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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

In [ ]:
```
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_absolu
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
from sklearn.datasets import load_iris
```

Odczyt danych z pliku sqlite3

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

Przerabianie danych na potrzeby analiz przez bilioteke pandas i zamkniecie bilbioteki

In [ ]:
```
dane = pd.read_sql_query("SELECT * FROM Algerian_forest_fires_dataset ", polocze
```

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

Wyswietlenie informacji o danych

In [ ]:
```
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

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

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

Wyświetlenie ilosci danych

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

Out[ ]:
```
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

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

Out[ ]:

	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

Wyświetlenie ostatnich 5 wierszy danych

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

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Class
242	26	9	2012	30	65	14	0.0	85.4	16	44.5	4.5	16.9	6.5	f
243	27	9	2012	28	87	15	4.4	41.1	6.5	8	0.1	6.2	0	not f
244	28	9	2012	27	87	29	0.5	45.9	3.5	7.9	0.4	3.4	0.2	not f
245	29	9	2012	24	54	18	0.1	79.7	4.3	15.2	1.7	5.1	0.7	not f
246	30	9	2012	24	64	15	0.2	67.3	3.8	16.5	1.2	4.8	0.5	not f

Wyświetlenie wszystkich danych

In [ ]:
```
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           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

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

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FW
count	246	245	245	245	245	245	245.0	245.0	245.0	245	245.0	245	245.(
unique	33	5	2	20	63	19	40.0	174.0	167.0	199	107.0	175	127.(
top	1	7	2012	35	64	14	0.0	88.9	7.9	8	1.1	3	0.4
freq	8	62	244	29	10	43	133.0	8.0	5.0	5	8.0	5	12.(

Sprawdzanie wartości które sa puste (null)

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

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BU
122	None	None	None	None	None	None	None	None	None	None	None	Nor
123	Sidi-Bel Abbes Region Dataset	None	None	None	None	None	None	None	None	None	None	Nor
168	14	7	2012	37	37	18	0.2	88.9	12.9	14.69	12.5	10

Podsumowanie danych ile są puste dla danego atrybutu

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

Out[ ]:
```
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)

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

Sprawdzanie danych po usunięciu

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

Out[ ]:

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

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

Out[ ]:
```
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

In [ ]:
```
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  2
8.3  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  1
2.5   6.8        fire
36     7      7  2012          35   64   18    0.2  80.0   9.7   40.4   2.8  1
2.1   3.2    not fire
37     8      7  2012          33   68   19    0.0  85.6  12.5   49.8     6  1
5.4     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  1
1.7   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  1
1.1   3.6        fire
47    18      7  2012          31   68   14    0.0  85.4  12.1   43.1   4.6  1
4.2     6        fire
48    19      7  2012          35   59   17    0.0  88.1    12   52.8   7.7  1
8.2  10.9        fire
49    20      7  2012          33   65   15    0.1  81.4  12.3   62.1   2.8  1
6.5     4        fire
50    21      7  2012          33   70   17    0.0  85.4  18.5   71.5   5.2  2
2.4   8.8        fire
51    22      7  2012          28   79   18    0.1  73.4  16.4   79.9   1.8  2
1.7   2.8    not fire
52    23      7  2012          27   66   22    0.4  68.2  10.5   71.3   1.8  1
5.4   2.1    not fire
53    24      7  2012          28   78   16    0.1  70.0   9.6   79.7   1.4  1
4.7   1.3    not fire
54    25      7  2012          31   65   18    0.0  84.3  12.5   88.7   4.8  1
8.5   7.3        fire
55    26      7  2012          36   53   19    0.0  89.2  17.1   98.6    10  2
3.9  15.3        fire
56    27      7  2012          36   48   13    0.0  90.3  22.2  108.5   8.7  2
9.4  15.3        fire
57    28      7  2012          33   76   15    0.0  86.5  24.4  117.8   5.6  3
2.1  11.3        fire
58    29      7  2012          32   73   15    0.0  86.6  26.7    127   5.6
35  11.9        fire
```

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59    30      7  2012           31   79   15    0.0  85.4  28.5    136   4.7  3
7.4  10.7        fire
60    31      7  2012           35   64   17    0.0  87.2  31.9  145.7   6.8  4
1.2  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  1
1.5   6.1        fire
66     6      8  2012           32   75   14    0.0  86.4    13   39.1   5.2  1
4.2   6.8        fire
67     7      8  2012           32   69   16    0.0  86.5  15.5   48.6   5.5  1
7.2     8        fire
68     8      8  2012           32   60   18    0.3  77.1  11.3     47   2.2  1
4.1   2.6    not fire
69     9      8  2012           35   59   17    0.0  87.4  14.8     57   6.9  1
7.9   9.9        fire
70    10      8  2012           35   55   14    0.0  88.9  18.6     67   7.4  2
1.9  11.6        fire
71    11      8  2012           35   63   13    0.0  88.9  21.7     77   7.1  2
5.5  12.1        fire
72    12      8  2012           35   51   13    0.3  81.3  15.6   75.1   2.5  2
0.7   4.2    not fire
73    13      8  2012           35   63   15    0.0  87.0    19   85.1   5.9  2
4.4  10.2        fire
74    14      8  2012           33   66   14    0.0  87.0  21.7   94.7   5.7  2
7.2  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  1
7.6   4.2        fire
77    17      8  2012           37   52   18    0.0  89.3    16  100.7   9.7  2
2.9  14.6        fire
78    18      8  2012           36   54   18    0.0  89.4    20  110.9   9.7  2
7.5  16.1        fire
79    19      8  2012           35   62   19    0.0  89.4  23.2  120.9   9.7  3
1.3  17.2        fire
80    20      8  2012           35   68   19    0.0  88.3  25.9  130.6   8.8  3
4.7  16.8        fire
81    21      8  2012           36   58   19    0.0  88.6  29.6  141.1   9.2  3
8.8  18.4        fire
82    22      8  2012           36   55   18    0.0  89.1  33.5  151.3   9.9  4
3.1  20.4        fire
83    23      8  2012           36   53   16    0.0  89.5  37.6  161.5  10.4  4
7.5  22.3           fire
84    24      8  2012           34   64   14    0.0  88.9  40.5  171.3     9  5
0.9  20.9        fire
85    25      8  2012           35   60   15    0.0  88.9  43.9  181.3   8.2  5
4.7  20.3           fire
86    26      8  2012           31   78   18    0.0  85.8  45.6  190.6   4.7  5
7.1  13.7          fire
87    27      8  2012           33   82   21    0.0  84.9    47  200.2   4.4  5
9.3  13.2           fire
88    28      8  2012           34   64   16    0.0  89.4  50.2  210.4   7.3  6
2.9  19.9          fire
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89    29      8  2012          35   48   18    0.0  90.1  54.2  220.4  12.5  6
7.4  30.2        fire
90    30      8  2012          35   70   17    0.8  72.7  25.2  180.4   1.7  3
7.4   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  1
1.3   7.7        fire
110   19      9  2012          29   57   14    0.0  89.3  12.5   41.3   7.8  1
4.2   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  1
9.2   8.3        fire
113   22      9  2012          31   50   19    0.6  77.8  10.6   41.4   2.4  1
2.9   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
```

