

EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES

PROJECT DEVELOPMENT PHASE

SPRINT 1

```
In [4]: import matplotlib.pyplot as plt
import numpy as np import pandas
as pd import seaborn as sns
from sklearn import metrics from sklearn.metrics import
classification_report,confusion_matrix
```

```
In [5]: import warnings warnings.filterwarnings(action="ignore")
%matplotlib inline sns.set_style('darkgrid')
pd.set_option("display.max_rows",1000)
pd.set_option("display.max_columns",1000)
```

```
In [6]: fires = pd.read_csv(r"C:\Users\dhine\Downloads\forestfires.csv\forestfires.csv")
#show the first 15 instance of dataset fires.head(15)
```

Out[6]:

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	area
0	75		mar	fri	86.2	26.2	94.3	5.1	8.2	51	6.7	0.0	0.0
1	7	4	oct	tue	90.6	35.4	669.1	6.7	18.0	33	0.9	0.0	0.0
2	74		oct	sat	90.6	43.7	686.9	6.7	14.6	33	1.3	0.0	0.0
3	8	6	mar	fri	91.7	33.3	77.5	9.0	8.3	97	4.0	0.2	0.0
4	86		mar	sun	89.3	51.3	102.2	9.6	11.4	99	1.8	0.0	0.0
5	8	6	aug	sun	92.3	85.3	488.0	14.7	22.2	29	5.4	0.0	0.0
6	86		aug	mon	92.3	88.9	495.6	8.5	24.1	27	3.1	0.0	0.0
7	8	6	aug	mon	91.5	145.4	608.2	10.7	8.0	86	2.2	0.0	0.0
8	86		sep	tue	91.0	129.5	692.6	7.0	13.1	63	5.4	0.0	0.0
9	7	5	sep	sat	92.5	88.0	698.6	7.1	22.8	40	4.0	0.0	0.0
10	7	5	sep	sat	92.5	88.0	698.6	7.1	17.8	51	7.2	0.0	0.0
11	7	5	sep	sat	92.8	73.2	713.0	22.6	19.3	38	4.0	0.0	0.0
12	6	5	aug	fri	63.5	70.8	665.3	0.8	17.0	72	6.7	0.0	0.0
13	6	5	sep	mon	90.9	126.5	686.5	7.0	21.3	42	2.2	0.0	0.0
14	6	5	sep	wed	92.9	133.3	699.6	9.2	26.4	21	4.5	0.0	0.0

```
In [7]: fires.shape
```

```
(517, 13)
```

```
Out[7]:
```

```
In [8]: #show the last 10 instances of dataset fires.tail(10)
```

```
Out[8]:
```

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	area
502	4	4	aug	tue	96.1	181.1	671.2	14.3	20.7	69	4.9	0.4	0.00
503	2	4	aug	wed	94.5	139.4	689.1	20.0	29.2	30	4.9	0.0	1.95
504	4	3	aug	wed	94.5	139.4	689.1	20.0	28.9	29	4.9	0.0	49.59
505	1	2	aug	thu	91.0	163.2	744.4	10.1	26.7	35	1.8	0.0	5.80
506	1	2	aug	fri	91.0	166.9	752.6	7.1	18.5	73	8.5	0.0	0.00
507	2	4	aug	fri	91.0	166.9	752.6	7.1	25.9	41	3.6	0.0	0.00
508	1	2	aug	fri	91.0	166.9	752.6	7.1	25.9	41	3.6	0.0	0.00
509	5	4	aug	fri	91.0	166.9	752.6	7.1	21.1	71	7.6	1.4	2.17
510	6	5	aug	fri	91.0	166.9	752.6	7.1	18.2	62	5.4	0.0	0.43
511	8	6	aug	sun	81.6	56.7	665.6	1.9	27.8	35	2.7	0.0	0.00
512	4	3	aug	sun	81.6	56.7	665.6	1.9	27.8	32	2.7	0.0	6.44
513	2	4	aug	sun	81.6	56.7	665.6	1.9	21.9	71	5.8	0.0	54.29
514	7	4	aug	sun	81.6	56.7	665.6	1.9	21.2	70	6.7	0.0	11.16
515	1	4	aug	sat	94.4	146.0	614.7	11.3	25.6	42	4.0	0.0	0.00
516	6	3	nov	tue	79.5	3.0	106.7	1.1	11.8	31	4.5	0.0	0.00

```
In [9]: fires.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 517 entries, 0 to 516 Data
columns (total 13 columns):
# Column Non-Null Count Dtype
```

```
-----
0    X  517 non-null int64
1    Y  517 non-null int64
2  month  517 non-null object
3    day  517 non-null object
4  FFMC  517 non-null float64 5  DMC  517 non-null float64
6    DC  517 non-null float64
7    ISI  517 non-null float64
8    temp  517 non-null float64
9    RH  517 non-null int64
10   wind  517 non-null float64
```

```
11 rain 517 non-null float64
12 area 517 non-null float64 dtypes: float64(8), int64(3), object(2) memory usage: 52.6+
KB
```

```
In [10]: #generate descriptive statistics of each attribute fires.describe().T
Out[10]:
count
```

