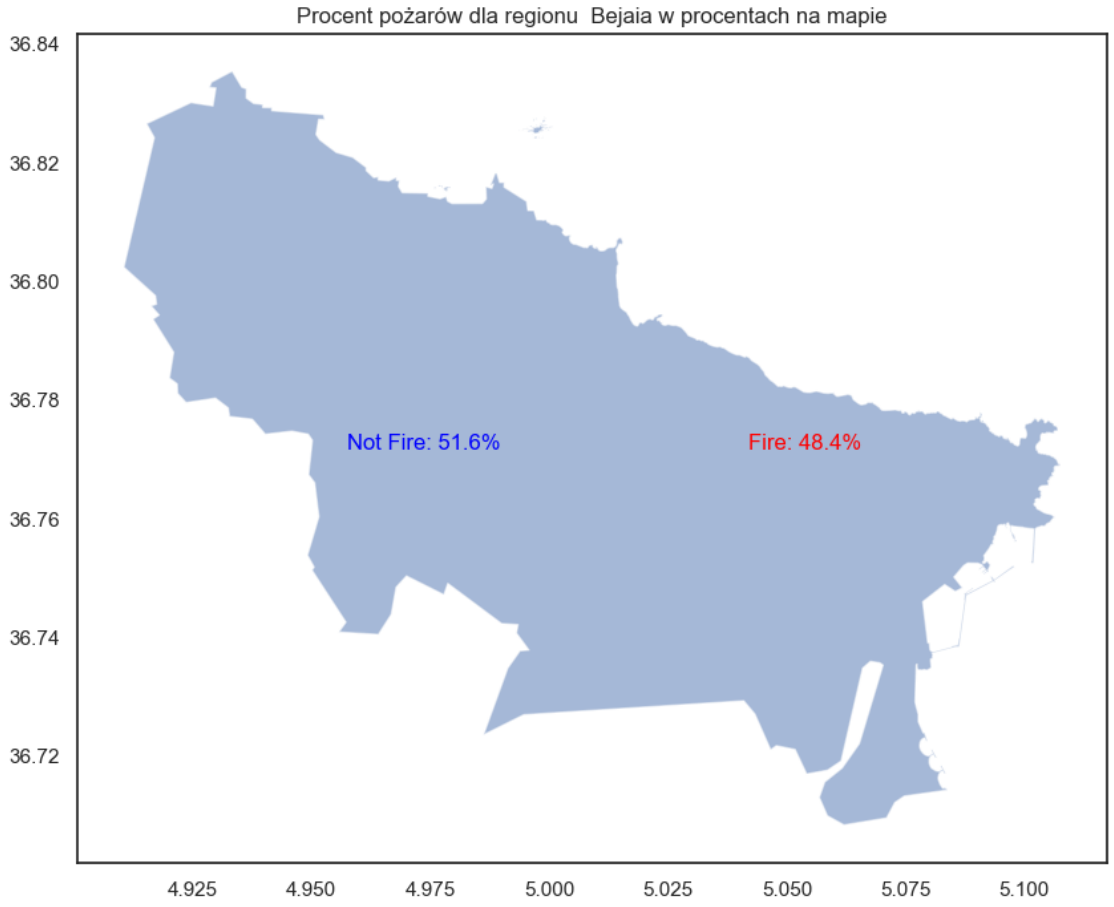
procentbejaia = bejaia_pozar['Classes'].value_counts(normalize=True) * 100

fig, ax = plt.subplots(figsize=(10, 10))
bejaia.plot(ax=ax, alpha=0.5)

for idx, row in bejaia.iterrows():
    for i, val in enumerate(procentbejaia):
        if i == 0:
            color = 'blue'
            text = f"{etykietyklasy[0]}: {val:.1f}%"
            x_offset = -0.030
        else:
            color = 'red'
            text = f"{etykietyklasy[1]}: {val:.1f}%"
            x_offset = 0.050
        ax.annotate(text=text, xy=(
            row.geometry.centroid.x + x_offset, row.geometry.centroid.y),␣
 ↪color=color, ha='center', fontsize=12)


plt.title('Procent pożarów dla regionu  Bejaia w procentach na mapie')


plt.show()
```



[ ]:
```
etykietyklasy = ['Not Fire', 'Fire']

mapa_sidi_bel_abbes = '.
 ↪\dza_admbnda_unhcr2020_shp\dza_admbnda_adm2_unhcr_20200120.shp'
danemapy = gpd.read_file(mapa_sidi_bel_abbes)

Sidi_bel_abbes = danemapy[danemapy['ADM2_EN'] == 'Sidi Bel Abbes']


Sidi_bel_abbes_pozar= dane[dane['Region'] == 2]

procentsidibel = Sidi_bel_abbes_pozar['Classes'].value_counts(normalize=True) *␣
 ↪100