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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  1
0.7     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
132   10      6  2012          30   41   15    0.0  89.4  13.3   22.5   8.4  1
3.1    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  2
1.2  12.9        fire
135   13      6  2012          30   52   15    2.0  72.3  11.4    7.8   1.4  1
0.9   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  1
2.7   6.7        fire
148   26      6  2012          36   62   16    0.0  87.8  16.5   34.5     7  1
6.4   9.5        fire
```

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149   27      6  2012          36   55   15    0.0  89.1  20.9   43.3     8  2
0.8    12        fire
150   28      6  2012          37   37   13    0.0  92.5  27.2   52.4  11.7  2
7.1  18.4        fire
151   29      6  2012          37   36   13    0.6  86.2  17.9   36.7   4.8  1
7.8   7.2        fire
152   30      6  2012          34   42   15    1.7  79.7    12    8.5   2.2  1
1.5   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  1
0.3   5.2        fire
156    4      7  2012          34   58   18    0.0  88.0  13.6   36.8     8  1
4.1   9.9        fire
157    5      7  2012          34   45   18    0.0  90.5  18.7   46.4  11.3  1
8.7    15        fire
158    6      7  2012          35   42   15    0.3  84.7  15.5   45.1   4.3  1
6.7   6.3        fire
159    7      7  2012          38   43   13    0.5  85.0    13   35.4   4.1  1
3.7   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  1
2.5   9.6        fire
165   13      7  2012          39   45   13    0.6  85.2  11.3   10.4   4.2  1
0.9   4.7        fire
166   15      7  2012          34   45   17    0.0  90.5    18   24.1  10.9  1
7.7  14.1        fire
167   16      7  2012          31   83   17    0.0  84.5  19.4   33.1   4.7  1
9.2   7.3        fire
168   17      7  2012          32   81   17    0.0  84.6  21.1   42.3   4.7  2
0.9   7.7        fire
169   18      7  2012          33   68   15    0.0  86.1  23.9   51.6   5.2  2
3.9   9.1        fire
170   19      7  2012          34   58   16    0.0  88.1  27.8   61.1   7.3  2
7.7    13        fire
171   20      7  2012          36   50   16    0.0  89.9  32.7     71   9.5  3
2.6  17.3        fire
172   21      7  2012          36   29   18    0.0  93.9  39.6   80.6  18.5  3
9.5    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  4
6.5  16.3        fire
175   24      7  2012          33   63   17    1.1  72.8  20.9   56.6   1.6  2
1.7   2.5    not fire
176   25      7  2012          39   64    9    1.2  73.8  11.7   15.9   1.1  1
1.4   0.7    not fire
177   26      7  2012          35   58   10    0.2  78.3  10.8   19.7   1.6  1
0.7     1    not fire
178   27      7  2012          29   87   18    0.0  80.0  11.8   28.3   2.8  1
1.8   3.2    not fire
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179   28      7  2012          33   57   16    0.0  87.5  15.7   37.6   6.7  1
5.7     9        fire
180   29      7  2012          34   59   16    0.0  88.1  19.5   47.2   7.4  1
9.5  10.9        fire
181   30      7  2012          36   56   16    0.0  88.9  23.8   57.1   8.2  2
3.8  13.2        fire
182   31      7  2012          37   55   15    0.0  89.3  28.3   67.2   8.3  2
8.3  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  1
0.6  13.5        fire
185    3      8  2012          39   33   17    0.0  93.7  17.1   32.1  17.2  1
6.9  19.5        fire
186    4      8  2012          38   35   15    0.0  93.8    23   42.7  15.7  2
2.9  20.9        fire
187    5      8  2012          34   42   17    0.1  88.3  23.6   52.5    19  2
3.5  12.6        fire
188    6      8  2012          30   54   14    3.1  70.5    11    9.1   1.3  1
0.5   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  1
6.4  12.7        fire
192   10      8  2012          39   39   15    0.2  89.3  15.8   35.4   8.2  1
5.8  10.7        fire
193   11      8  2012          40   31   15    0.0  94.2  22.5   46.3  16.6  2
2.4  21.6        fire
194   12      8  2012          39   21   17    0.4  93.0  18.4   41.5  15.5  1
8.4  18.8        fire
195   13      8  2012          35   34   16    0.2  88.3  16.9   45.1   7.5  1
7.5  10.5        fire
196   14      8  2012          37   40   13    0.0  91.9  22.3   55.5  10.8  2
2.3  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  2
4.2  14.8        fire
199   17      8  2012          42   24    9    0.0  96.0  30.3   76.4  15.7  3
0.4    24        fire
200   18      8  2012          37   37   14    0.0  94.3  35.9   86.8    16  3
5.9  26.3        fire
201   19      8  2012          35   66   15    0.1  82.7  32.7   96.8   3.3  3
5.5   7.7        fire
202   20      8  2012          36   81   15    0.0  83.7  34.4    107   3.8  3
8.1     9        fire
203   21      8  2012          36   71   15    0.0  86.0  36.9  117.1   5.1  4
1.3  12.2        fire
204   22      8  2012          37   53   14    0.0  89.5  41.1  127.5     8  4
5.5  18.1        fire
205   23      8  2012          36   43   16    0.0  91.2  46.1  137.7  11.5  5
0.2  24.5        fire
206   24      8  2012          35   38   15    0.0  92.1  51.3  147.7  12.2  5
4.9  26.9        fire
207   25      8  2012          34   40   18    0.0  92.1  56.3  157.5  14.3  5
9.5  31.1        fire
208   26      8  2012          33   37   16    0.0  92.2  61.3  167.2  13.1
64  30.3        fire
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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  3
0.6   6.1    not fire
211   29      8  2012          35   53   17    0.5  80.2  20.7  149.2   2.7  3
0.6   5.9        fire
212   30      8  2012          34   49   15    0.0  89.2  24.8  159.1   8.1  3
5.7    16        fire
213   31      8  2012          30   59   19    0.0  89.1  27.8  168.2   9.8  3
9.3  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  1
2.4  10.3        fire
227   14      9  2012          28   81   15    0.0  84.6  12.6   41.5   4.3  1
4.3   5.7        fire
228   15      9  2012          32   51   13    0.0  88.7    16   50.2   6.9  1
7.8   9.8        fire
229   16      9  2012          33   26   13    0.0  93.9  21.2   59.2  14.2  2
2.4  19.3        fire
230   17      9  2012          34   44   12    0.0  92.5  25.2   63.3  11.2  2
6.2  17.5        fire
231   18      9  2012          36   33   13    0.1  90.6  25.8   77.8     9  2
8.2  15.4        fire
232   19      9  2012          29   41    8    0.1  83.9  24.9     86   2.7  2
8.9   5.6        fire
233   20      9  2012          34   58   13    0.2  79.5  18.7     88   2.1  2
4.4   3.8    not fire
234   21      9  2012          35   34   17    0.0  92.2  23.6   97.3  13.8  2
9.4  21.6        fire
235   22      9  2012          33   64   13    0.0  88.9  26.1  106.3   7.1  3
2.4  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  1
1.9   0.4    not fire
238   25      9  2012          28   70   15    0.0  79.9  13.8   36.1   2.4  1
4.1     3    not fire
```

```
239   26      9  2012          30   65   14    0.0  85.4    16   44.5   4.5  1
6.9   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

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

Wyświetlenie pierwszych 5 dancyh wirszy dla Regionu Bejaia

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

Out[ ]:

	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

Wyświetlenie pierwszych 5 dancyh wirszy dla Regionu Sidi-Bel Abbes

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

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Class
239	26	9	2012	30	65	14	0.0	85.4	16	44.5	4.5	16.9	6.5	f
240	27	9	2012	28	87	15	4.4	41.1	6.5	8	0.1	6.2	0	not f
241	28	9	2012	27	87	29	0.5	45.9	3.5	7.9	0.4	3.4	0.2	not f
242	29	9	2012	24	54	18	0.1	79.7	4.3	15.2	1.7	5.1	0.7	not f
243	30	9	2012	24	64	15	0.2	67.3	3.8	16.5	1.2	4.8	0.5	not f

In [ ]:
```
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	25.5	3.9	not fire	1

```
29    30      6  2012          33   50   14    0.0  88.7  22.9   92.8   7.2  2
8.3  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  1
2.5   6.8        fire          1
36     7      7  2012          35   64   18    0.2  80.0   9.7   40.4   2.8  1
2.1   3.2    not fire          1
37     8      7  2012          33   68   19    0.0  85.6  12.5   49.8     6  1
5.4     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  1
1.7   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  1
1.1   3.6        fire          1
47    18      7  2012          31   68   14    0.0  85.4  12.1   43.1   4.6  1
4.2     6        fire          1
48    19      7  2012          35   59   17    0.0  88.1    12   52.8   7.7  1
8.2  10.9        fire          1
49    20      7  2012          33   65   15    0.1  81.4  12.3   62.1   2.8  1
6.5     4        fire          1
50    21      7  2012          33   70   17    0.0  85.4  18.5   71.5   5.2  2
2.4   8.8        fire          1
51    22      7  2012          28   79   18    0.1  73.4  16.4   79.9   1.8  2
1.7   2.8    not fire          1
52    23      7  2012          27   66   22    0.4  68.2  10.5   71.3   1.8  1
5.4   2.1    not fire          1
53    24      7  2012          28   78   16    0.1  70.0   9.6   79.7   1.4  1
4.7   1.3    not fire          1
54    25      7  2012          31   65   18    0.0  84.3  12.5   88.7   4.8  1
8.5   7.3        fire          1
55    26      7  2012          36   53   19    0.0  89.2  17.1   98.6    10  2
3.9  15.3        fire          1
56    27      7  2012          36   48   13    0.0  90.3  22.2  108.5   8.7  2
9.4  15.3        fire          1
57    28      7  2012          33   76   15    0.0  86.5  24.4  117.8   5.6  3
2.1  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  3
7.4  10.7        fire          1
60    31      7  2012          35   64   17    0.0  87.2  31.9  145.7   6.8  4
1.2  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  1
1.5   6.1        fire          1
66     6      8  2012          32   75   14    0.0  86.4    13   39.1   5.2  1
4.2   6.8        fire          1
67     7      8  2012          32   69   16    0.0  86.5  15.5   48.6   5.5  1
7.2     8        fire          1
68     8      8  2012          32   60   18    0.3  77.1  11.3     47   2.2  1
4.1   2.6    not fire          1
69     9      8  2012          35   59   17    0.0  87.4  14.8     57   6.9  1
7.9   9.9        fire          1
70    10      8  2012          35   55   14    0.0  88.9  18.6     67   7.4  2
1.9  11.6        fire          1
71    11      8  2012          35   63   13    0.0  88.9  21.7     77   7.1  2
5.5  12.1        fire          1
72    12      8  2012          35   51   13    0.3  81.3  15.6   75.1   2.5  2
0.7   4.2    not fire          1
73    13      8  2012          35   63   15    0.0  87.0    19   85.1   5.9  2
4.4  10.2        fire          1
74    14      8  2012          33   66   14    0.0  87.0  21.7   94.7   5.7  2
7.2  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  1
7.6   4.2        fire          1
77    17      8  2012          37   52   18    0.0  89.3    16  100.7   9.7  2
2.9  14.6        fire          1
78    18      8  2012          36   54   18    0.0  89.4    20  110.9   9.7  2
7.5  16.1        fire          1
79    19      8  2012          35   62   19    0.0  89.4  23.2  120.9   9.7  3
1.3  17.2        fire          1
80    20      8  2012          35   68   19    0.0  88.3  25.9  130.6   8.8  3
4.7  16.8        fire          1
81    21      8  2012          36   58   19    0.0  88.6  29.6  141.1   9.2  3
8.8  18.4        fire          1
82    22      8  2012          36   55   18    0.0  89.1  33.5  151.3   9.9  4
3.1  20.4        fire          1
83    23      8  2012          36   53   16    0.0  89.5  37.6  161.5  10.4  4
7.5  22.3           fire       1
84    24      8  2012          34   64   14    0.0  88.9  40.5  171.3     9  5
0.9  20.9        fire          1
85    25      8  2012          35   60   15    0.0  88.9  43.9  181.3   8.2  5
4.7  20.3           fire       1
86    26      8  2012          31   78   18    0.0  85.8  45.6  190.6   4.7  5
7.1  13.7          fire        1
87    27      8  2012          33   82   21    0.0  84.9    47  200.2   4.4  5
9.3  13.2           fire       1
88    28      8  2012          34   64   16    0.0  89.4  50.2  210.4   7.3  6
2.9  19.9          fire        1
```

```
89    29      8  2012           35   48   18    0.0  90.1  54.2  220.4  12.5  6
7.4  30.2        fire          1
90    30      8  2012           35   70   17    0.8  72.7  25.2  180.4   1.7  3
7.4   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  1
1.3   7.7        fire          1
110   19      9  2012           29   57   14    0.0  89.3  12.5   41.3   7.8  1
4.2   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  1
9.2   8.3        fire          1
113   22      9  2012           31   50   19    0.6  77.8  10.6   41.4   2.4  1
2.9   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  1
0.7     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  1
3.1    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  2
1.2  12.9        fire          2
135   13      6  2012           30   52   15    2.0  72.3  11.4    7.8   1.4  1
0.9   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  1
2.7   6.7        fire          2
148   26      6  2012           36   62   16    0.0  87.8  16.5   34.5     7  1
6.4   9.5        fire          2
```

```
149   27      6  2012           36   55   15    0.0  89.1  20.9   43.3     8  2
0.8    12        fire          2
150   28      6  2012           37   37   13    0.0  92.5  27.2   52.4  11.7  2
7.1  18.4        fire          2
151   29      6  2012           37   36   13    0.6  86.2  17.9   36.7   4.8  1
7.8   7.2        fire          2
152   30      6  2012           34   42   15    1.7  79.7    12    8.5   2.2  1
1.5   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  1
0.3   5.2        fire          2
156    4      7  2012           34   58   18    0.0  88.0  13.6   36.8     8  1
4.1   9.9        fire          2
157    5      7  2012           34   45   18    0.0  90.5  18.7   46.4  11.3  1
8.7    15        fire          2
158    6      7  2012           35   42   15    0.3  84.7  15.5   45.1   4.3  1
6.7   6.3        fire          2
159    7      7  2012           38   43   13    0.5  85.0    13   35.4   4.1  1
3.7   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  1
2.5   9.6        fire          2
165   13      7  2012           39   45   13    0.6  85.2  11.3   10.4   4.2  1
0.9   4.7        fire          2
166   15      7  2012           34   45   17    0.0  90.5    18   24.1  10.9  1
7.7  14.1        fire          2
167   16      7  2012           31   83   17    0.0  84.5  19.4   33.1   4.7  1
9.2   7.3        fire          2
168   17      7  2012           32   81   17    0.0  84.6  21.1   42.3   4.7  2
0.9   7.7        fire          2
169   18      7  2012           33   68   15    0.0  86.1  23.9   51.6   5.2  2
3.9   9.1        fire          2
170   19      7  2012           34   58   16    0.0  88.1  27.8   61.1   7.3  2
7.7    13        fire          2
171   20      7  2012           36   50   16    0.0  89.9  32.7     71   9.5  3
2.6  17.3        fire          2
172   21      7  2012           36   29   18    0.0  93.9  39.6   80.6  18.5  3
9.5    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  4
6.5  16.3        fire          2
175   24      7  2012           33   63   17    1.1  72.8  20.9   56.6   1.6  2
1.7   2.5    not fire          2
176   25      7  2012           39   64    9    1.2  73.8  11.7   15.9   1.1  1
1.4   0.7    not fire          2
177   26      7  2012           35   58   10    0.2  78.3  10.8   19.7   1.6  1
0.7     1    not fire          2
178   27      7  2012           29   87   18    0.0  80.0  11.8   28.3   2.8  1
1.8   3.2    not fire          2
```