X	517.0	4.669246	2.313778	1.0	3.0	4.00	7.00	9.00
Y	517.0	4.299807	1.229900	2.0	4.0	4.00	5.00	9.00
FFMC	517.0	90.644681	5.520111	18.7	90.2	91.60	92.90	96.20

```
DMC 517.0 110.872340 64.046482 1.1 68.6 108.30 142.40 291.30 DC 517.0
547.940039 248.066192 7.9 437.7 664.20 713.90 860.60
```

```
fires['area'].values[fires['area'].values >0] = 1
#renaming the area attribute to output for clear understanding
fires = fires.rename(columns={'area': 'output'}) fires.head(10)
```

ISI	517.0	9.021663	4.559477	0.0	6.5	8.40	10.80	56.10
temp	517.0	18.889168	5.806625	2.2	15.5	19.30	22.80	33.30
RH	517.0	44.288201	16.317469	15.0	33.0	42.00	53.00	100.00
wind	517.0	4.017602	1.791653	0.4	2.7	4.00	4.90	9.40
rain	517.0	0.021663	0.295959	0.0	0.0	0.00	0.00	6.40
area	517.0	12.847292	63.655818	0.0	0.0	0.52	6.57	1090.84

```
In [11]:
```

```
Out[11]:
```

X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	output
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0	7	5	mar	fri	oct	86.2	26.2	94.3	5.1	8.2	51	6.7	0.0	0.0
1	7	4	tue	oct	sat	90.6	35.4	669.1	6.7	18.0	33	0.9	0.0	0.0
2	7	4	mar	fri	mar	90.6	43.7	686.9	6.7	14.6	33	1.3	0.0	0.0
3	8	6	sun	aug		91.7	33.3	77.5	9.0	8.3	97	4.0	0.2	0.0
4	8	6	sun			89.3	51.3	102.2	9.6	11.4	99	1.8	0.0	0.0
5	8	6	aug	mon		92.3	85.3	488.0	14.7	22.2	29	5.4	0.0	0.0
6	8	6	aug	mon		92.3	88.9	495.6	8.5	24.1	27	3.1	0.0	0.0
7	8	6	sep	tue		91.5	145.4	608.2	10.7	8.0	86	2.2	0.0	0.0
8	8	6	sep	sat		91.0	129.5	692.6	7.0	13.1	63	5.4	0.0	0.0
9	7	5				92.5	88.0	698.6	7.1	22.8	40	4.0	0.0	0.0

In [12]: fires.corr()
 Out[12]:

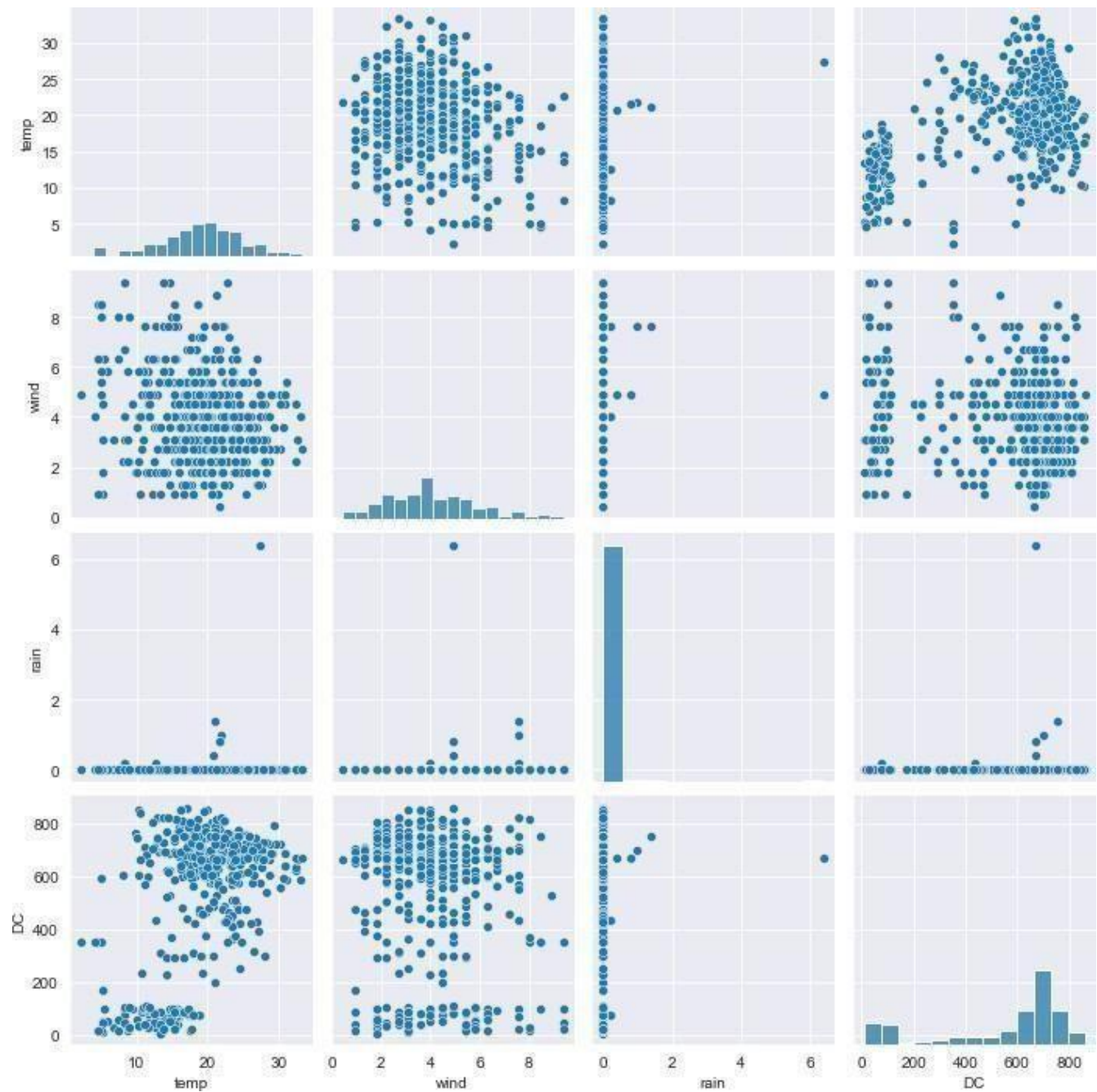
X	Y	FFMC	DMC	DC	ISI	temp	RH	wind		
X	1.000000	0.539548	-0.021039	-0.048384	-0.085916	0.006210	-0.051258	0.085223	0.018798	0.065
Y	0.539548	1.000000	-0.046308	0.007782	-0.10117	-0.024488	-0.024103	0.062221	-0.02034	0.033
FFMC	-0.021039	-0.046308	1.000000	0.382619	0.330512	0.531805	0.431532	-0.300995	-0.028485	0.056
DMC	-0.048384	0.007782	0.382619	1.000000	0.682192	0.305128	0.469594	0.073795	-0.10534	0.074
DC	-0.085916	-0.101178	0.330512	0.682192	1.000000	0.229154	0.496208	-0.039192	-0.203466	0.035
ISI	0.006210	-0.024488	0.531805	0.305128	0.229154	1.000000	0.394287	-0.132517	0.10682	0.067
temp	-0.051258	-0.024103	0.431532	0.469594	0.496208	0.394287	1.000000	-0.527390	-0.227116	0.069
RH	0.085223	0.062221	-0.300995	0.073795	-0.03919	-0.132517	-0.527390	1.000000	0.06941	0.099
wind	0.018798	-0.020341	-0.028485	-0.105342	-0.203466	0.106826	-0.227116	0.069410	1.000000	0.061
rain	0.065387	0.033234	0.056702	0.074790	0.035861	0.067668	0.069491	0.099751	0.06111	1.000
output	0.062491	0.056892	0.073823	0.062672	0.096724	0.035663	0.076047	-0.035587	0.055702	0.025