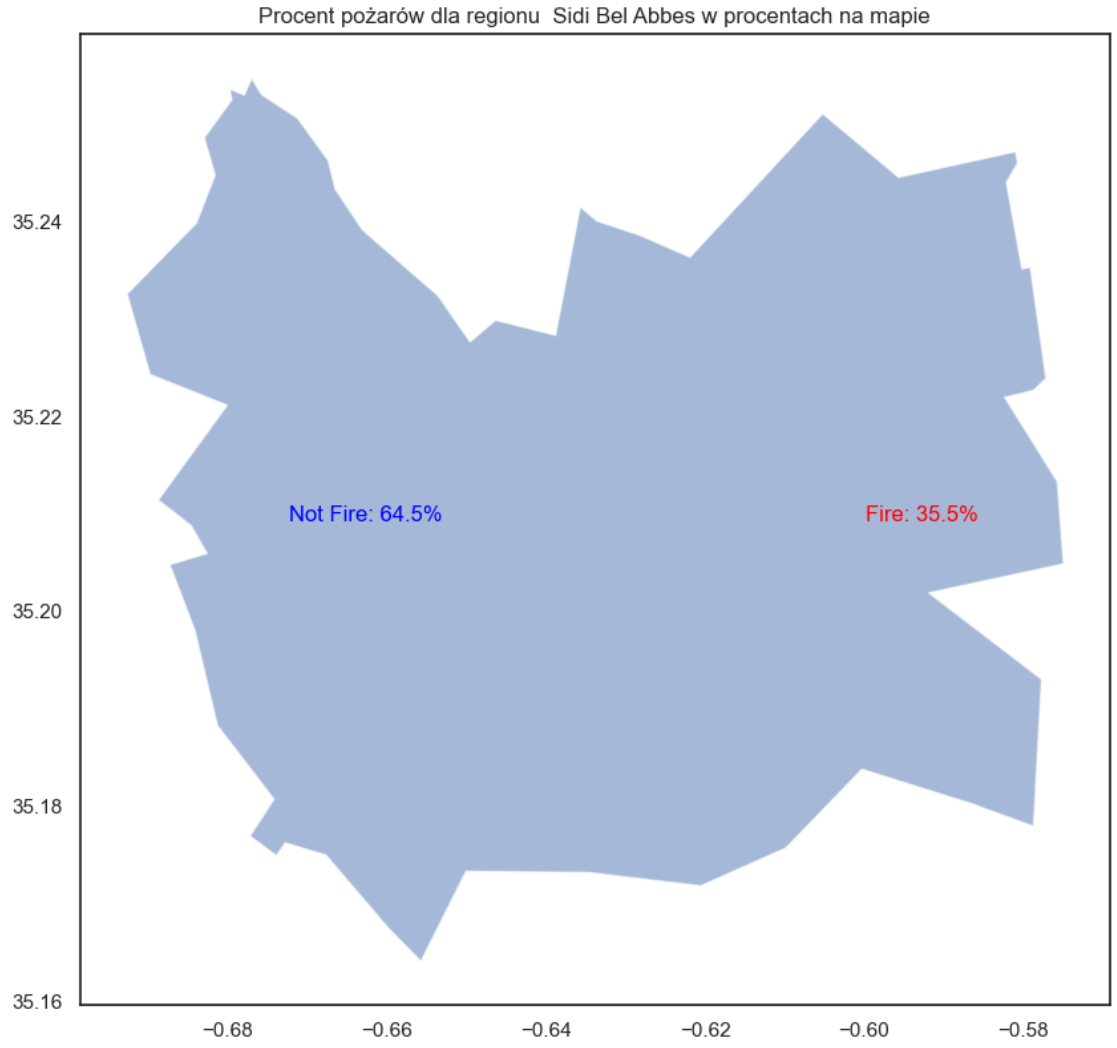
fig, ax = plt.subplots(figsize=(10, 10))
Sidi_bel_abbes.plot(ax=ax, alpha=0.5)

for idx, row in Sidi_bel_abbes.iterrows():
```

```
    for i, val in enumerate(procentsidibel):
        if i == 0:
            color = 'blue'
            text = f"{etykietyklasy[0]}: {val:.1f}%"
            x_offset = -0.030
        else:
            color = 'red'
            text = f"{etykietyklasy[1]}: {val:.1f}%"
            x_offset = 0.040
        ax.annotate(text=text, xy=(
            row.geometry.centroid.x + x_offset, row.geometry.centroid.y),␣
 ↪color=color, ha='center', fontsize=12)

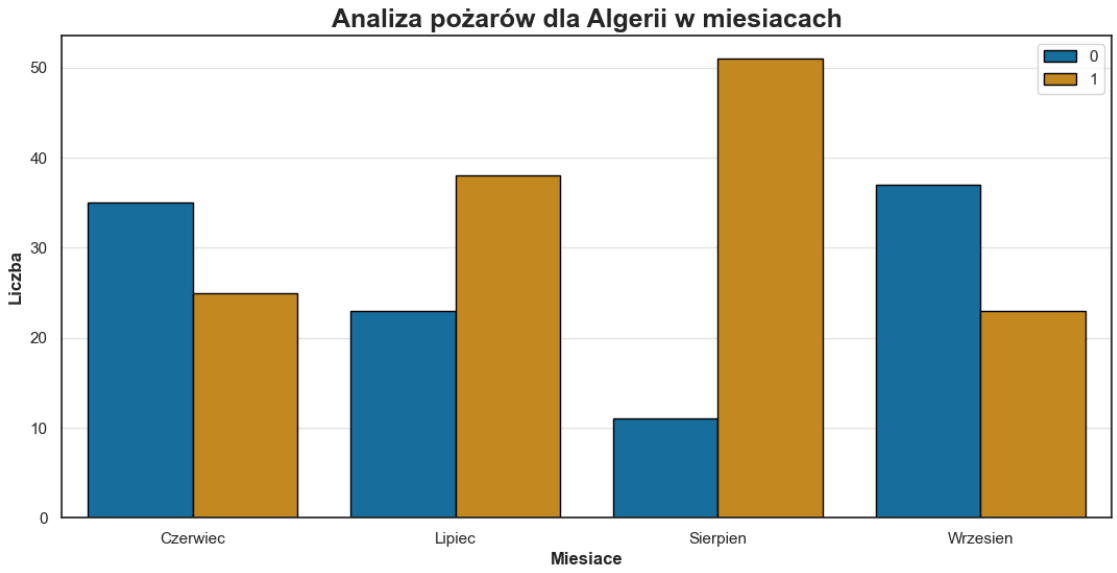

plt.title('Procent pożarów dla regionu  Sidi Bel Abbes w procentach na mapie')