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179   28      7  2012          33   57   16    0.0  87.5  15.7   37.6   6.7  1
5.7     9        fire          2
180   29      7  2012          34   59   16    0.0  88.1  19.5   47.2   7.4  1
9.5  10.9        fire          2
181   30      7  2012          36   56   16    0.0  88.9  23.8   57.1   8.2  2
3.8  13.2        fire          2
182   31      7  2012          37   55   15    0.0  89.3  28.3   67.2   8.3  2
8.3  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  1
0.6  13.5        fire          2
185    3      8  2012          39   33   17    0.0  93.7  17.1   32.1  17.2  1
6.9  19.5        fire          2
186    4      8  2012          38   35   15    0.0  93.8    23   42.7  15.7  2
2.9  20.9        fire          2
187    5      8  2012          34   42   17    0.1  88.3  23.6   52.5    19  2
3.5  12.6        fire          2
188    6      8  2012          30   54   14    3.1  70.5    11    9.1   1.3  1
0.5   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  1
6.4  12.7        fire          2
192   10      8  2012          39   39   15    0.2  89.3  15.8   35.4   8.2  1
5.8  10.7        fire          2
193   11      8  2012          40   31   15    0.0  94.2  22.5   46.3  16.6  2
2.4  21.6        fire          2
194   12      8  2012          39   21   17    0.4  93.0  18.4   41.5  15.5  1
8.4  18.8        fire          2
195   13      8  2012          35   34   16    0.2  88.3  16.9   45.1   7.5  1
7.5  10.5        fire          2
196   14      8  2012          37   40   13    0.0  91.9  22.3   55.5  10.8  2
2.3  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  2
4.2  14.8        fire          2
199   17      8  2012          42   24    9    0.0  96.0  30.3   76.4  15.7  3
0.4    24        fire          2
200   18      8  2012          37   37   14    0.0  94.3  35.9   86.8    16  3
5.9  26.3        fire          2
201   19      8  2012          35   66   15    0.1  82.7  32.7   96.8   3.3  3
5.5   7.7        fire          2
202   20      8  2012          36   81   15    0.0  83.7  34.4    107   3.8  3
8.1     9        fire          2
203   21      8  2012          36   71   15    0.0  86.0  36.9  117.1   5.1  4
1.3  12.2        fire          2
204   22      8  2012          37   53   14    0.0  89.5  41.1  127.5     8  4
5.5  18.1        fire          2
205   23      8  2012          36   43   16    0.0  91.2  46.1  137.7  11.5  5
0.2  24.5        fire          2
206   24      8  2012          35   38   15    0.0  92.1  51.3  147.7  12.2  5
4.9  26.9        fire          2
207   25      8  2012          34   40   18    0.0  92.1  56.3  157.5  14.3  5
9.5  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
```

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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  3
0.6   6.1    not fire          2
211   29      8  2012           35   53   17    0.5  80.2  20.7  149.2   2.7  3
0.6   5.9        fire          2
212   30      8  2012           34   49   15    0.0  89.2  24.8  159.1   8.1  3
5.7    16        fire          2
213   31      8  2012           30   59   19    0.0  89.1  27.8  168.2   9.8  3
9.3  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  1
2.4  10.3        fire          2
227   14      9  2012           28   81   15    0.0  84.6  12.6   41.5   4.3  1
4.3   5.7        fire          2
228   15      9  2012           32   51   13    0.0  88.7    16   50.2   6.9  1
7.8   9.8        fire          2
229   16      9  2012           33   26   13    0.0  93.9  21.2   59.2  14.2  2
2.4  19.3        fire          2
230   17      9  2012           34   44   12    0.0  92.5  25.2   63.3  11.2  2
6.2  17.5        fire          2
231   18      9  2012           36   33   13    0.1  90.6  25.8   77.8     9  2
8.2  15.4        fire          2
232   19      9  2012           29   41    8    0.1  83.9  24.9     86   2.7  2
8.9   5.6        fire          2
233   20      9  2012           34   58   13    0.2  79.5  18.7     88   2.1  2
4.4   3.8    not fire          2
234   21      9  2012           35   34   17    0.0  92.2  23.6   97.3  13.8  2
9.4  21.6        fire          2
235   22      9  2012           33   64   13    0.0  88.9  26.1  106.3   7.1  3
2.4  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  1
1.9   0.4    not fire          2
238   25      9  2012           28   70   15    0.0  79.9  13.8   36.1   2.4  1
4.1     3    not fire          2
```

```
239   26      9  2012           30   65   14    0.0  85.4    16   44.5   4.5  1
6.9   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

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

Ponowne sprawdzanie danych po operacji

In [ ]:
```
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	1	0.6	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	1	3.9	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  1
2.9        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  1
0.9        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  1
5.3        fire          1
56   27     7  2012          36  48  13   0.0  90.3  22.2  108.5   8.7  29.4  1
5.3        fire          1
57   28     7  2012          33  76  15   0.0  86.5  24.4  117.8   5.6  32.1  1
1.3        fire          1
58   29     7  2012          32  73  15   0.0  86.6  26.7    127   5.6    35  1
1.9        fire          1
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59   30     7  2012          31  79  15   0.0  85.4  28.5    136   4.7  37.4  1
0.7        fire          1
60   31     7  2012          35  64  17   0.0  87.2  31.9  145.7   6.8  41.2  1
5.7        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  1
1.6        fire          1
71   11     8  2012          35  63  13   0.0  88.9  21.7     77   7.1  25.5  1
2.1        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  1
0.2        fire          1
74   14     8  2012          33  66  14   0.0  87.0  21.7   94.7   5.7  27.2  1
0.6        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  1
4.6        fire          1
78   18     8  2012          36  54  18   0.0  89.4    20  110.9   9.7  27.5  1
6.1        fire          1
79   19     8  2012          35  62  19   0.0  89.4  23.2  120.9   9.7  31.3  1
7.2        fire          1
80   20     8  2012          35  68  19   0.0  88.3  25.9  130.6   8.8  34.7  1
6.8        fire          1
81   21     8  2012          36  58  19   0.0  88.6  29.6  141.1   9.2  38.8  1
8.4        fire          1
82   22     8  2012          36  55  18   0.0  89.1  33.5  151.3   9.9  43.1  2
0.4        fire          1
83   23     8  2012          36  53  16   0.0  89.5  37.6  161.5  10.4  47.5  2
2.3          fire        1
84   24     8  2012          34  64  14   0.0  88.9  40.5  171.3     9  50.9  2
0.9        fire          1
85   25     8  2012          35  60  15   0.0  88.9  43.9  181.3   8.2  54.7  2
0.3          fire        1
86   26     8  2012          31  78  18   0.0  85.8  45.6  190.6   4.7  57.1  1
3.7         fire         1
87   27     8  2012          33  82  21   0.0  84.9    47  200.2   4.4  59.3  1
3.2          fire        1
88   28     8  2012          34  64  16   0.0  89.4  50.2  210.4   7.3  62.9  1
9.9         fire         1
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89   29     8  2012          35  48  18   0.0  90.1  54.2  220.4  12.5  67.4  3
0.2        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
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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  1
6.7        fire          2
133  12     6  2012          27  58  17   0.0  88.9  21.3   37.8   8.7  21.2  1
2.9        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
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149  28     6  2012          37  37  13   0.0  92.5  27.2   52.4  11.7  27.1  1
8.4       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  1
4.1       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  1
7.3       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  2
5.4       fire          2
173  23     7  2012          31  71  17   0.0  87.3  46.6     99   6.9  46.5  1
6.3       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
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179  29     7  2012          34  59  16   0.0  88.1  19.5   47.2   7.4  19.5  1
0.9        fire          2
180  30     7  2012          36  56  16   0.0  88.9  23.8   57.1   8.2  23.8  1
3.2        fire          2
181  31     7  2012          37  55  15   0.0  89.3  28.3   67.2   8.3  28.3  1
4.5        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  1
3.5        fire          2
184   3     8  2012          39  33  17   0.0  93.7  17.1   32.1  17.2  16.9  1
9.5        fire          2
185   4     8  2012          38  35  15   0.0  93.8    23   42.7  15.7  22.9  2
0.9        fire          2
186   5     8  2012          34  42  17   0.1  88.3  23.6   52.5    19  23.5  1
2.6        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  1
2.7        fire          2
191  10     8  2012          39  39  15   0.2  89.3  15.8   35.4   8.2  15.8  1
0.7        fire          2
192  11     8  2012          40  31  15   0.0  94.2  22.5   46.3  16.6  22.4  2
1.6        fire          2
193  12     8  2012          39  21  17   0.4  93.0  18.4   41.5  15.5  18.4  1
8.8        fire          2
194  13     8  2012          35  34  16   0.2  88.3  16.9   45.1   7.5  17.5  1
0.5        fire          2
195  14     8  2012          37  40  13   0.0  91.9  22.3   55.5  10.8  22.3  1
5.7        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  1
4.8        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  2
6.3        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  1
2.2        fire          2
203  22     8  2012          37  53  14   0.0  89.5  41.1  127.5     8  45.5  1
8.1        fire          2
204  23     8  2012          36  43  16   0.0  91.2  46.1  137.7  11.5  50.2  2
4.5        fire          2
205  24     8  2012          35  38  15   0.0  92.1  51.3  147.7  12.2  54.9  2
6.9        fire          2
206  25     8  2012          34  40  18   0.0  92.1  56.3  157.5  14.3  59.5  3
1.1        fire          2
207  26     8  2012          33  37  16   0.0  92.2  61.3  167.2  13.1    64  3
0.3        fire          2
208  27     8  2012          36  54  14   0.0  91.0  65.9  177.3    10    68  2
6.1        fire          2
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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  1
9.4        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  1
0.3        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  1
9.3        fire          2
229  17     9  2012          34  44  12   0.0  92.5  25.2   63.3  11.2  26.2  1
7.5        fire          2
230  18     9  2012          36  33  13   0.1  90.6  25.8   77.8     9  28.2  1
5.4        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  2
1.6        fire          2
234  22     9  2012          33  64  13   0.0  88.9  26.1  106.3   7.1  32.4  1
3.7        fire          2
235  23     9  2012          35  56  14   0.0  89.0  29.4  115.6   7.5    36  1
5.2        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

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

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

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

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes	F

Wyświetlenie danych na dataframe

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

```
<bound method DataFrame.to_string of     day month  year Temperature  RH  Ws  R
ain  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

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

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

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

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

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

Sprawdzanie danych po naprawie kolumn

In [ ]:
```
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	1	0.6	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	1	3.9	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  1
2.9        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  1
0.9        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  1
5.3        fire          1
56   27     7  2012          36  48  13   0.0  90.3  22.2  108.5   8.7  29.4  1
5.3        fire          1
57   28     7  2012          33  76  15   0.0  86.5  24.4  117.8   5.6  32.1  1
1.3        fire          1
58   29     7  2012          32  73  15   0.0  86.6  26.7    127   5.6    35  1
1.9        fire          1
```

```
59   30     7  2012          31  79  15   0.0  85.4  28.5    136   4.7  37.4  1
0.7        fire          1
60   31     7  2012          35  64  17   0.0  87.2  31.9  145.7   6.8  41.2  1
5.7        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  1
1.6        fire          1
71   11     8  2012          35  63  13   0.0  88.9  21.7     77   7.1  25.5  1
2.1        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  1
0.2        fire          1
74   14     8  2012          33  66  14   0.0  87.0  21.7   94.7   5.7  27.2  1
0.6        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  1
4.6        fire          1
78   18     8  2012          36  54  18   0.0  89.4    20  110.9   9.7  27.5  1
6.1        fire          1
79   19     8  2012          35  62  19   0.0  89.4  23.2  120.9   9.7  31.3  1
7.2        fire          1
80   20     8  2012          35  68  19   0.0  88.3  25.9  130.6   8.8  34.7  1
6.8        fire          1
81   21     8  2012          36  58  19   0.0  88.6  29.6  141.1   9.2  38.8  1
8.4        fire          1
82   22     8  2012          36  55  18   0.0  89.1  33.5  151.3   9.9  43.1  2
0.4        fire          1
83   23     8  2012          36  53  16   0.0  89.5  37.6  161.5  10.4  47.5  2
2.3          fire        1
84   24     8  2012          34  64  14   0.0  88.9  40.5  171.3     9  50.9  2
0.9        fire          1
85   25     8  2012          35  60  15   0.0  88.9  43.9  181.3   8.2  54.7  2
0.3          fire        1
86   26     8  2012          31  78  18   0.0  85.8  45.6  190.6   4.7  57.1  1
3.7         fire         1
87   27     8  2012          33  82  21   0.0  84.9    47  200.2   4.4  59.3  1
3.2          fire        1
88   28     8  2012          34  64  16   0.0  89.4  50.2  210.4   7.3  62.9  1
9.9         fire         1
```