In [15]: numerical_feature = fires.describe(include=["int", "float"]).columns

```
# Print it in List type ..
print(list(numerical_feature))
```

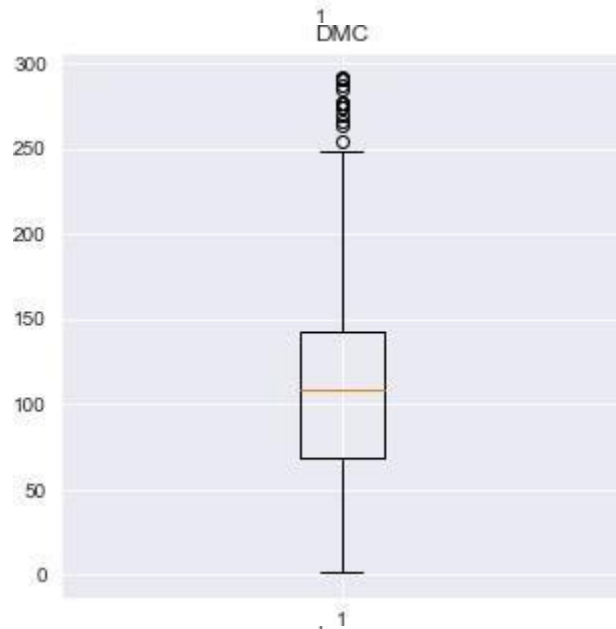
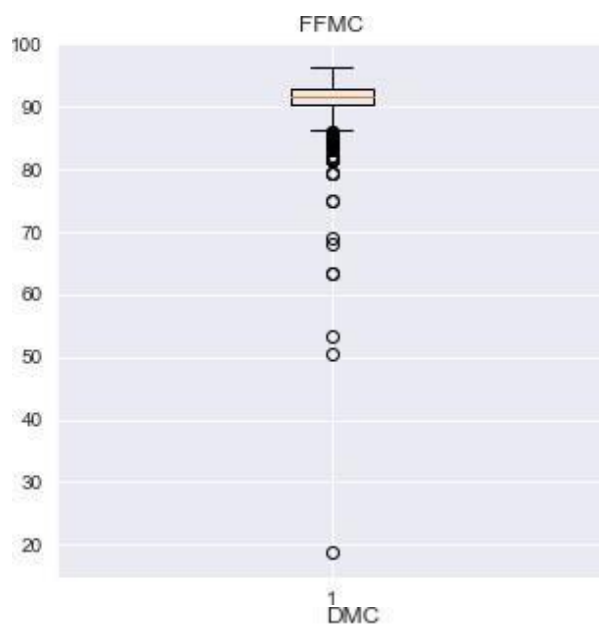
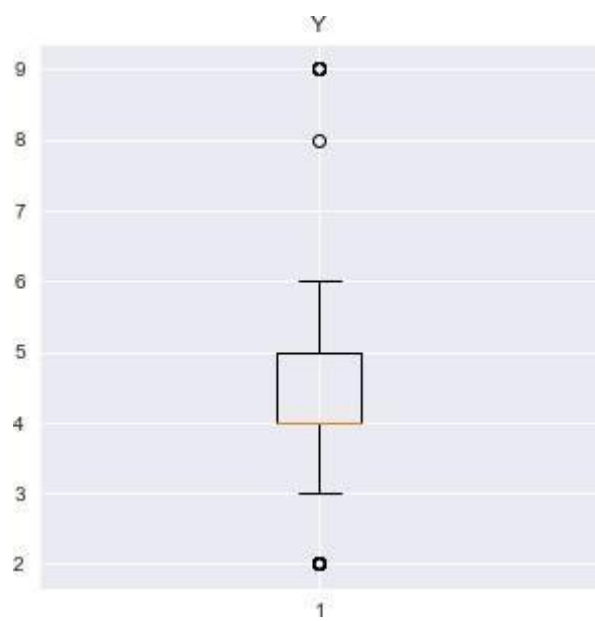
```
['X', 'Y', 'FFMC', 'DMC', 'DC', 'ISI', 'temp', 'RH', 'wind', 'rain', 'output']
```