plt.show()
```

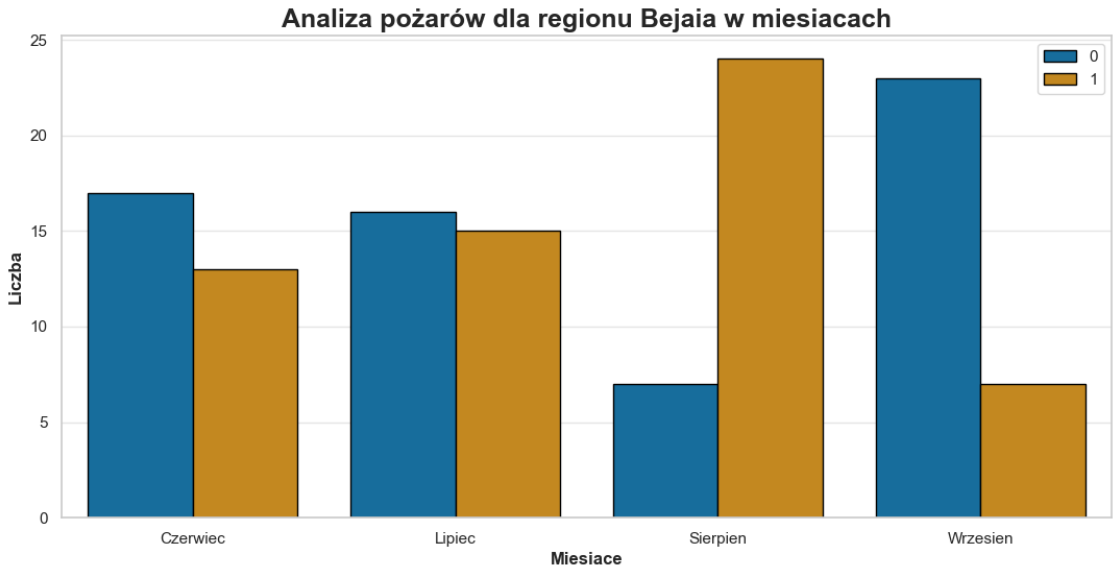


Analiza pożarów dla Algerii i dla danych regionów dla danego miesiąca - klasa 0 - Not Fire - klasa 1 - Fire

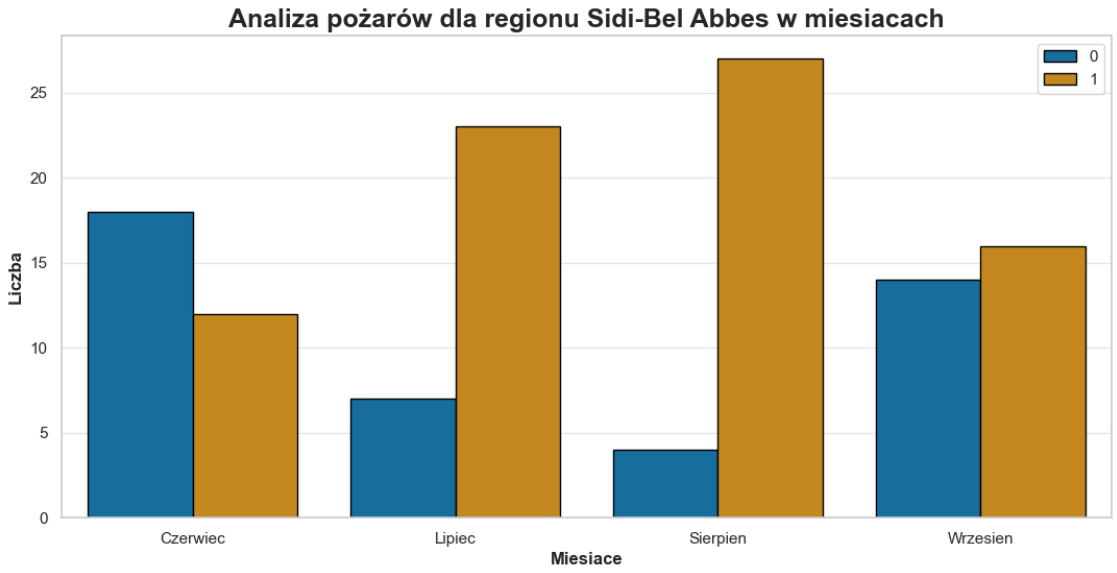
[ ]:
```
plt.subplots(figsize=(13, 6))
sns.set_style('whitegrid')
sns.countplot(x='month', hue='Classes', data=dane,
              ec='black', palette='colorblind')
plt.title('Analiza pożarów dla Algerii w miesiacach',
          fontsize=18, weight='bold')
plt.ylabel('Liczba', weight='bold')
plt.xlabel('Miesiace', weight='bold')
plt.legend(loc='upper right')
plt.xticks(np.arange(4), ['Czerwiec', 'Lipiec', 'Sierpien', 'Wrzesien',])
plt.grid(alpha=0.5, axis='y')
plt.show()
```



[ ]:
```
nowedane = dane.loc[dane['Region'] == 1]
plt.subplots(figsize=(13, 6))
sns.set_style('whitegrid')
sns.countplot(x='month', hue='Classes', data=nowedane,
              ec='black', palette='colorblind')
plt.title('Analiza pożarów dla regionu Bejaia w miesiacach',
          fontsize=18, weight='bold')
plt.ylabel('Liczba', weight='bold')
plt.xlabel('Miesiace', weight='bold')
plt.legend(loc='upper right')
plt.xticks(np.arange(4), ['Czerwiec', 'Lipiec', 'Sierpien', 'Wrzesien',])
plt.grid(alpha=0.5, axis='y')
plt.show()
```



[ ]:
```
nowedane = dane.loc[dane['Region'] == 2]
plt.subplots(figsize=(13, 6))
sns.set_style('whitegrid')
sns.countplot(x='month', hue='Classes', data=nowedane,
              ec='black', palette='colorblind')
plt.title('Analiza pożarów dla regionu Sidi-Bel Abbes w miesiacach',
          fontsize=18, weight='bold')
plt.ylabel('Liczba', weight='bold')
plt.xlabel('Miesiace', weight='bold')
plt.legend(loc='upper right')
plt.xticks(np.arange(4), ['Czerwiec', 'Lipiec', 'Sierpien', 'Wrzesien',])
plt.grid(alpha=0.5, axis='y')
plt.show()
```



Analiza regresji

Usunięcie dnia meisiaca i roku na prztrzeby regresji analizy

[ ]:
```
dane = dane.drop(['day', 'month', 'year'], axis=1)
dane.head(10)
```

[ ]:

	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes	\
0	29	57	18	0.0	65.7	3.4	7.6	1.3	3.4	0.5	0	
1	29	61	13	1.3	64.4	4.1	7.6	1.0	3.9	0.4	0	
2	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1	0	
3	25	89	13	2.5	28.6	1.3	6.9	0.0	1.7	0.0	0	
4	27	77	16	0.0	64.8	3.0	14.2	1.2	3.9	0.5	0	
5	31	67	14	0.0	82.6	5.8	22.2	3.1	7.0	2.5	1	
6	33	54	13	0.0	88.2	9.9	30.5	6.4	10.9	7.2	1	
7	30	73	15	0.0	86.6	12.1	38.3	5.6	13.5	7.1	1	
8	25	88	13	0.2	52.9	7.9	38.8	0.4	10.5	0.3	0	
9	28	79	12	0.0	73.2	9.5	46.3	1.3	12.6	0.9	0	

	Region
0	1
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1