```
89   29     8  2012          35  48  18   0.0  90.1  54.2  220.4  12.5  67.4  3
0.2        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  1
6.7        fire          2
133  12     6  2012          27  58  17   0.0  88.9  21.3   37.8   8.7  21.2  1
2.9        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  1
8.4       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  1
4.1       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  1
7.3       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  2
5.4       fire          2
173  23     7  2012          31  71  17   0.0  87.3  46.6     99   6.9  46.5  1
6.3       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  1
0.9        fire          2
180  30     7  2012          36  56  16   0.0  88.9  23.8   57.1   8.2  23.8  1
3.2        fire          2
181  31     7  2012          37  55  15   0.0  89.3  28.3   67.2   8.3  28.3  1
4.5        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  1
3.5        fire          2
184   3     8  2012          39  33  17   0.0  93.7  17.1   32.1  17.2  16.9  1
9.5        fire          2
185   4     8  2012          38  35  15   0.0  93.8    23   42.7  15.7  22.9  2
0.9        fire          2
186   5     8  2012          34  42  17   0.1  88.3  23.6   52.5    19  23.5  1
2.6        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  1
2.7        fire          2
191  10     8  2012          39  39  15   0.2  89.3  15.8   35.4   8.2  15.8  1
0.7        fire          2
192  11     8  2012          40  31  15   0.0  94.2  22.5   46.3  16.6  22.4  2
1.6        fire          2
193  12     8  2012          39  21  17   0.4  93.0  18.4   41.5  15.5  18.4  1
8.8        fire          2
194  13     8  2012          35  34  16   0.2  88.3  16.9   45.1   7.5  17.5  1
0.5        fire          2
195  14     8  2012          37  40  13   0.0  91.9  22.3   55.5  10.8  22.3  1
5.7        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  1
4.8        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  2
6.3        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  1
2.2        fire          2
203  22     8  2012          37  53  14   0.0  89.5  41.1  127.5     8  45.5  1
8.1        fire          2
204  23     8  2012          36  43  16   0.0  91.2  46.1  137.7  11.5  50.2  2
4.5        fire          2
205  24     8  2012          35  38  15   0.0  92.1  51.3  147.7  12.2  54.9  2
6.9        fire          2
206  25     8  2012          34  40  18   0.0  92.1  56.3  157.5  14.3  59.5  3
1.1        fire          2
207  26     8  2012          33  37  16   0.0  92.2  61.3  167.2  13.1    64  3
0.3        fire          2
208  27     8  2012          36  54  14   0.0  91.0  65.9  177.3    10    68  2
6.1        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  1
9.4        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  1
0.3        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  1
9.3        fire          2
229  17     9  2012          34  44  12   0.0  92.5  25.2   63.3  11.2  26.2  1
7.5        fire          2
230  18     9  2012          36  33  13   0.1  90.6  25.8   77.8     9  28.2  1
5.4        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  2
1.6        fire          2
234  22     9  2012          33  64  13   0.0  88.9  26.1  106.3   7.1  32.4  1
3.7        fire          2
235  23     9  2012          35  56  14   0.0  89.0  29.4  115.6   7.5    36  1
5.2        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

In [ ]:
```
dane[['month','day','year','Temperature','RH','Ws']]=dane[['month','day','year',
```

In [ ]:
```
obkiekty=[noweobiekty for noweobiekty in dane.columns if dane[noweobiekty].dtype
```

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

Wyświetlenie danych po operacjach

In [ ]:
```
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
```

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

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	
count	243.000000	243.000000	243.0	243.000000	243.000000	243.000000	243.000000	243.0(
mean	15.761317	7.502058	2012.0	32.152263	62.041152	15.493827	0.762963	77.8
std	8.842552	1.114793	0.0	3.628039	14.828160	2.811385	2.003207	14.3
min	1.000000	6.000000	2012.0	22.000000	21.000000	6.000000	0.000000	28.6(
25%	8.000000	7.000000	2012.0	30.000000	52.500000	14.000000	0.000000	71.8
50%	16.000000	8.000000	2012.0	32.000000	63.000000	15.000000	0.000000	83.3(
75%	23.000000	8.000000	2012.0	35.000000	73.500000	17.000000	0.500000	88.3(
max	31.000000	9.000000	2012.0	42.000000	90.000000	29.000000	16.800000	96.0(

Ustawnie klasyfikacji dla klas

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

Out[ ]:
```
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
```

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

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

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

Ustawienie klasy:

- not fire na 0
- fire na 1

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

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

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

Wyświetlenie korelacji

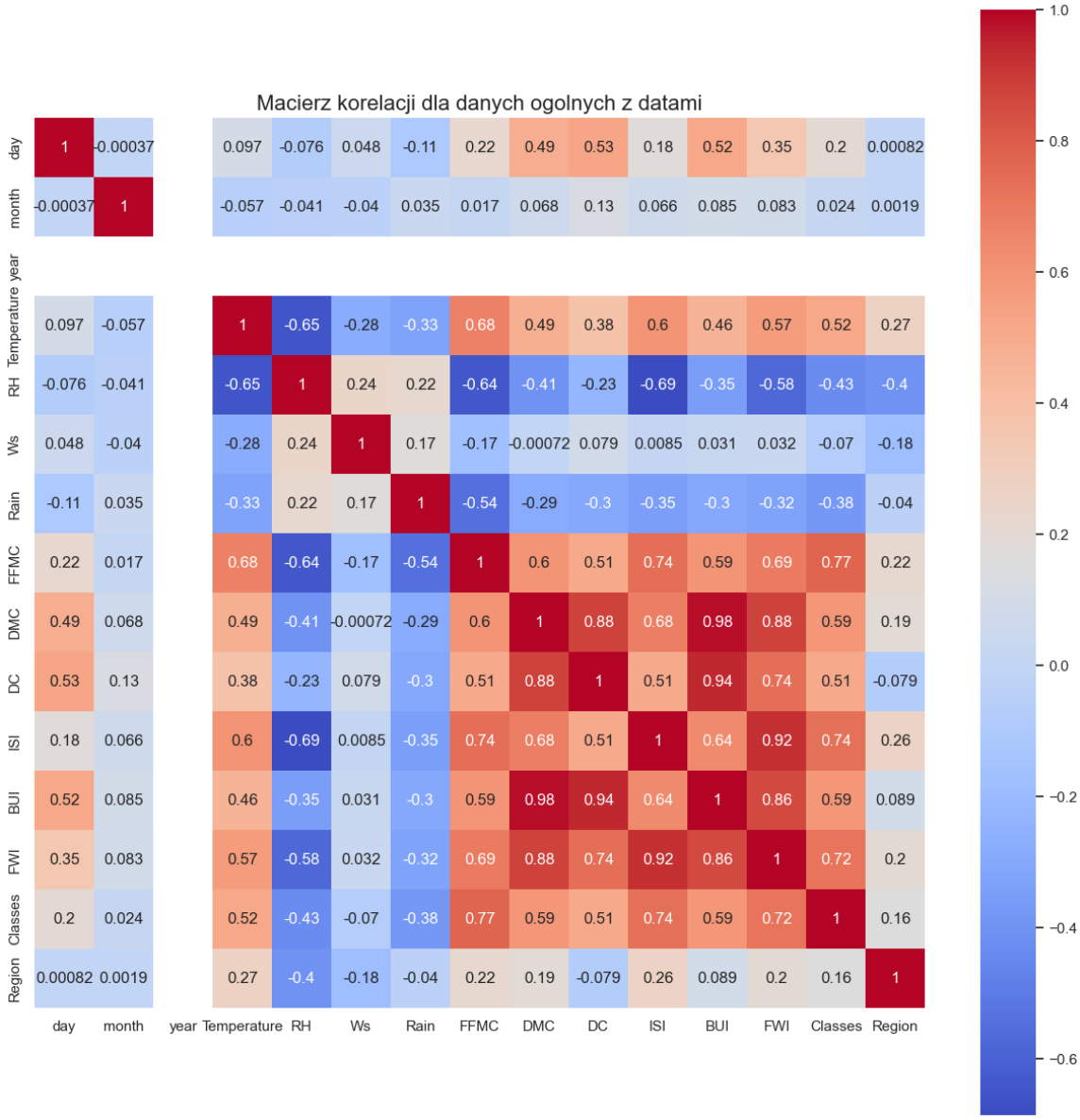
In [ ]:
```
dane.corr(numeric_only=True)
```

Out[ ]:

	day	month	year	Temperature	RH	Ws	Rain	FFM
day	1.000000	-0.000369	NaN	0.097227	-0.076034	0.047812	-0.112523	0.2249
month	-0.000369	1.000000	NaN	-0.056781	-0.041252	-0.039880	0.034822	0.0170
year	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
Temperature	0.097227	-0.056781	NaN	1.000000	-0.651400	-0.284510	-0.326492	0.6765
RH	-0.076034	-0.041252	NaN	-0.651400	1.000000	0.244048	0.222356	-0.6448
Ws	0.047812	-0.039880	NaN	-0.284510	0.244048	1.000000	0.171506	-0.1665
Rain	-0.112523	0.034822	NaN	-0.326492	0.222356	0.171506	1.000000	-0.5439
FFMC	0.224956	0.017030	NaN	0.676568	-0.644873	-0.166548	-0.543906	1.0000
DMC	0.491514	0.067943	NaN	0.485687	-0.408519	-0.000721	-0.288773	0.6036
DC	0.527952	0.126511	NaN	0.376284	-0.226941	0.079135	-0.298023	0.5073
ISI	0.180543	0.065608	NaN	0.603871	-0.686667	0.008532	-0.347484	0.7400
BUI	0.517117	0.085073	NaN	0.459789	-0.353841	0.031438	-0.299852	0.5920
FWI	0.350781	0.082639	NaN	0.566670	-0.580957	0.032368	-0.324422	0.6911
Classes	0.202840	0.024004	NaN	0.516015	-0.432161	-0.069964	-0.379097	0.7694
Region	0.000821	0.001857	NaN	0.269555	-0.402682	-0.181160	-0.040013	0.2222