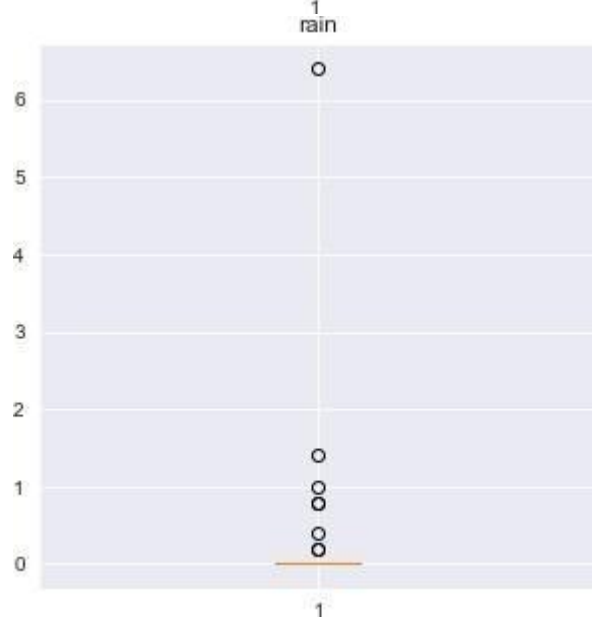
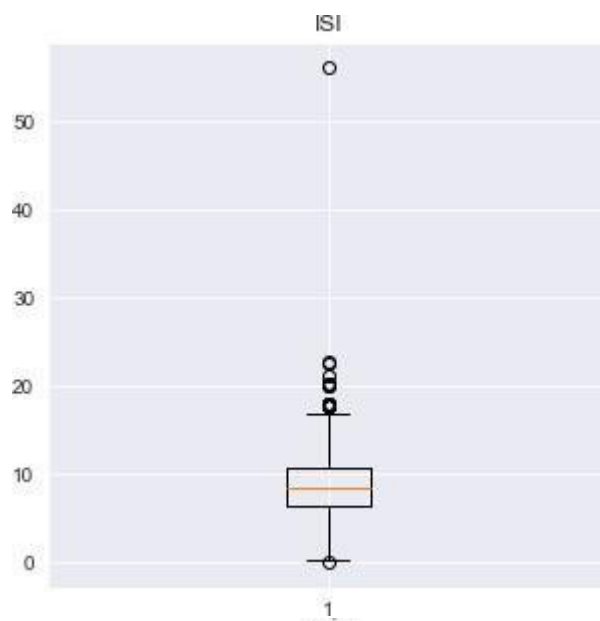
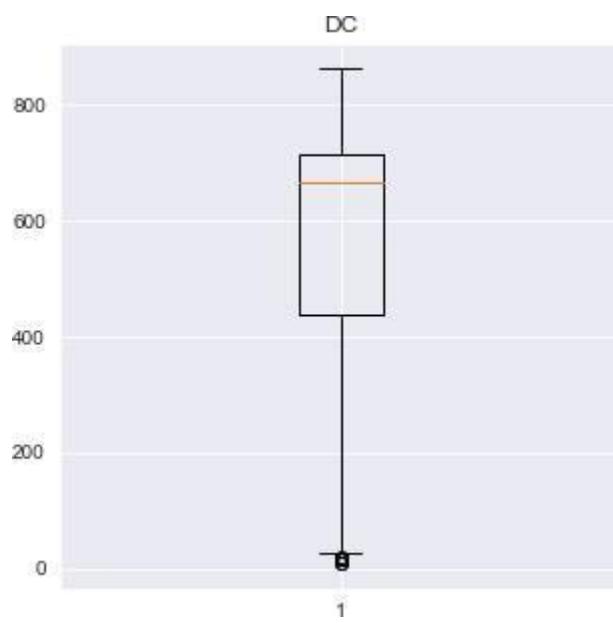
```
In [16]: sns.set_style('darkgrid')
# Find the relation #
plt.subplot(fires)
sns.pairplot(fires[["temp", "wind",
"rain", "DC"]]) plt.show()
```