```
9       1
```

Podział zbioru danych na funkcję wejściową i wyjściową do analizy regresji

[ ]:
```
x = dane.iloc[:,0:10]
y= dane['FWI']
```

[ ]:
```
x.head()
```

[ ]:
```
   Temperature  RH  Ws  Rain  FFMC  DMC    DC  ISI  BUI  FWI
0           29  57  18   0.0  65.7  3.4   7.6  1.3  3.4  0.5
1           29  61  13   1.3  64.4  4.1   7.6  1.0  3.9  0.4
2           26  82  22  13.1  47.1  2.5   7.1  0.3  2.7  0.1
3           25  89  13   2.5  28.6  1.3   6.9  0.0  1.7  0.0
4           27  77  16   0.0  64.8  3.0  14.2  1.2  3.9  0.5
```

[ ]:
```
y.head()
```

[ ]:
```
0    0.5
1    0.4
2    0.1
3    0.0
4    0.5
Name: FWI, dtype: float64
```

Podział zestawu danych na zbiór uczący i zbiór testowy

[ ]:
```
x_uczacy, x_testujacy, y_uczacy , y_testujacy = train_test_split(x, y,␣
 ↪test_size=0.25,
                                                                 random_state=0)
x_uczacy.shape, x_testujacy.shape
```

[ ]:
```
((182, 10), (61, 10))
```

[ ]:
```
x_testujacy.columns
```

[ ]:
```
Index(['Temperature', 'RH', 'Ws', 'Rain', 'FFMC', 'DMC', 'DC', 'ISI', 'BUI',
       'FWI'],
      dtype='object')
```

Korelacja uczących danych

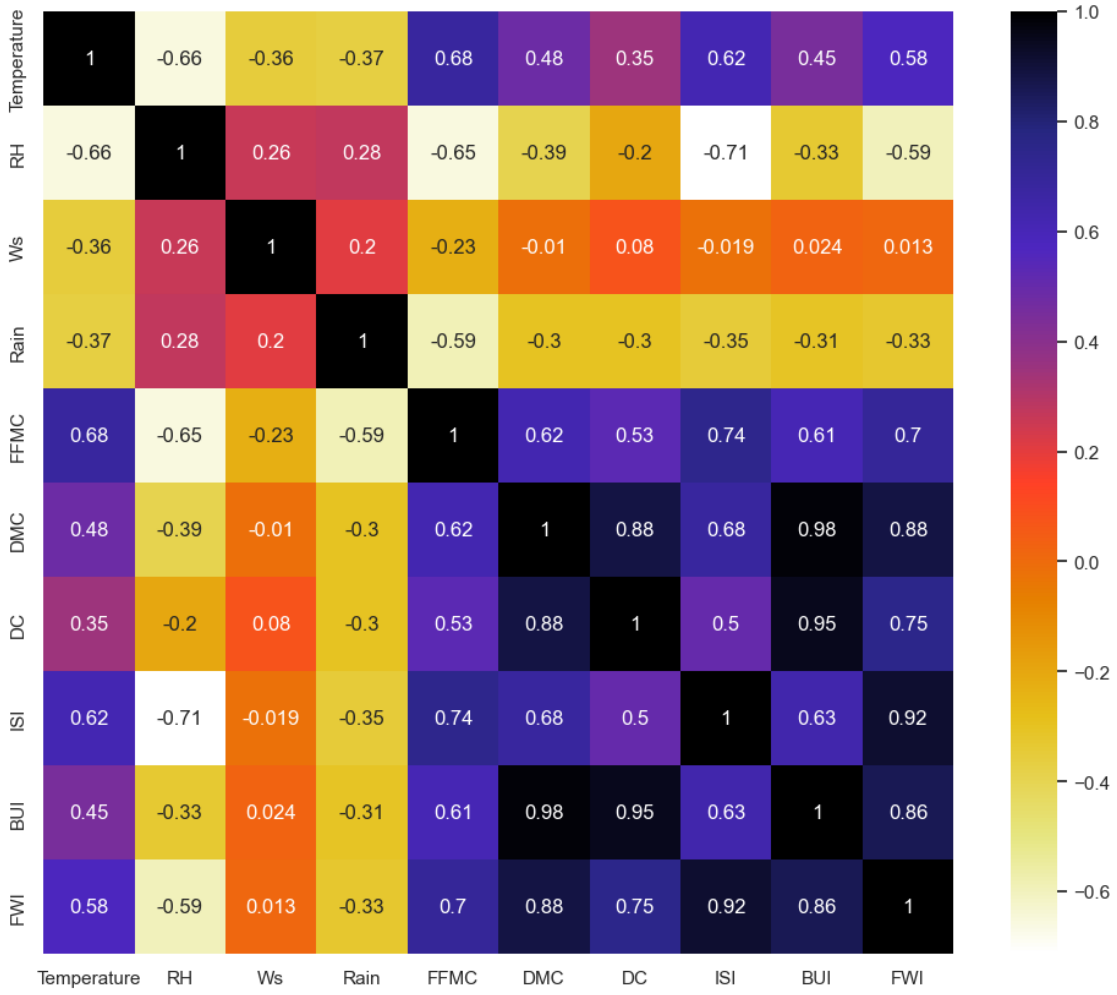
[ ]:
```
x_uczacy.corr()
```

[ ]:
```
             Temperature        RH        Ws      Rain      FFMC       DMC  \
Temperature     1.000000 -0.657325 -0.357016 -0.365941  0.684556  0.482965
RH             -0.657325  1.000000  0.262581  0.275592 -0.653649 -0.393893
Ws             -0.357016  0.262581  1.000000  0.204035 -0.226129 -0.010158
Rain           -0.365941  0.275592  0.204035  1.000000 -0.589465 -0.300364
```

```
FFMC            0.684556 -0.653649 -0.226129 -0.589465  1.000000  0.621958
DMC             0.482965 -0.393893 -0.010158 -0.300364  0.621958  1.000000
DC              0.349021 -0.203883  0.079699 -0.302591  0.528275  0.884417
ISI             0.618172 -0.712353 -0.018845 -0.347660  0.742079  0.680918
BUI             0.447959 -0.333027  0.023680 -0.308258  0.606527  0.984222
FWI             0.575406 -0.594299  0.013239 -0.326426  0.704563  0.882314
```