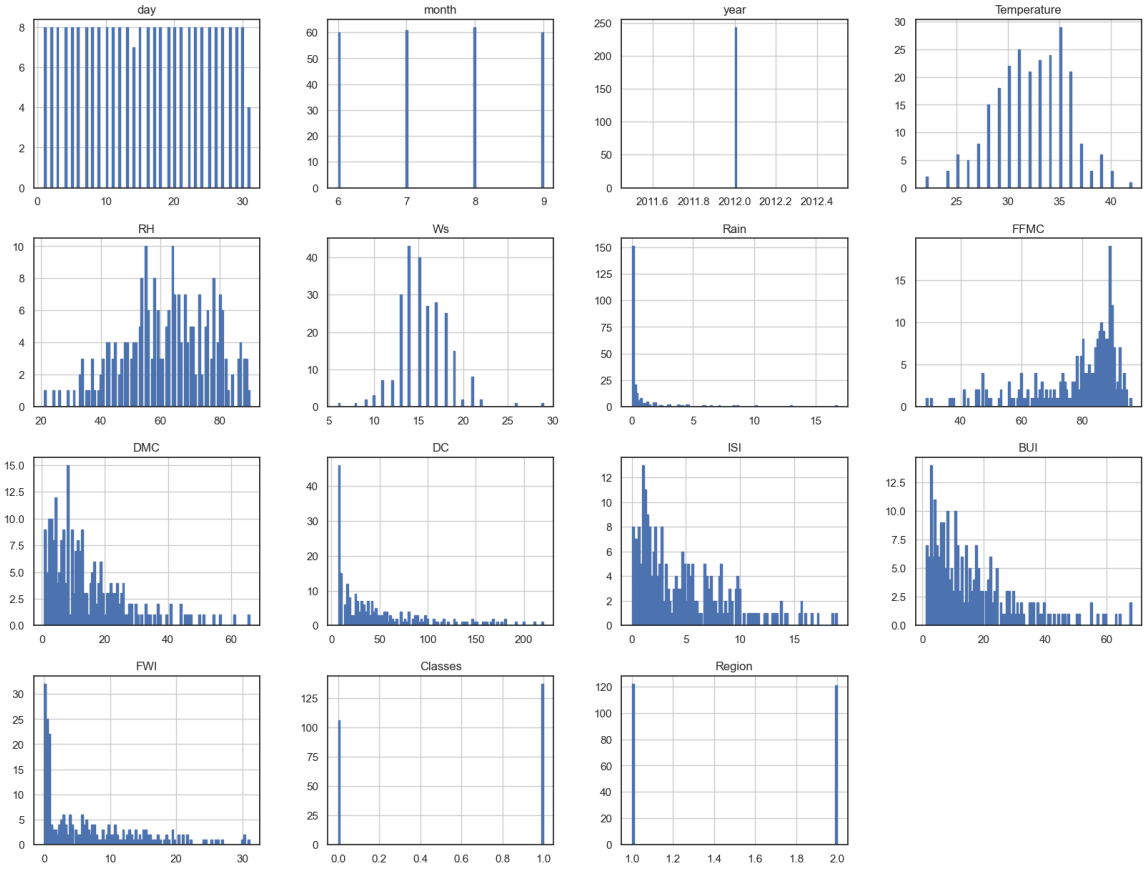
In [ ]:

```
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

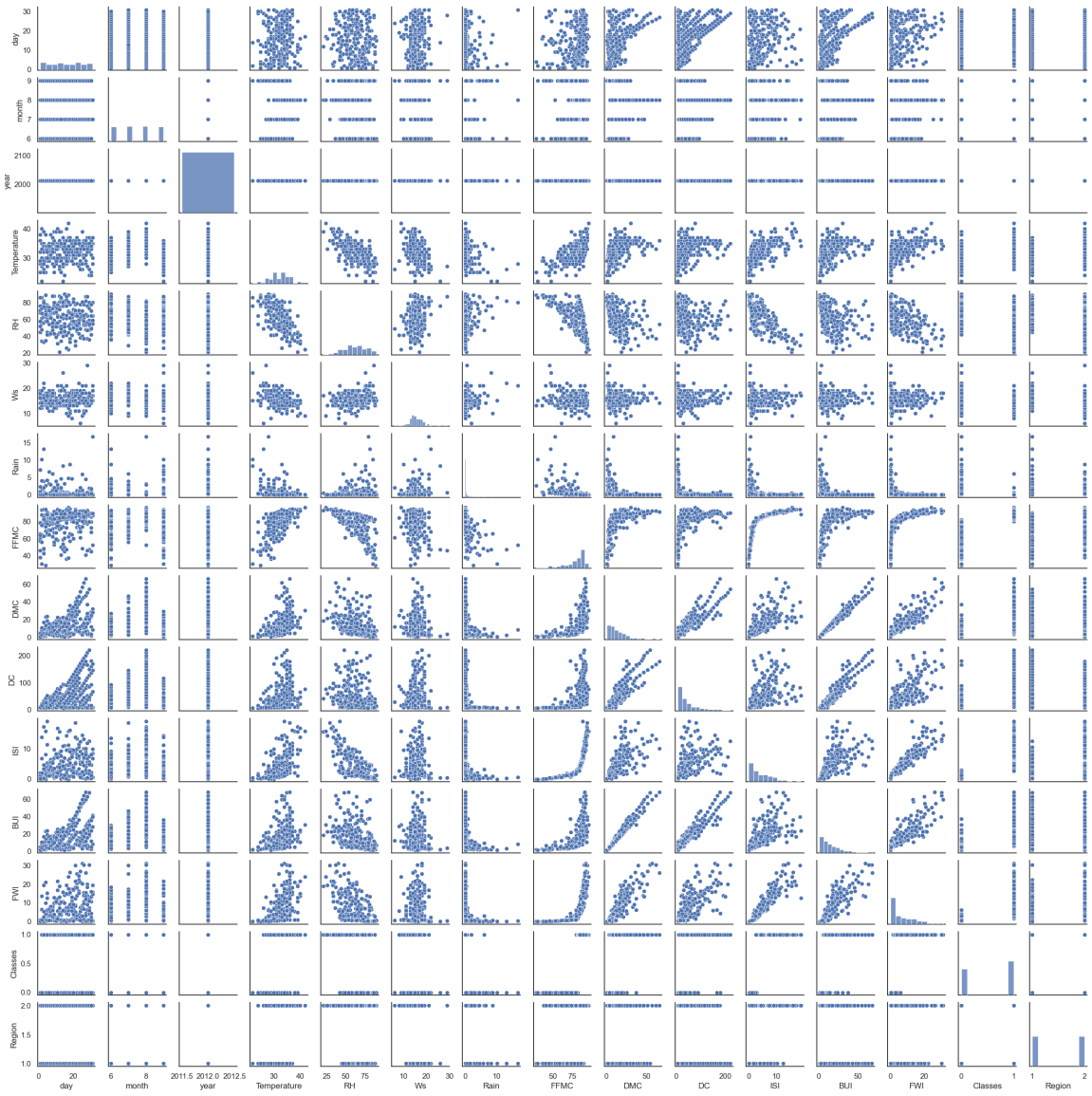
In [ ]:
```
dane.hist(bins=100, figsize=(20, 15), ec='b')
plt.show()
```



Wykresy rozrzutów

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

Out[ ]:
```
<seaborn.axisgrid.PairGrid at 0x1e963591a50>
```



Procent porżarów według klasy

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

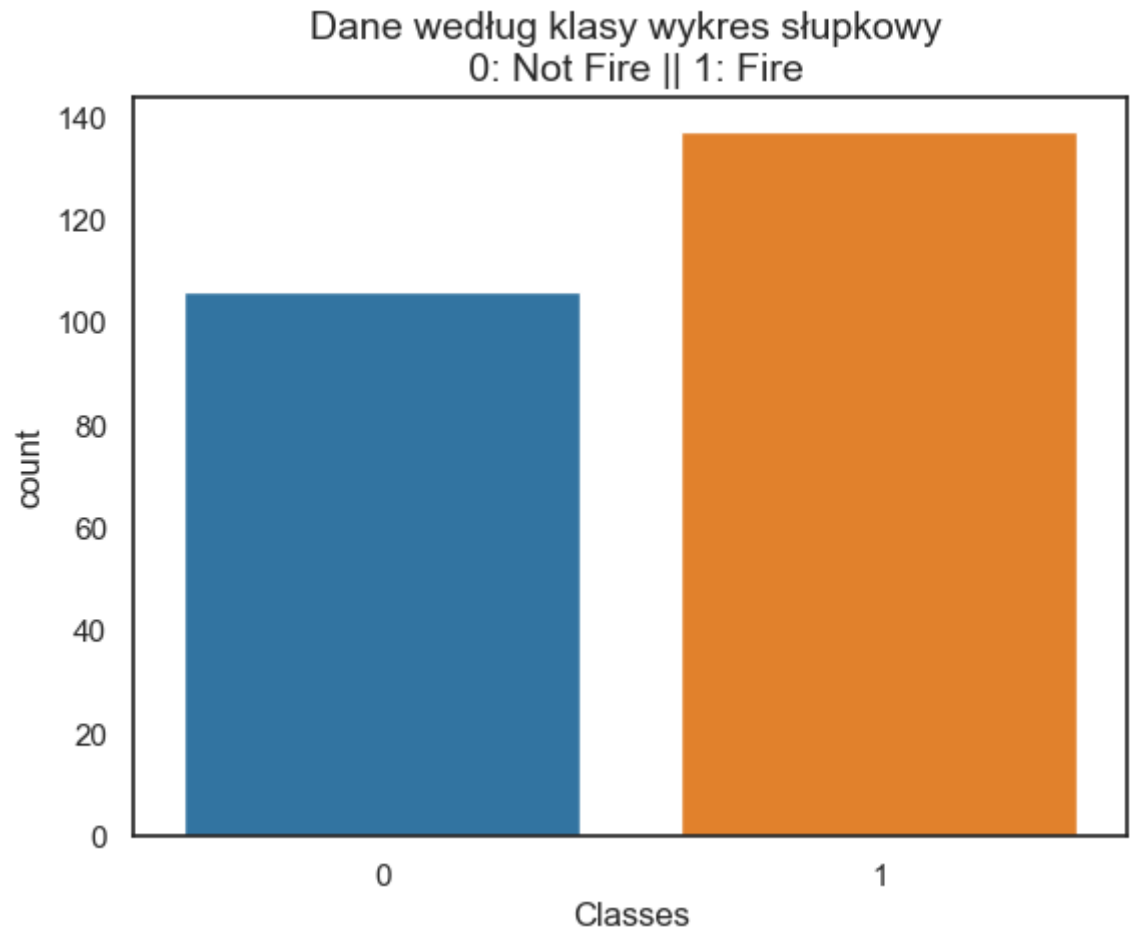
Out[ ]:
```
1    56.378601
0    43.621399
Name: Classes, dtype: float64
```

Analiza pożarów dla Algerii

- klasa 0 - Not Fire
- klasa 1 - Fire

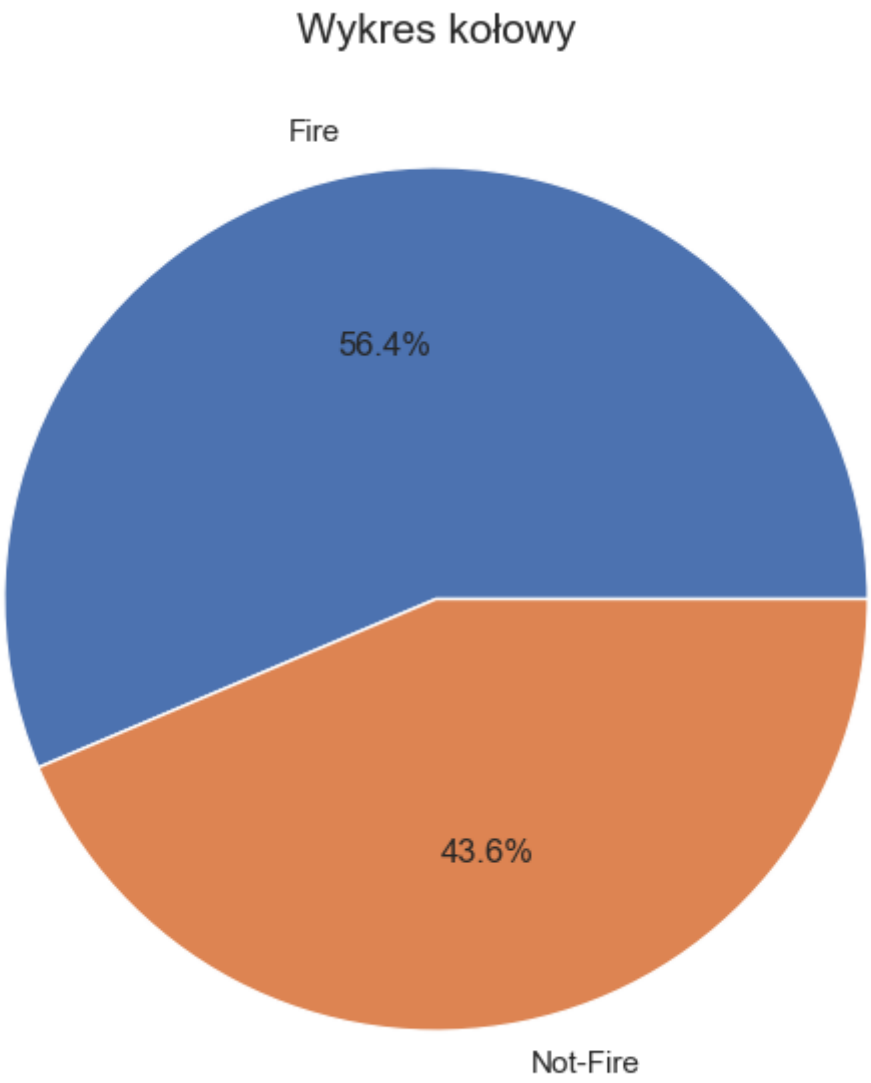
In [ ]:
```
sns.countplot(x='Classes', data=dane, palette="tab10")
plt.title('Dane według klasy wykres słupkowy \n 0: Not Fire || 1: Fire', fontsiz
```

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



Wykres kołowy

In [ ]:
```
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:

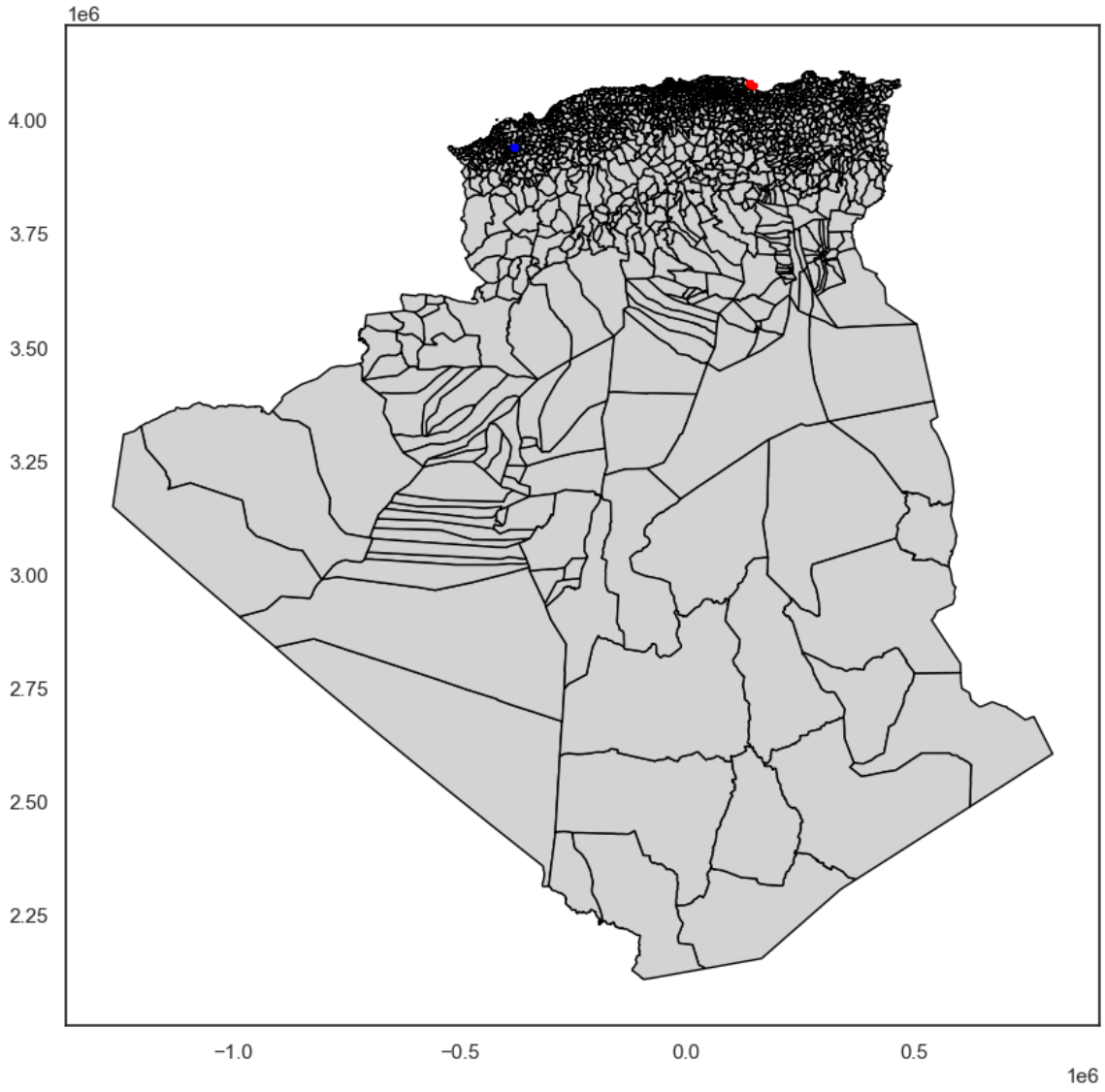
- Kolor czerowny - Bejaia
- Kolor niebieski - Sidi Bel Abbes

In [ ]:
```
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='c

plt.show()
```



Analiza pożarów dla Algerii dla danego regionu

- klasa 0 - Not Fire
- klasa 1 - Fire

In [ ]:
```
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

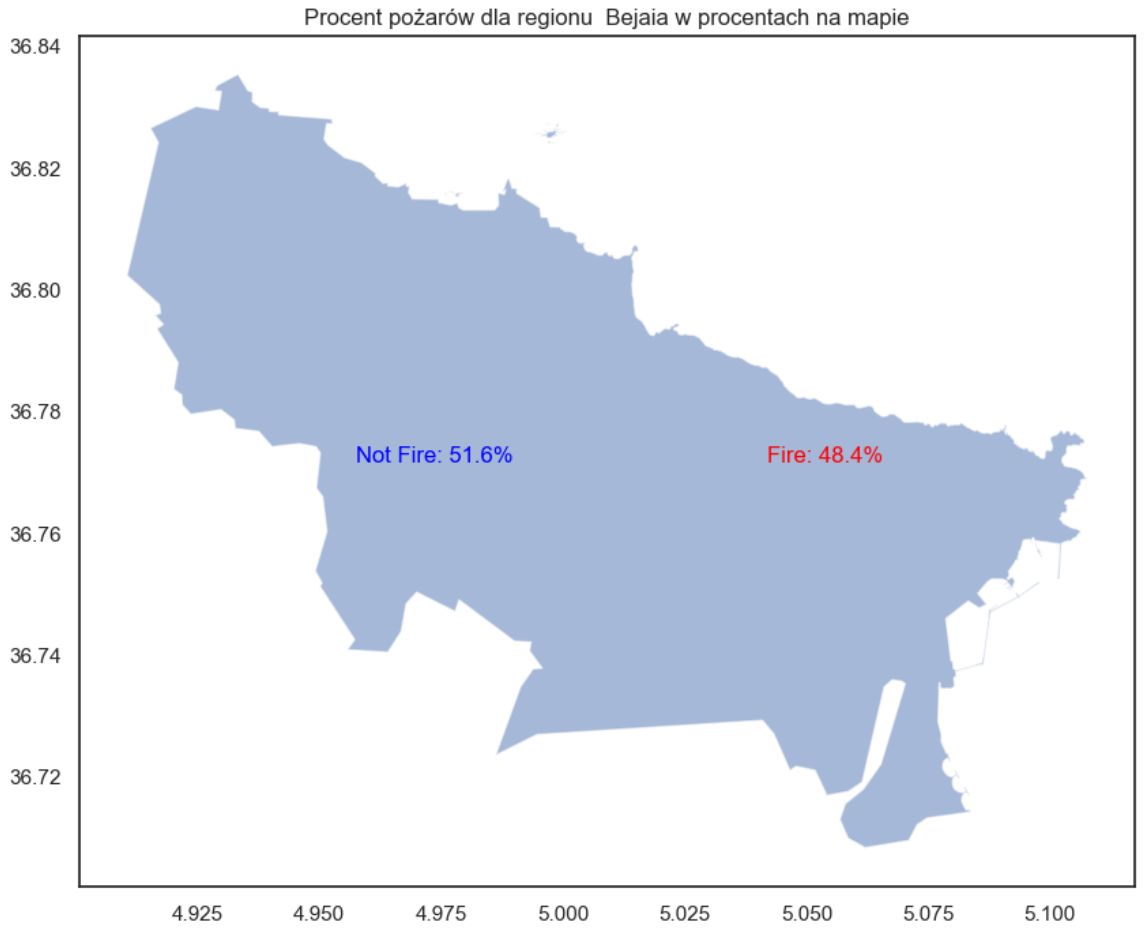
fig, ax = plt.subplots(figsize=(10, 10))
bejaia.plot(ax=ax, alpha=0.5)

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=


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


plt.show()
```



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

mapa_sidi_bel_abbes = '.\dza_admbnda_unhcr2020_shp\dza_admbnda_adm2_unhcr_202001
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) *

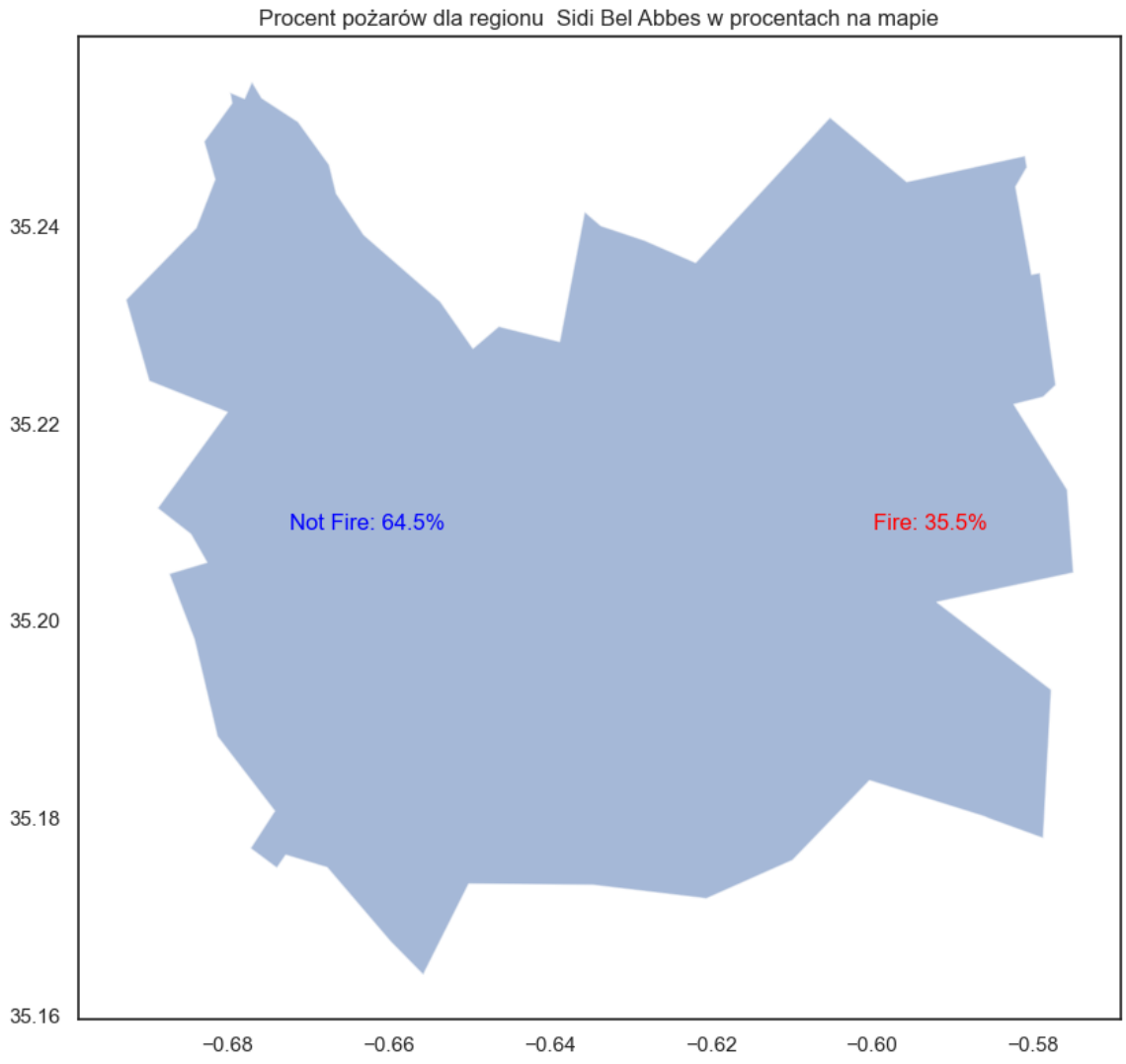
fig, ax = plt.subplots(figsize=(10, 10))
Sidi_bel_abbes.plot(ax=ax, alpha=0.5)