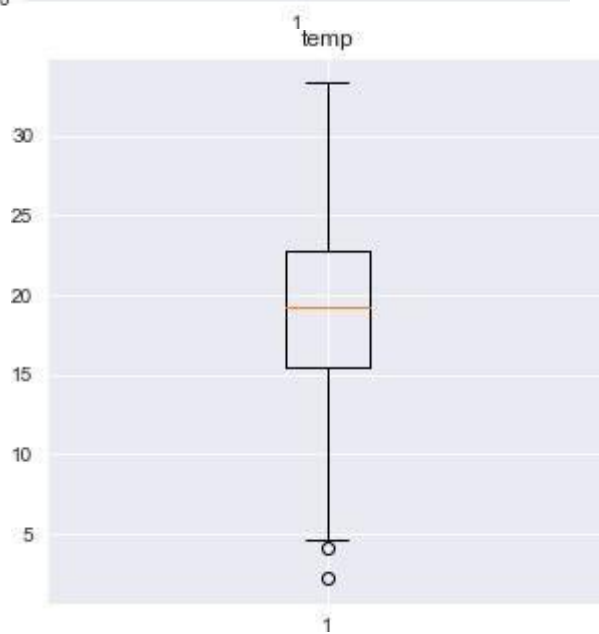
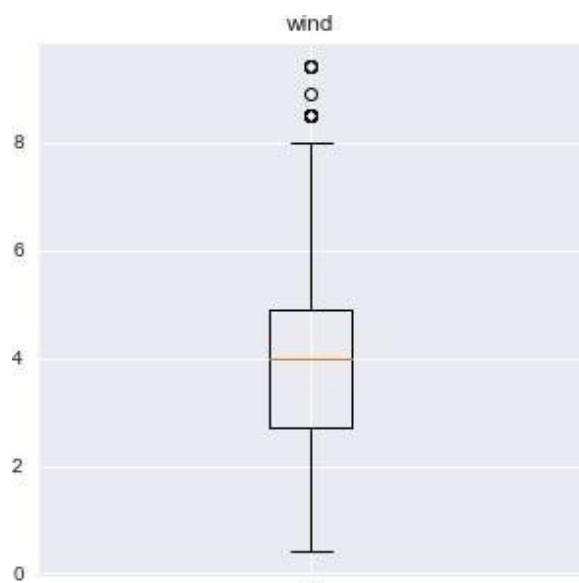
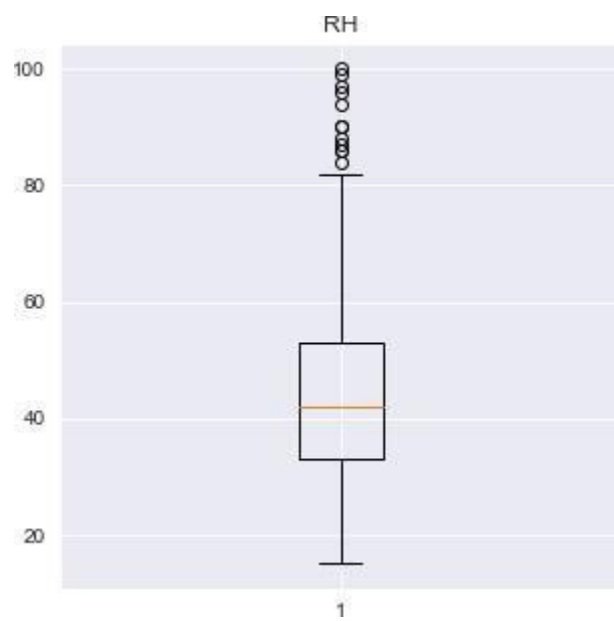


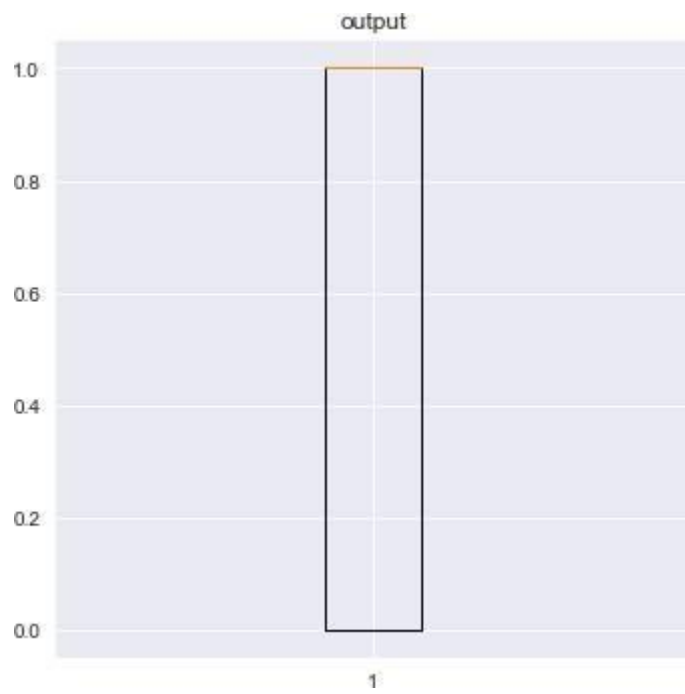
```
In [17]: for idx, col in enumerate(numerical_feature, 1):
plt.figure(figsize=(5,5))

# plt.subplot(len(numerical_feature) // 2, 3, idx) plt.boxplot(fires[col])
plt.title(col)
# plt.hist(fires[col])
plt.tight_layout()
plt.show(plt)
```