```
                   DC       ISI       BUI       FWI
Temperature  0.349021  0.618172  0.447959  0.575406
RH          -0.203883 -0.712353 -0.333027 -0.594299
Ws           0.079699 -0.018845  0.023680  0.013239
Rain        -0.302591 -0.347660 -0.308258 -0.326426
FFMC         0.528275  0.742079  0.606527  0.704563
DMC          0.884417  0.680918  0.984222  0.882314
DC           1.000000  0.501412  0.951157  0.746551
ISI          0.501412  1.000000  0.632285  0.918573
BUI          0.951157  0.632285  1.000000  0.855633
FWI          0.746551  0.918573  0.855633  1.000000
```

[ ]:
```
plt.figure(figsize=(12, 10))
korelacja = x_uczacy.corr()
sns.heatmap(korelacja, annot=True, cmap=plt.cm.CMRmap_r)
plt.show()
```



Analizując wyniki korelacji, można zauważyć, że:

- Temperatura ma silną dodatnią korelację z FFMC, a także pozytywną korelację z FWI, BUI i ISI. Oznacza to, że wyższa temperatura zwiększa poziom wysuszonych paliw, co z kolei prowadzi do wzrostu zagrożenia pożarowego.
- Wilgotność względna (RH) ma silną negatywną korelację z FFMC oraz negatywną korelację z FWI, BUI i ISI. Oznacza to, że wyższa wilgotność powietrza zmniejsza poziom wysuszonych paliw i obniża zagrożenie pożarowe.
- Prędkość wiatru (Ws) ma słabą dodatnią korelację z FFMC, a także słabą dodatnią korelację z FWI, BUI i ISI. Oznacza to, że wyższa prędkość wiatru może zwiększyć rozprzestrzenianie się pożaru.
- Opady deszczu mają negatywną korelację z FFMC, FWI, BUI i ISI. Oznacza to, że opady deszczu mogą zmniejszyć poziom wysuszonych paliw i obniżyć zagrożenie pożarowe.
- Składowe FWI (BUI, ISI, FFMC, DMC i DC) są ze sobą silnie skorelowane, co jest zrozumiałe, biorąc pod uwagę, że FWI jest złożonym wskaźnikiem, który uwzględnia wpływ wszystkich

tych składowych na zagrożenie pożarowe. Warto zauważyć, że DMC i DC mają silną pozytywną korelację między sobą, co wskazuje na to, że wyższy poziom wilgoci w glebie wpływa na zwiększenie poziomu wilgoci w glebie organicznej, co z kolei zmniejsza zagrożenie pożarowe.

Sprawdzanie korelacji dla niezależnych cech, a cechy o korelacji większej niż 0,7 gdzie reszta zostanie usunieta z analizy

[ ]:
```
def korelacjafunkcja(dane, prog):
    kolumna_korelacji = set()
    kolumna_macierzy = dane.corr()
    for i in range(len(kolumna_macierzy.columns)):
        for j in range(i):
            if abs(kolumna_macierzy.iloc[i, j]) > prog:
                colname = kolumna_macierzy.columns[i]
                kolumna_korelacji.add(colname)
    return kolumna_korelacji
```

[ ]:
```
nowakorelacja = korelacjafunkcja(x_uczacy, 0.7)
nowakorelacja
```

[ ]:
```
{'BUI', 'DC', 'FWI', 'ISI'}
```

Usówanie 4 atrybutów ze wzgledu na korleacje wyzsza niz 0,7

[ ]:
```
x_uczacy.drop(nowakorelacja, axis=1, inplace=True)
x_testujacy.drop(nowakorelacja, axis=1, inplace=True)
x_uczacy.shape
x_testujacy.shape
```

[ ]:
```
(61, 6)
```

Skalowanie

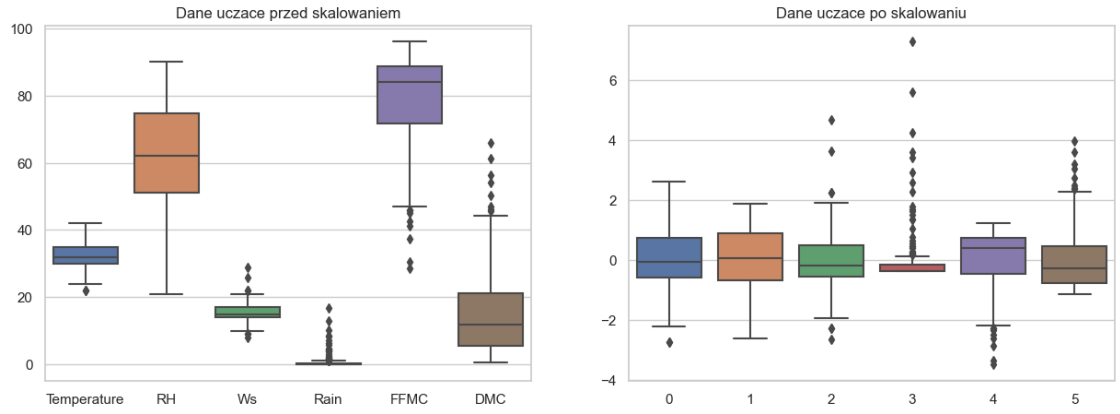
[ ]:
```
def skalowaniefunkcja(x_uczacy, x_testujacy):
    skalowanie = StandardScaler()
    x_uczacy_skalowane = skalowanie.fit_transform(x_uczacy)
    x_testujacy_skalowane = skalowanie.transform(x_testujacy)

    return x_uczacy_skalowane, x_testujacy_skalowane
```

[ ]:
```
x_uczacy_skalowane, x_testujacy_skalowane = skalowaniefunkcja(x_uczacy,␣
↪x_testujacy)
```

[ ]:
```
fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(15, 5))
sns.boxplot(data=x_uczacy, ax=ax1)
ax1.set_title('Dane uczace przed skalowaniem')
sns.boxplot(data=x_uczacy_skalowane, ax=ax2)
ax2.set_title('Dane uczace po skalowaniu')
```

[ ]: Text(0.5, 1.0, 'Dane uczace po skalowaniu')



Regresja liniowa

```
[ ]: Regresjaliniowa = LinearRegression()
     Regresjaliniowa.fit(x_uczacy_skalowane, y_uczacy)
```

[ ]: LinearRegression()

```
[ ]: print('Przechwycenie wynosi :',Regresjaliniowa.intercept_)
     print('Współczynnik wynosi :',Regresjaliniowa.coef_)
```

```
Przechwycenie wynosi : 7.558791208791209
Współczynnik wynosi : [ 0.36394299 -1.99797066  0.98619421  0.04636838
0.80703533  5.44395047]
```

```
[ ]: print("Uczace dane wynik:",Regresjaliniowa.score(x_uczacy_skalowane, y_uczacy))
     print("Testowe dane wynik:",Regresjaliniowa.
       ↪score(x_testujacy_skalowane,y_testujacy))
```

```
Uczace dane wynik: 0.8671797758215145
Testowe dane wynik: 0.7064857305909149
```

```
[ ]: Regresjaliniowa_predykcja = Regresjaliniowa.predict(x_testujacy_skalowane)
     Regresjaliniowa_predykcja
```

```
[ ]: array([ 6.71133901, 12.02490235,  7.17708272,  8.24813881,  5.87107049,
            10.06783722, -1.57757075,  9.49762004,  6.91005123, 11.61699016,
             1.59431776, 13.00464249, 10.62115882, 12.84924636,  2.76686137,
            -0.28105695,  5.56265496,  5.29475405,  2.8722131 , -2.08125537,
            14.70243078,  5.2585157 , 11.12180353, -1.61398266,  2.36852748,
             5.45039685, 10.68723643, -0.14835576,  0.73216072,  2.91307288,
            11.58970348,  0.80835466, -1.68692435, 19.3097082 ,  2.70799081,
             2.90471917,  4.61345951, 20.52842245, 26.80883138,  6.4163819 ,
```