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=


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


plt.show()
```

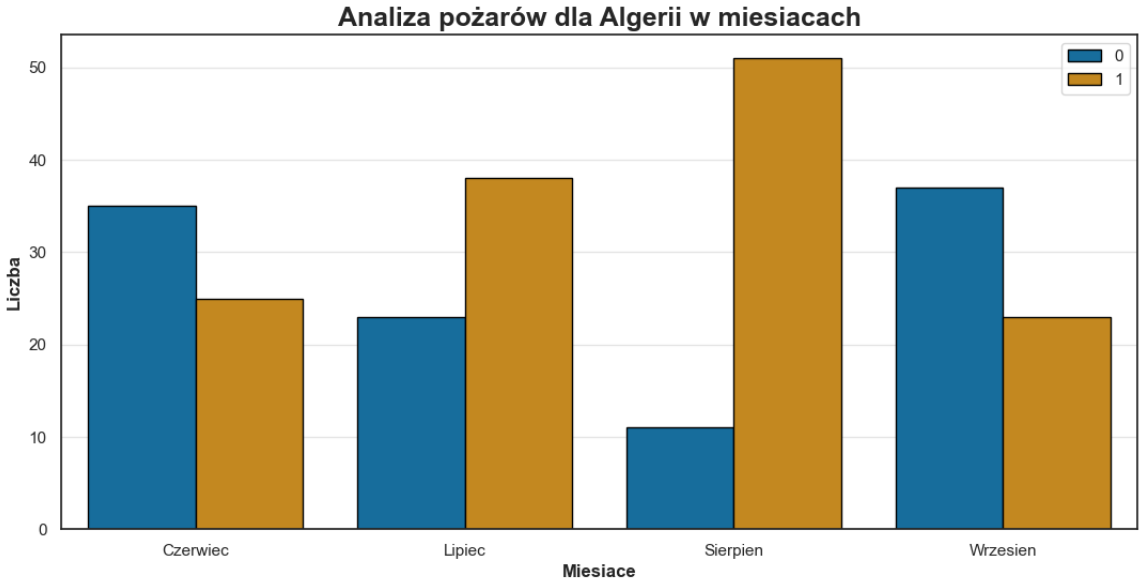


Analiza pożarów dla Algerii i dla danych regionów dla danego miesiąca

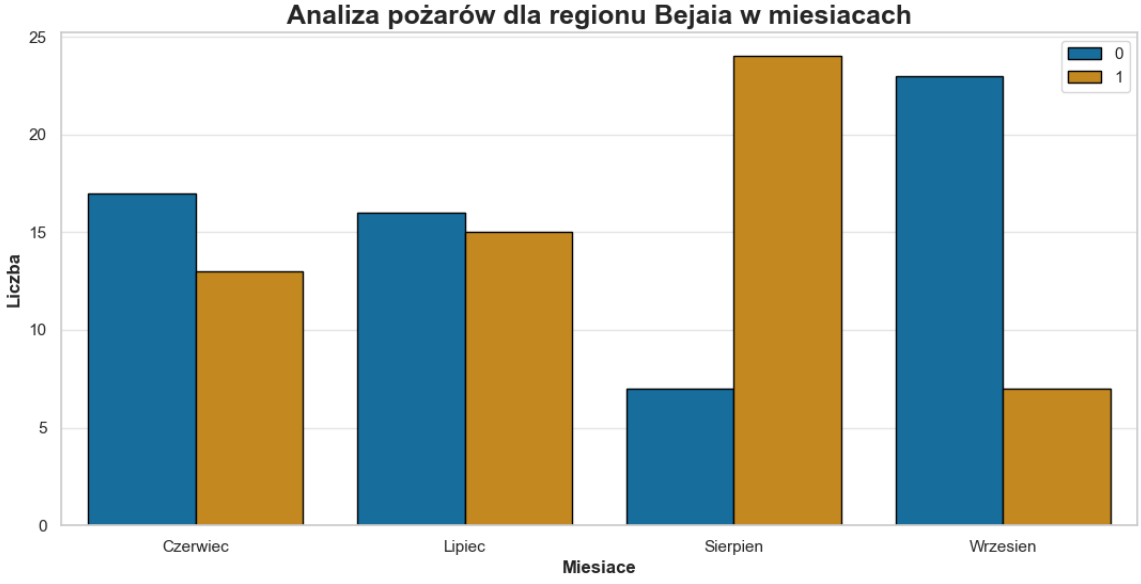
- klasa 0 - Not Fire
- klasa 1 - Fire

In [ ]:
```
plt.subplots(figsize=(13, 6))
sns.set_style('whitegrid')
sns.countplot(x='month', hue='Classes', data=dane,
```

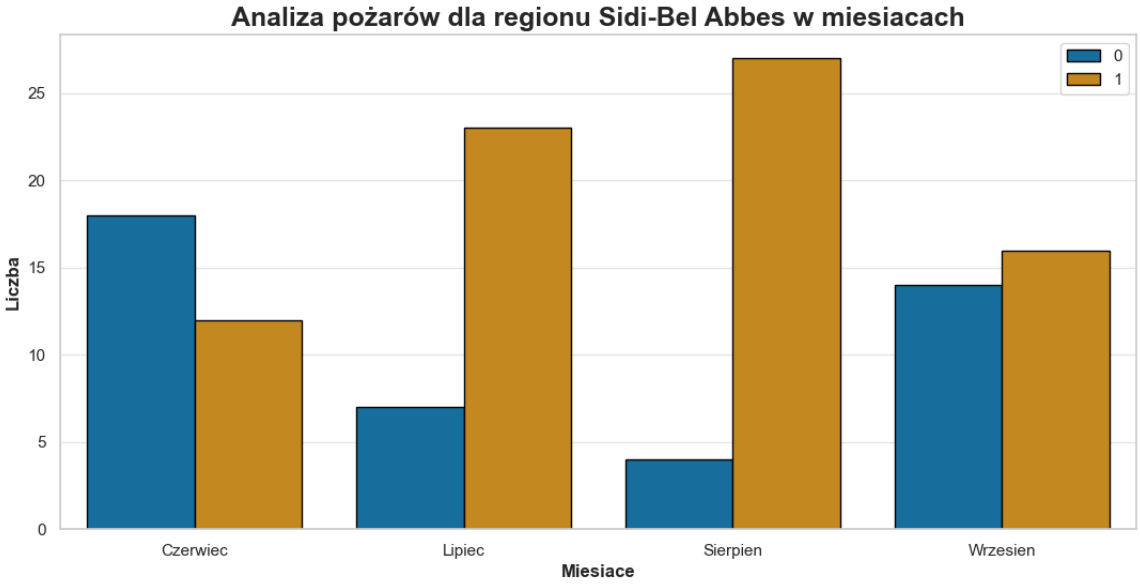
```
              ec='black', palette='colorblind')
plt.title('Analiza pożarów dla Algerii w miesiacach',
          fontsize=18, weight='bold')
plt.ylabel('Liczba', weight='bold')
plt.xlabel('Miesiace', weight='bold')
plt.legend(loc='upper right')
plt.xticks(np.arange(4), ['Czerwiec', 'Lipiec', 'Sierpien', 'Wrzesien',])
plt.grid(alpha=0.5, axis='y')
plt.show()
```



In [ ]:
```
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()
```



In [ ]:
```
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

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

Out[ ]:

	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
5	31	67	14	0.0	82.6	5.8	22.2	3.1	7.0	2.5	1	1
6	33	54	13	0.0	88.2	9.9	30.5	6.4	10.9	7.2	1	1
7	30	73	15	0.0	86.6	12.1	38.3	5.6	13.5	7.1	1	1
8	25	88	13	0.2	52.9	7.9	38.8	0.4	10.5	0.3	0	1
9	28	79	12	0.0	73.2	9.5	46.3	1.3	12.6	0.9	0	1

Podział zbioru danych na funkcję wejściową i wyjściową do analizy regresji

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

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

Out[ ]:

	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

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

Out[ ]:
```
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

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

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

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

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

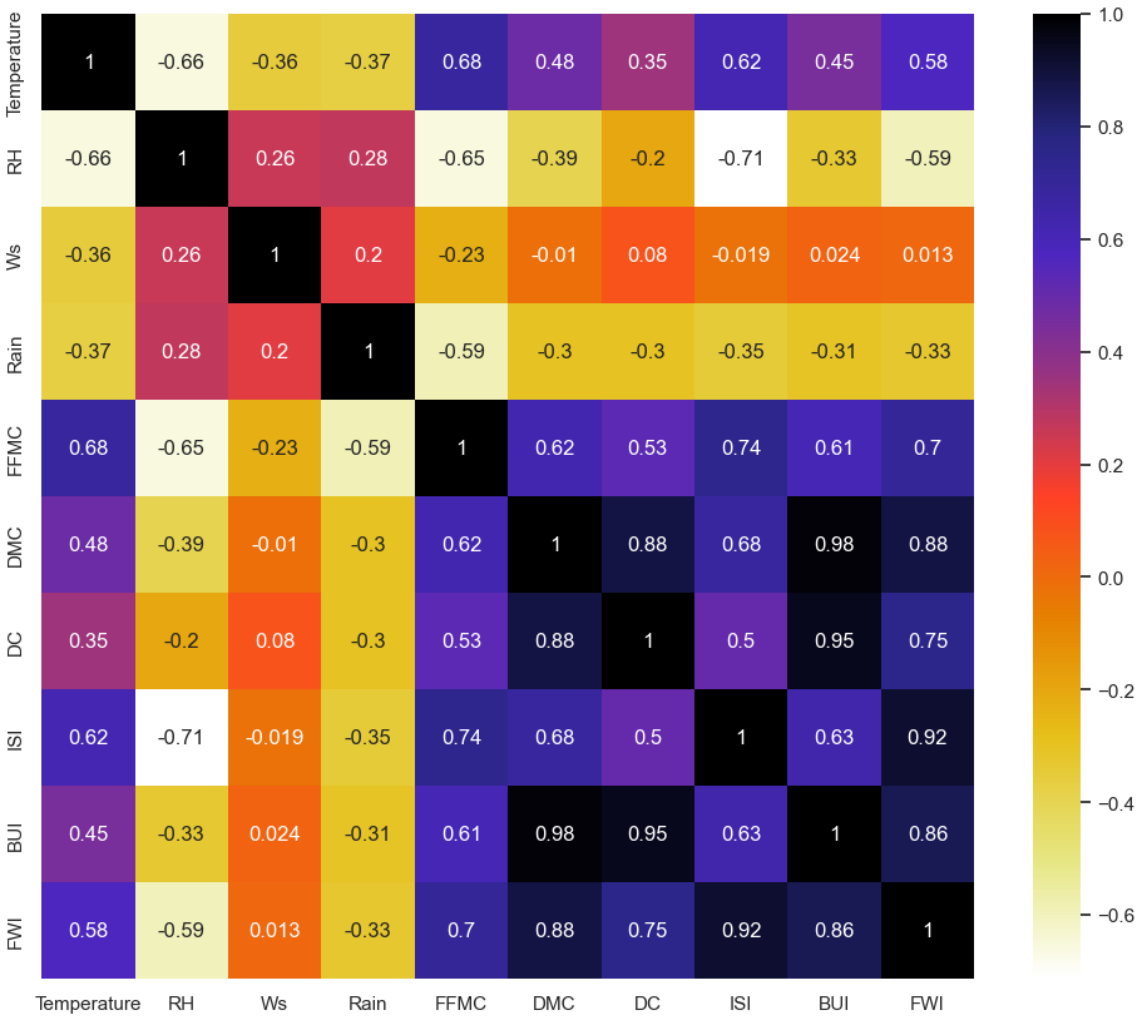
Korelacja uczących danych

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

Out[ ]:

	Temperature	RH	Ws	Rain	FFMC	DMC	DC	
Temperature	1.000000	-0.657325	-0.357016	-0.365941	0.684556	0.482965	0.349021	0.
RH	-0.657325	1.000000	0.262581	0.275592	-0.653649	-0.393893	-0.203883	-0.
Ws	-0.357016	0.262581	1.000000	0.204035	-0.226129	-0.010158	0.079699	-0.
Rain	-0.365941	0.275592	0.204035	1.000000	-0.589465	-0.300364	-0.302591	-0.
FFMC	0.684556	-0.653649	-0.226129	-0.589465	1.000000	0.621958	0.528275	0.
DMC	0.482965	-0.393893	-0.010158	-0.300364	0.621958	1.000000	0.884417	0.
DC	0.349021	-0.203883	0.079699	-0.302591	0.528275	0.884417	1.000000	0.
ISI	0.618172	-0.712353	-0.018845	-0.347660	0.742079	0.680918	0.501412	1.
BUI	0.447959	-0.333027	0.023680	-0.308258	0.606527	0.984222	0.951157	0.
FWI	0.575406	-0.594299	0.013239	-0.326426	0.704563	0.882314	0.746551	0.

In [ ]:
```
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