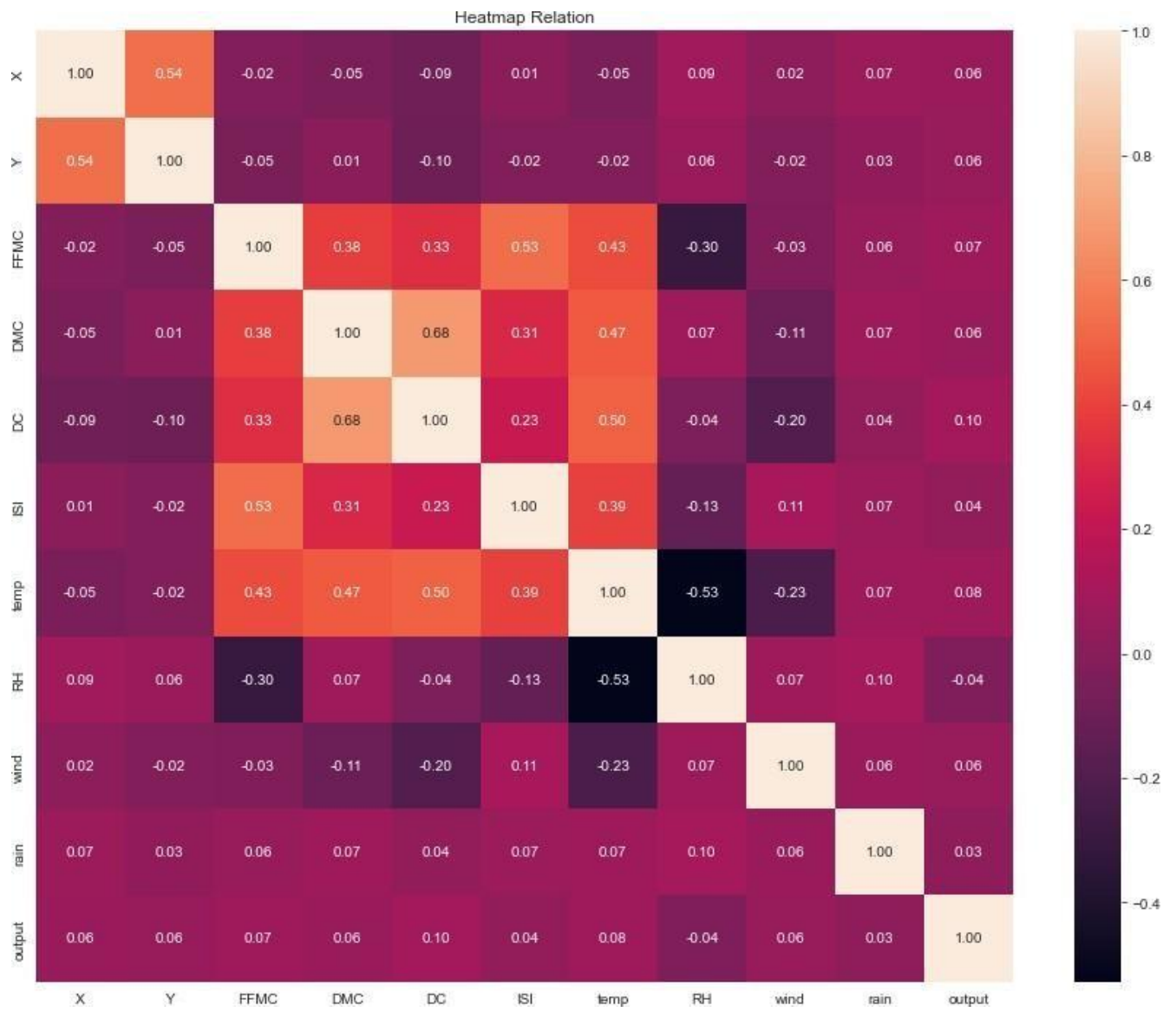








```
In [18]: plt.figure(figsize=(15, 12))    plt.title("Heatmap Relation")
sns.heatmap(fires[numerical_feature].corr(), annot=True, fmt='.2f');
```



```
In [19]: highest_rain = fires.sort_values(by='rain', ascending=False)[['month', 'day', 'rain']].head()
highest_rain
```