```
         6.1327361 ,  3.2544518 , -4.1397093 ,  3.91659235,  1.16929796,
        -5.4031485 ,  7.39875906,  4.74298501, -4.2341344 , 17.30309118,
         3.21502256,  8.83942816, -2.46778223,  0.69332504,  4.5829139 ,
         1.50799021, 10.54082105,  7.88725824,  8.47179454, 17.63579458,
         1.8425123 ])
```

[ ]:
```
Aktualna_predykcja = pd.DataFrame(
    {'Aktualny przychod': y_testujacy, 'Predykcja przychodu':␣
 ↪Regresjaliniowa_predykcja})
Aktualna_predykcja
```

[ ]:

	Aktualny przychod	Predykcja przychodu
110	9.7	6.711339
150	7.2	12.024902
37	8.0	7.177083
75	6.3	8.248139
109	7.7	5.871070
..	…	…
179	10.9	10.540821
160	3.1	7.887258
159	3.0	8.471795
170	17.3	17.635795
221	3.7	1.842512

[61 rows x 2 columns]

[ ]:
```
absolutnyblad = metrics.
 ↪mean_absolute_error(y_testujacy,Regresjaliniowa_predykcja)
sredniblad = metrics.mean_squared_error(y_testujacy, Regresjaliniowa_predykcja)
glownyblad = np.sqrt(metrics.mean_squared_error(
    y_testujacy, Regresjaliniowa_predykcja))

print('Aboslutny błąd:', absolutnyblad)
print('Sredni błąd:', sredniblad)
print('Główny błąd:', glownyblad)
```

```
Aboslutny błąd: 2.420707955240326
Sredni błąd: 10.189169987051969
Główny błąd: 3.192047929942777
```

[ ]:
```
wynik =  r2_score(y_testujacy, Regresjaliniowa_predykcja)
print("Współczynnik determinacji:",wynik)
```

```
Współczynnik determinacji: 0.7064857305909149
```

Regresja w formie modelu OLS

[ ]:
```
x = sm.add_constant(x)
model = sm.OLS(y, x)
results = model.fit()
print(results.summary())
```

```
                            OLS Regression Results
==============================================================================
Dep. Variable:                    FWI   R-squared:                       1.000
Model:                            OLS   Adj. R-squared:                  1.000
Method:                 Least Squares   F-statistic:                 2.200e+30
Date:                Mon, 22 May 2023   Prob (F-statistic):               0.00
Time:                        15:17:34   Log-Likelihood:                 7274.7
No. Observations:                 243   AIC:                        -1.453e+04
Df Residuals:                     232   BIC:                        -1.449e+04
Df Model:                          10
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const        2.914e-15   3.16e-14      0.092      0.927   -5.93e-14    6.52e-14
Temperature -7.199e-16   6.65e-16     -1.083      0.280   -2.03e-15     5.9e-16
RH           9.008e-16   1.77e-16      5.081      0.000    5.51e-16    1.25e-15
Ws          -2.602e-16   6.42e-16     -0.406      0.685   -1.52e-15       1e-15
Rain         2.281e-16   9.83e-16      0.232      0.817   -1.71e-15    2.16e-15
FFMC        -2.299e-16   2.24e-16     -1.027      0.306   -6.71e-16    2.11e-16
DMC          4.009e-16   1.12e-15      0.358      0.720    -1.8e-15     2.6e-15
DC           2.047e-16   1.65e-16      1.240      0.216   -1.21e-16     5.3e-16
ISI         -9.168e-16   1.82e-15     -0.502      0.616   -4.51e-15    2.68e-15
BUI         -7.277e-16   1.46e-15     -0.499      0.618    -3.6e-15    2.14e-15
FWI             1.0000   1.36e-15   7.38e+14      0.000       1.000       1.000
==============================================================================
Omnibus:                        3.589   Durbin-Watson:                   0.399
Prob(Omnibus):                  0.166   Jarque-Bera (JB):                3.653
Skew:                           0.291   Prob(JB):                        0.161
Kurtosis:                       2.848   Cond. No.                     2.45e+03
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 2.45e+03. This might indicate that there are
strong multicollinearity or other numerical problems.
```

Przy regresji OLS znajduje sie 10 zmiennych

R-kwadrat wynosi 0,86, co oznacza, że 86% zmienności zmiennej zależnej Classes może być wyjaśnione przez zmienne niezależne w tym modelu. Współczynnik R-kwadrat skorygowany wynosi 0,854, co oznacza, że model jest dobrze dopasowany do danych.

Każda z zmiennych niezależnych ma swój współczynnik. Współczynnik jest estymowanym przeciętnym wpływem danej zmiennej niezależnej na zmienną zależną przy założeniu, że wszystkie inne zmienne niezależne są stałe. Współczynniki dla zmiennych Temperature, RH, Ws, FFMC, DMC i ISI są istotne statystycznie, ponieważ mają wartości p mniejsze niż 0,05. Oznacza to, że zmienne te mają istotny wpływ na zmienną zależną Classes.

Zmienne Rain, DC, BUI i FWI nie są istotne statystycznie, ponieważ mają wartości p większe niż 0,05. Oznacza to, że zmienne te nie mają istotnego wpływu na zmienną zależną Classes w tym modelu.

Najbardziej znaczące atrybuty

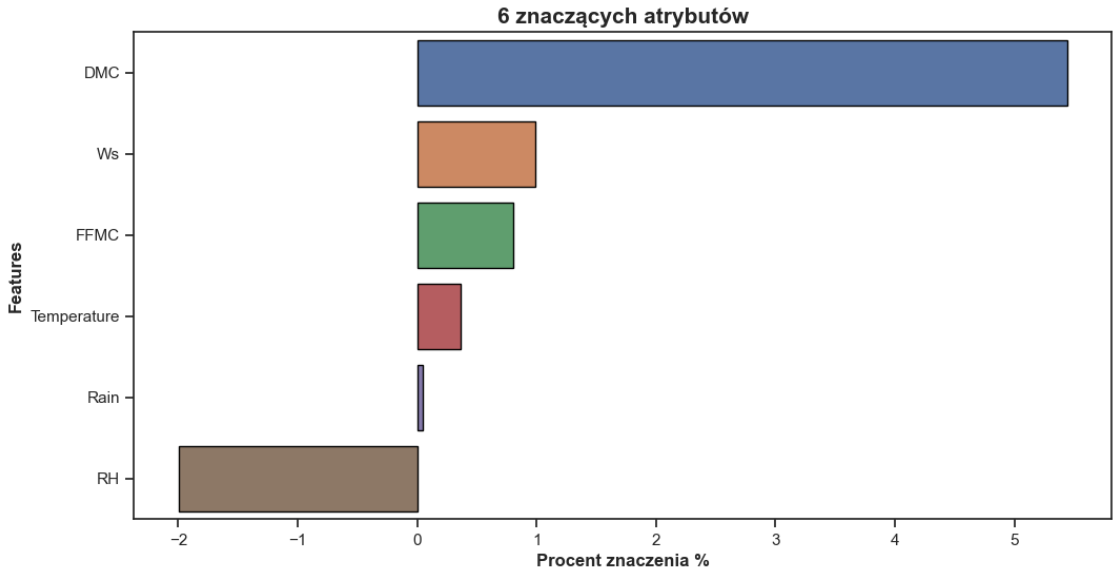
[ ]:
```
znaczaceatrybuty = Regresjaliniowa.coef_
znaczaceatrybutytabela = pd.DataFrame({
    'Atrybuty': x_uczacy.columns,
    'Znaczenie': znaczaceatrybuty
}).sort_values('Znaczenie', ascending=False)
znaczaceatrybutytabela
```

[ ]:

	Atrybuty	Znaczenie
5	DMC	5.443950
2	Ws	0.986194
4	FFMC	0.807035
0	Temperature	0.363943
3	Rain	0.046368
1	RH	-1.997971

[ ]:
```
plt.figure(figsize=(12,6))
sns.set_style('ticks')
ax = sns.barplot(data=znaczaceatrybutytabela,
                 x='Znaczenie', y='Atrybuty', ec='black')
ax.set_title('6 znaczących atrybutów', weight='bold',fontsize = 15)
ax.set_xlabel('Procent znaczenia %',weight='bold')
ax.set_ylabel('Features',weight='bold')
```

[ ]:
```
Text(0, 0.5, 'Features')
```



- (DMC) Indeks Kodu wilgotności Duffa - Wynosi ponad 5%
- (Ws) Prędkość wiatru Wynosi troche ponad 1%
- (FFMC) Indeks Dokładnego kodu wilgotności paliwa - prawie 1 %
- (Temperatue) Temperatura w południe maksymalna wynosi prawie 0.4 %
- (Rain) Całkowity dzień opadów wynosi troche niz 0 %
- (RH) Wilgotność względna wynosi prawie -2%

Klasyfikacja

[ ]:
```
dane.head()
```

[ ]:

	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes	Region
0	29	57	18	0.0	65.7	3.4	7.6	1.3	3.4	0.5	0	1
1	29	61	13	1.3	64.4	4.1	7.6	1.0	3.9	0.4	0	1
2	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1	0	1
3	25	89	13	2.5	28.6	1.3	6.9	0.0	1.7	0.0	0	1
4	27	77	16	0.0	64.8	3.0	14.2	1.2	3.9	0.5	0	1

[ ]:
```
x = dane.iloc[:, 0:10]
y = dane['Classes']
```

[ ]:
```
x.head(10)
```

[ ]:

	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI
0	29	57	18	0.0	65.7	3.4	7.6	1.3	3.4	0.5
1	29	61	13	1.3	64.4	4.1	7.6	1.0	3.9	0.4
2	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1
3	25	89	13	2.5	28.6	1.3	6.9	0.0	1.7	0.0
4	27	77	16	0.0	64.8	3.0	14.2	1.2	3.9	0.5