In [ ]:
```
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
```

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

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

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

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

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

Skalowanie

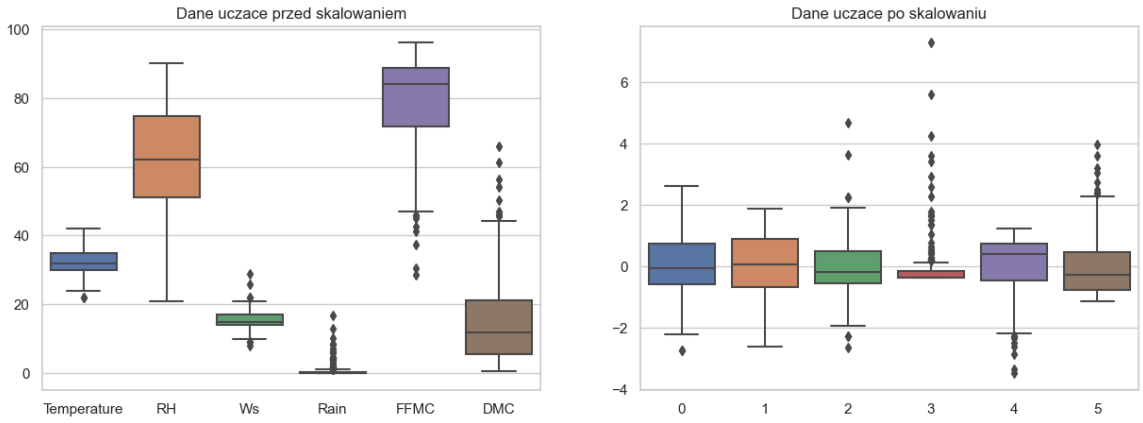
In [ ]:
```
def skalowaniefunkcja(x_uczacy, x_testujacy):
    skalowanie = StandardScaler()
    x_uczacy_skalowane = skalowanie.fit_transform(x_uczacy)
    x_testujacy_skalowane = skalowanie.transform(x_testujacy)

    return x_uczacy_skalowane, x_testujacy_skalowane
```

In [ ]:
```
x_uczacy_skalowane, x_testujacy_skalowane = skalowaniefunkcja(x_uczacy, x_testuj
```

In [ ]:
```
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')
```

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



Regresja liniowa

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

Out[ ]:
```
▾ LinearRegression

LinearRegression()
```

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

```
Przechwycenie wynosi : 7.558791208791209
Współczynnik wynosi : [ 0.36394299 -1.99797066  0.98619421  0.04636838  0.80703
533  5.44395047]
```

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

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

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

Out[ ]:
```
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 ])
```

In [ ]:
```
Aktualna_predykcja = pd.DataFrame(
    {'Aktualny przychod': y_testujacy, 'Predykcja przychodu': Regresjaliniowa_pr
Aktualna_predykcja
```

Out[ ]:

	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 × 2 columns

In [ ]:
```
absolutnyblad = metrics.mean_absolute_error(y_testujacy,Regresjaliniowa_predykcj
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
```

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

```
Współczynnik determinacji: 0.7064857305909149
```

Regresja w formie modelu OLS

In [ ]:
```
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, 05 Jun 2023   Prob (F-statistic):               0.00
Time:                        11:33:52   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 correctl
y 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

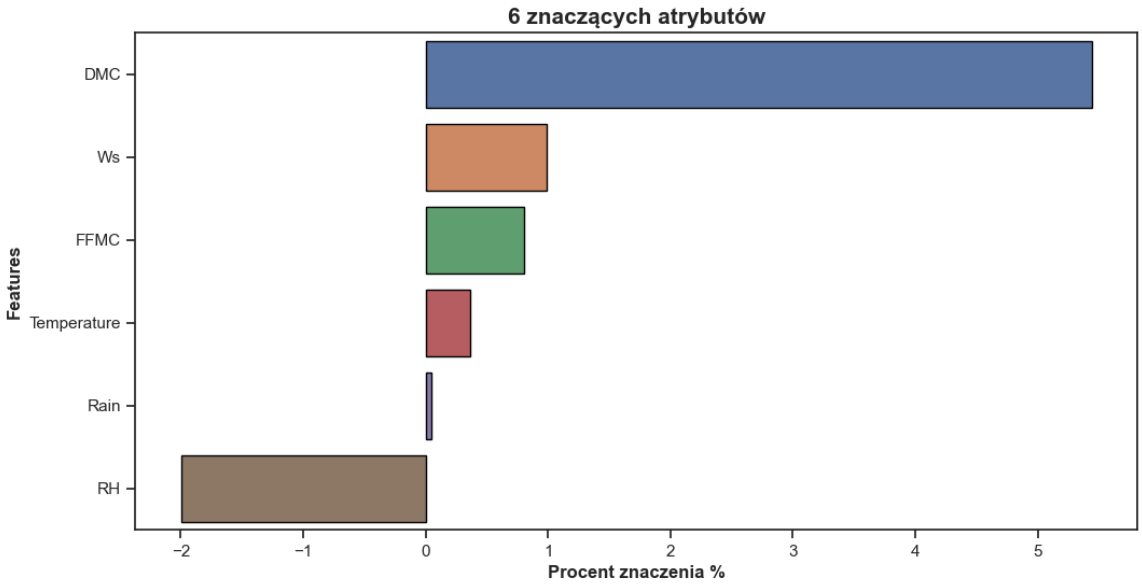
In [ ]:
```
znaczaceatrybuty = Regresjaliniowa.coef_
znaczaceatrybutytabela = pd.DataFrame({
    'Atrybuty': x_uczacy.columns,
    'Znaczenie': znaczaceatrybuty
}).sort_values('Znaczenie', ascending=False)
znaczaceatrybutytabela
```

Out[ ]:

	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

In [ ]:
```
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')
```

Out[ ]:
```
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

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

Out[ ]:

	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

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

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

Out[ ]:

	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

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

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

In [ ]:
```
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
```

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

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

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

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

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

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

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

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

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

In [ ]:
```
x_uczacy_skalowane, x_testujacy_skalowane = skalowaniefunkcja(x_uczacy, x_testuj
```

Drzewo dezycyjne

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

Out[ ]:
```
▾ DecisionTreeClassifier

DecisionTreeClassifier()
```

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

Out[ ]:
```
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])
```

In [ ]:
```
Aktualna_predykcja = pd.DataFrame(
    {'Aktualny przychod ': y_testujacy, 'Predykcjonowany przychod': Drzewodezycy
Aktualna_predykcja
```

Out[ ]:

	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 × 2 columns

In [ ]:
```
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)
```

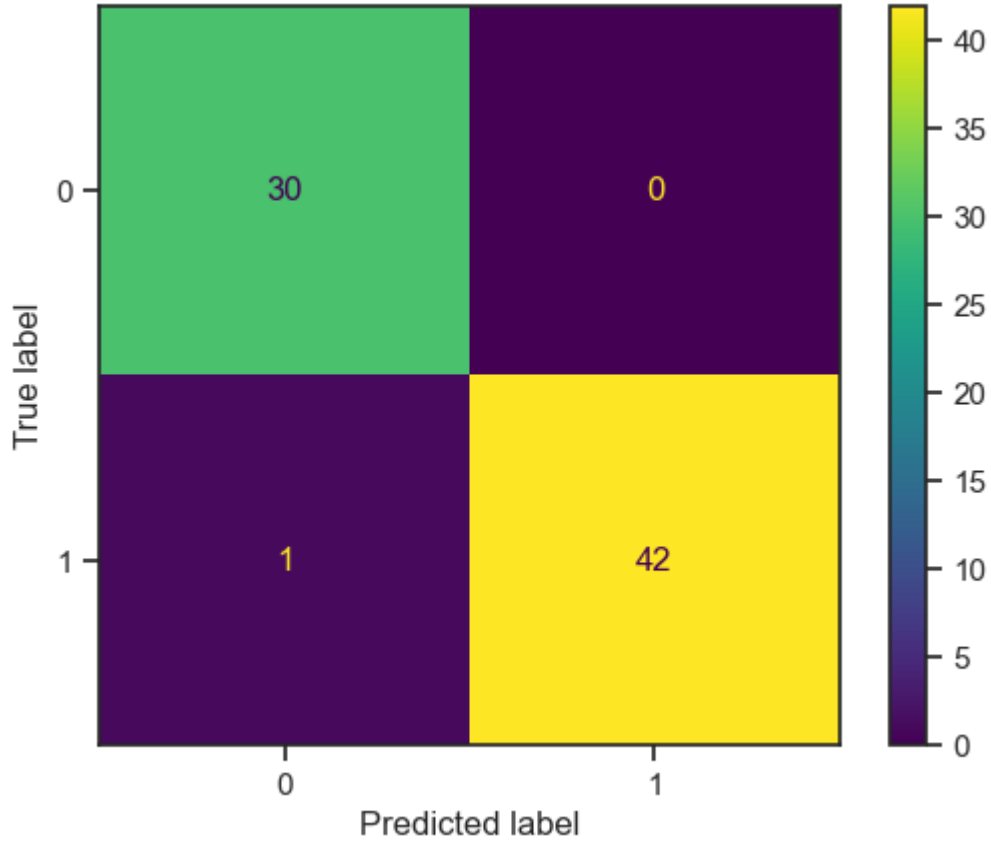
```
Decision Tree
Accuracy Score value: 0.9863
              precision    recall  f1-score   support

           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
```

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

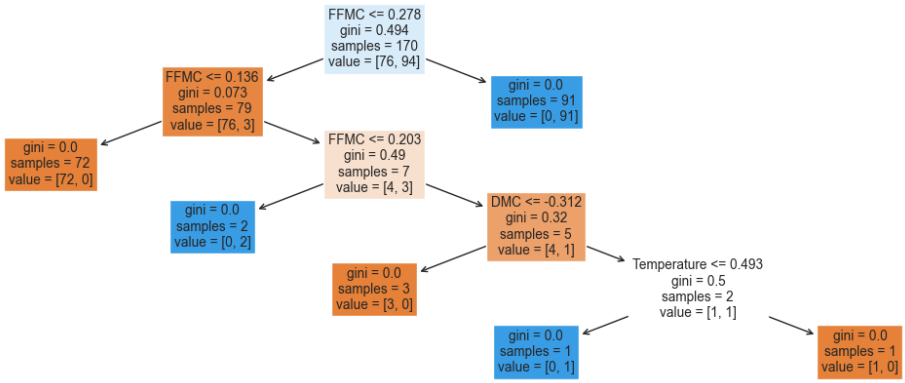
Out[ ]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x1e96e9ede90
>
```



In [ ]:
```
Drzewodezycyjnestring = tree.export_text(
    Drzewodezycyjne, feature_names=x_uczacy.columns.tolist())
print(Drzewodezycyjnestring)
```

```
|--- FFMC <= 0.28
|   |--- FFMC <= 0.14
|   |   |--- class: 0
|   |--- FFMC >  0.14
|   |   |--- FFMC <= 0.20
|   |   |   |--- class: 1
|   |   |--- FFMC >  0.20
|   |   |   |--- DMC <= -0.31
|   |   |   |   |--- class: 0
|   |   |   |--- DMC >  -0.31
|   |   |   |   |--- Temperature <= 0.49
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- Temperature >  0.49
|   |   |   |   |   |--- class: 0
|--- FFMC >  0.28
|   |--- class: 1
```

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



Jeśli FFMC jest mniejsze lub równe 0,28, drzewo rozgałęzia się ponownie na atrybucie FFMC. Jeśli FFMC jest mniejsze lub równe 0,14, klasa wynosi 0. Jeśli FFMC jest większe niż 0,14, ale mniejsze lub równe 0,20, klasa wynosi 1. Jeśli FFMC jest większe niż 0,20, drzewo rozgałęzia się na atrybucie DMC. Jeśli DMC jest mniejsze lub równe -0,31, klasa wynosi 0. Jeśli DMC jest większe niż -0,31, drzewo rozgałęzia się na atrybucie Temperatura. Jeśli Temperatura jest mniejsza lub równa 0,49, klasa wynosi 1. Jeśli Temperatura jest większa niż 0,49, klasa wynosi 0. Jeśli FFMC jest większe niż 0.28, klasa wynosi 1.