```
5           31  67  14   0.0  82.6   5.8  22.2  3.1   7.0  2.5
6           33  54  13   0.0  88.2   9.9  30.5  6.4  10.9  7.2
7           30  73  15   0.0  86.6  12.1  38.3  5.6  13.5  7.1
8           25  88  13   0.2  52.9   7.9  38.8  0.4  10.5  0.3
9           28  79  12   0.0  73.2   9.5  46.3  1.3  12.6  0.9
```

[ ]:
```
y.head(10)
```

[ ]:
```
0    0
1    0
2    0
3    0
4    0
5    1
6    1
7    1
8    0
9    0
Name: Classes, dtype: int32
```

[ ]:
```
x_uczacy, x_testujacy, y_uczacy, y_testujacy = train_test_split(
    x, y, test_size=0.3, random_state=0)
x_uczacy.shape, x_testujacy.shape
```

[ ]:
```
((170, 10), (73, 10))
```

[ ]:
```
x_uczacy.columns
```

[ ]:
```
Index(['Temperature', 'RH', 'Ws', 'Rain', 'FFMC', 'DMC', 'DC', 'ISI', 'BUI',
       'FWI'],
      dtype='object')
```

[ ]:
```
x_testujacy.columns
```

[ ]:
```
Index(['Temperature', 'RH', 'Ws', 'Rain', 'FFMC', 'DMC', 'DC', 'ISI', 'BUI',
       'FWI'],
      dtype='object')
```

[ ]:
```
korelacjanowadrzewo = korelacjafunkcja(x_uczacy, 0.7)
korelacjanowadrzewo
```

[ ]:
```
{'BUI', 'DC', 'FWI', 'ISI'}
```

[ ]:
```
x_uczacy.drop(korelacjanowadrzewo, axis=1, inplace=True)
x_testujacy.drop(korelacjanowadrzewo, axis=1, inplace=True)
x_uczacy.shape, x_testujacy.shape
```

[ ]:
```
((170, 6), (73, 6))
```

[ ]:
```
x_uczacy_skalowane, x_testujacy_skalowane = skalowaniefunkcja(x_uczacy,␣
↪x_testujacy)
```

Drzewo dezycyjne

[ ]:
```
Drzewodezycyjne = DecisionTreeClassifier()
Drzewodezycyjne.fit(x_uczacy_skalowane,y_uczacy)
```

[ ]:
```
DecisionTreeClassifier()
```

[ ]:
```
Drzewodezycyjne_predykcja = Drzewodezycyjne.predict(x_testujacy_skalowane)
Drzewodezycyjne_predykcja
```

[ ]:
```
array([1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 0, 1, 1,
       0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 1, 1, 0, 1, 0, 0, 0,
       0, 0, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1,
       0, 0, 1, 1, 1, 0, 1])
```

[ ]:
```
Aktualna_predykcja = pd.DataFrame(
    {'Aktualny przychod ': y_testujacy, 'Predykcjonowany przychod':␣
↪Drzewodezycyjne_predykcja})
Aktualna_predykcja
```

[ ]:

	Aktualny przychod	Predykcjonowany przychod
110	1	1
150	1	1
37	1	1
75	1	1
109	1	1
..	…	…
89	1	1
212	1	1
74	1	1
4	0	0
108	1	1

[73 rows x 2 columns]

[ ]:
```
Wynik = accuracy_score(y_testujacy, Drzewodezycyjne_predykcja)
Raport_klasyfikacyjny = classification_report(
    y_testujacy, Drzewodezycyjne_predykcja)

print("Decision Tree")
print("Accuracy Score value: {:.4f}".format(Wynik))
print(Raport_klasyfikacyjny)
```

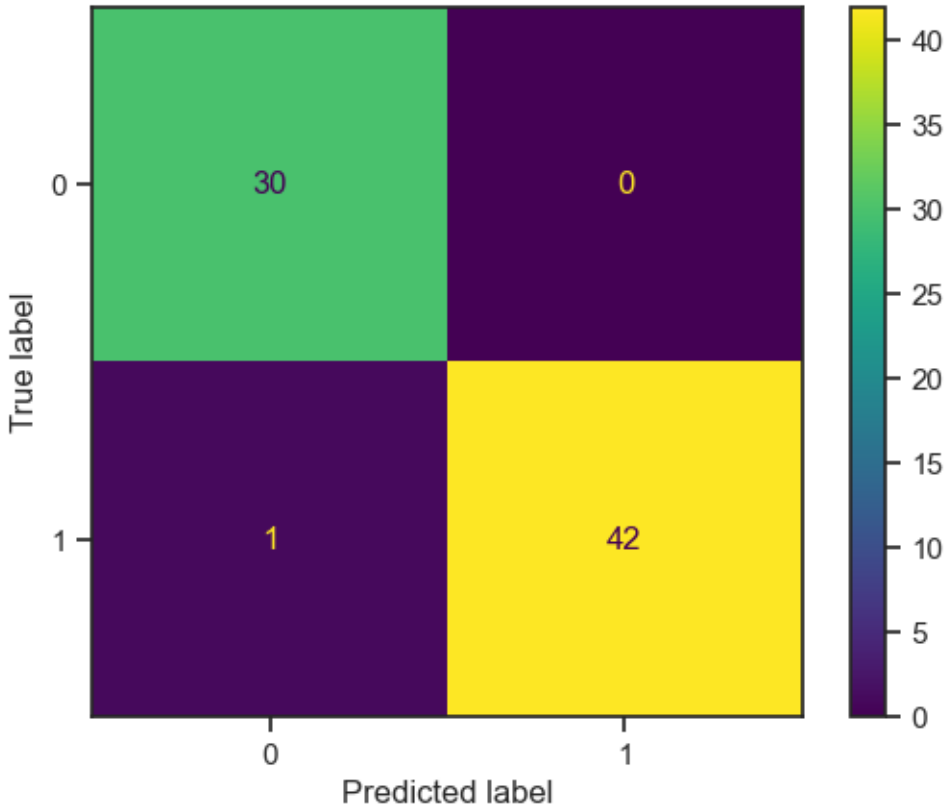
```
Decision Tree
Accuracy Score value: 0.9863
              precision    recall  f1-score   support
```

```
              0       0.97      1.00      0.98        30
              1       1.00      0.98      0.99        43

       accuracy                           0.99        73
      macro avg       0.98      0.99      0.99        73
   weighted avg       0.99      0.99      0.99        73
```

[ ]:
```
Drzewo_macierz = ConfusionMatrixDisplay.from_estimator(
    Drzewodezycyjne, x_testujacy_skalowane, y_testujacy)
Drzewo_macierz
```

[ ]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x1fd75a108d0>

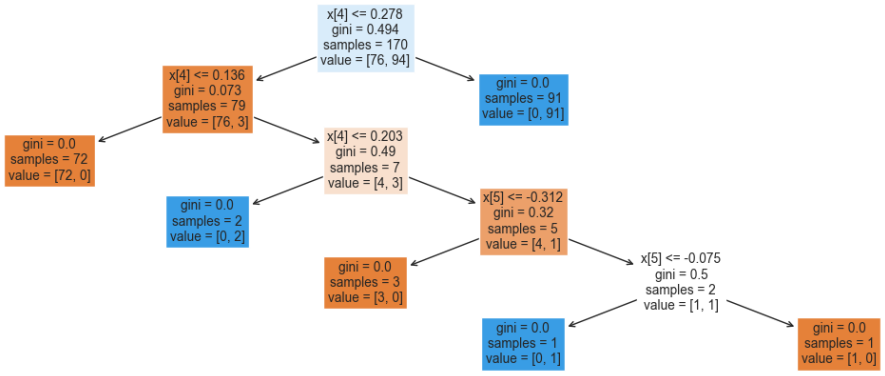


[ ]:
```
Drzewodezycyjnestring = tree.export_text(Drzewodezycyjne)
print(Drzewodezycyjnestring)
```

```
|--- feature_4 <= 0.28
|   |--- feature_4 <= 0.14
|   |   |--- class: 0
|   |--- feature_4 >  0.14
```

```
|   |   |--- feature_4 <= 0.20
|   |   |   |--- class: 1
|   |   |--- feature_4 >  0.20
|   |   |   |--- feature_5 <= -0.31
|   |   |   |   |--- class: 0
|   |   |   |--- feature_5 >  -0.31
|   |   |   |   |--- feature_5 <= -0.07
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- feature_5 >  -0.07
|   |   |   |   |   |--- class: 0
|--- feature_4 >  0.28
|   |--- class: 1
```

[ ]:
```
plt.figure(figsize=(15, 5))
tree.plot_tree(Drzewodezycyjne, filled=True)
plt.show()
```



Drzewo decyzyjne ma cztery poziomy i służy do klasyfikacji obiektów na dwie klasy (0 i 1) na podstawie pięciu cech.

Na pierwszym poziomie drzewa następuje podział na podstawie wartości cechy x_4. Jeśli wartość tej cechy jest mniejsza lub równa 0.28, to algorytm przechodzi na drugi poziom, w przeciwnym przypadku przypisuje obiekt do klasy 1.

Na drugim poziomie drzewa algorytm ponownie dokonuje podziału na podstawie cechy x_4, ale tym razem z wartością większą niż 0.14. Jeśli wartość ta jest mniejsza lub równa 0.20, to obiekt zostaje przypisany do klasy 1, w przeciwnym przypadku algorytm przechodzi na trzeci poziom.

Na trzecim poziomie drzewa algorytm dokonuje podziału na podstawie wartości cechy x_2. Jeśli wartość tej cechy jest mniejsza lub równa -0.35, to obiektzostaje przypisany do klasy 0, w przeciwnym przypadku przechodzi na czwarty poziom.

Na czwartym poziomie drzewa algorytm dokonuje podziału na podstawie wartości cechy x_1. Jeśli wartość tej cechy jest mniejsza lub równa 0.76, to obiekt zostaje przypisany do klasy 1, w przeciwnym przypadku przypisuje mu się klasę 0.