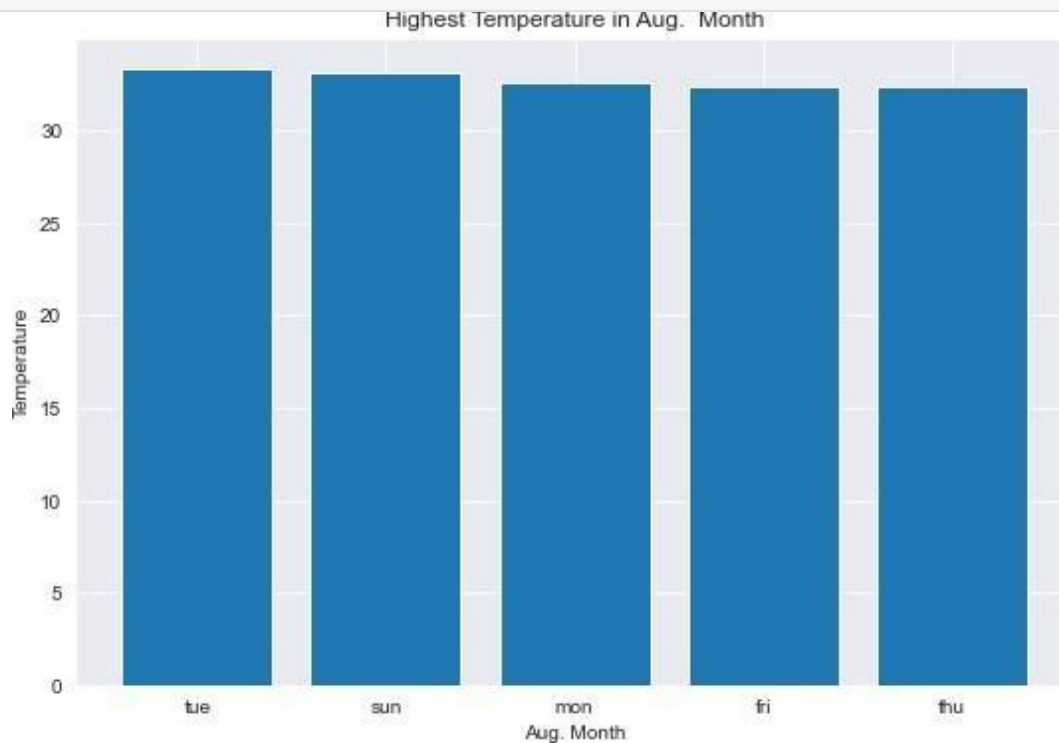
```
Out[19]:
```

	month	day	rain
499	aug	tue	6.4
509	aug	fri	1.4
243	aug	sun	1.0
500	aug	tue	0.8
501	aug	tue	0.8

```
In [20]: highest_temp = fires.sort_values(by='temp', ascending=False)[['month', 'day', 'temp']].head()
plt.figure(figsize=(9, 6))
plt.title("Highest Temperature in Aug. Month")
plt.bar(highest_temp['day'], highest_temp['temp'])

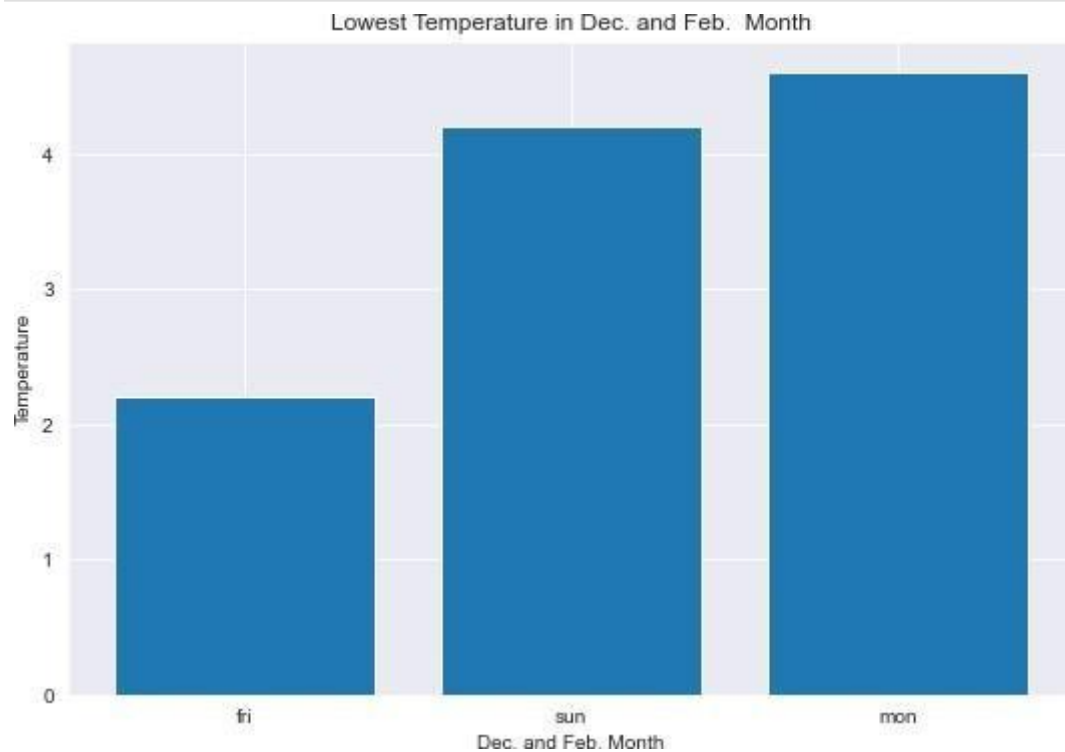
plt.xlabel("Day") plt.xlabel("Aug. Month")

plt.ylabel("Temperature")
plt.show()
```



```
In [21]: lowest_temp = fires.sort_values(by='temp', ascending=True)[['month', 'day', 'temp']].head()
plt.figure(figsize=(9, 6))
plt.title("Lowest Temperature in Dec. and Feb. Month")
plt.bar(lowest_temp['day'], lowest_temp['temp'])

plt.xlabel("Day")
plt.xlabel("Dec. and Feb. Month")
plt.ylabel("Temperature") plt.show()
```



```
In [22]: fires
```

Out[22]:

	X	Y	month	day	FFMC	DMC	DC	ISI	temp		RH	wind	rain	output
0	7	5	mar	fri	86.2	26.2	94.3	5.1	8.2	51	6.7	0.0	0.0	
1	7	4	oct	tue	90.6	35.4	669.1	6.7	18.0	33	0.9	0.0	0.0	
2	7	4	oct	sat	90.6	43.7	686.9	6.7	14.6	33	1.3	0.0	0.0	
3	3	6	mar	fri	91.7	33.3	77.5	9.0	8.3	97	4.0	0.2	0.0	
4	8	6	mar	sun	89.3	51.3	102.2	9.6	11.4	99	1.8	0.0	0.0	
5	3	6	aug	sun	92.3	85.3	488.0	14.7	22.2	29	5.4	0.0	0.0	
6	8	6	aug	mon	92.3	88.9	495.6	8.5	24.1	27	3.1	0.0	0.0	
7	3	6	aug	mon	91.5	145.4	608.2	10.7	8.0	86	2.2	0.0	0.0	
8	8	6	sep	tue	91.0	129.5	692.6	7.0	13.1	63	5.4	0.0	0.0	
9	7	5	sep	sat	92.5	88.0	698.6	7.1	22.8	40	4.0	0.0	0.0	
10	7	5	sep	sat	92.5	88.0	698.6	7.1	17.8	51	7.2	0.0	0.0	
11	7	5	sep	sat	92.8	73.2	713.0	22.6	19.3	38	4.0	0.0	0.0	
12	6	5	aug	fri	63.5	70.8	665.3	0.8	17.0	72	6.7	0.0	0.0	
13	5	5	sep	mon	90.9	126.5	686.5	7.0	21.3	42	2.2	0.0	0.0	
14	6	5	sep	wed	92.9	133.3	699.6	9.2	26.4	21	4.5	0.0	0.0	
15	5	5	sep	fri	93.3	141.2	713.9	13.9	22.9	44	5.4	0.0	0.0	
16	5	5	mar	sat	91.7	35.8	80.8	7.8	15.1	27	5.4	0.0	0.0	
17	3	5	oct	mon	84.9	32.8	664.2	3.0	16.7	47	4.9	0.0	0.0	
18	6	4	mar	wed	89.2	27.9	70.8	6.3	15.9	35	4.0	0.0	0.0	
19	5	4	apr	sat	86.3	27.4	97.1	5.1	9.3	44	4.5	0.0	0.0	
20	6	4	sep	tue	91.0	129.5	692.6	7.0	18.3	40	2.7	0.0	0.0	
21	5	4	sep	mon	91.8	78.5	724.3	9.2	19.1	38	2.7	0.0	0.0	
22	7	4	jun	sun	94.3	96.3	200.0	56.1	21.0	44	4.5	0.0	0.0	
23	7	4	aug	sat	90.2	110.9	537.4	6.2	19.5	43	5.8	0.0	0.0	
24	7	4	aug	sat	93.5	139.4	594.2	20.3	23.7	32	5.8	0.0	0.0	
25	7	4	aug	sun	91.4	142.4	601.4	10.6	16.3	60	5.4	0.0	0.0	
26	7	4	sep	fri	92.4	117.9	668.0	12.2	19.0	34	5.8	0.0	0.0	
27	7	4	sep	mon	90.9	126.5	686.5	7.0	19.4	48	1.3	0.0	0.0	

0.0

28	6	3	sep	sat	93.4	145.4	721.4	8.1	30.2	24	2.7	0.0	0.0
29	5	3	sep	sun	93.5	149.3	728.6	8.1	22.8	39	3.6	0.0	0.0
30	6	3	sep	fri	94.3	85.1	692.3	15.9	25.4	24	3.6	0.0	0.0
31	5	3	sep	mon	88.6	91.8	709.9	7.1	11.2	78	7.6	0.0	0.0
32	6	3	sep	fri	88.6	69.7	706.8	5.8	20.6	37	1.8	0.0	0.0
33	5	3	sep	sun	91.7	75.6	718.3	7.8	17.7	39	3.6	0.0	0.0
34	6	3	sep	mon	91.8	78.5	724.3	9.2	21.2	32	2.7	0.0	0.0
35	5	3	sep	tue	90.3	80.7	730.2	6.3	18.2	62	4.5	0.0	0.0
36	6	3	oct	tue	90.6	35.4	669.1	6.7	21.7	24	4.5		0.0

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	output
37	7	4	oct	fri	90.0	41.5	682.6	8.7	11.3	60	5.4	0.0	0.0
38	7	3	oct	sat	90.6	43.7	686.9	6.7	17.8	27	4.0	0.0	0.0
39	4	4	mar	tue	88.1	25.7	67.6	3.8	14.1	43	2.7	0.0	0.0
40	4	4	jul	tue	79.5	60.6	366.7	1.5	23.3	37	3.1	0.0	0.0
41	4	4	aug	sat	90.2	96.9	624.2	8.9	18.4	42	6.7	0.0	0.0
42	4	4	aug	tue	94.8	108.3	647.1	17.0	16.6	54	5.4	0.0	0.0
43	4	4	sep	sat	92.5	88.0	698.6	7.1	19.6	48	2.7	0.0	0.0
44	4	4	sep	wed	90.1	82.9	735.7	6.2	12.9	74	4.9	0.0	0.0
45	5	6	sep	wed	94.3	85.1	692.3	15.9	25.9	24	4.0	0.0	0.0
46	5	6	sep	mon	90.9	126.5	686.5	7.0	14.7	70	3.6	0.0	0.0
47	6	6	jul	mon	94.2	62.3	442.9	11.0	23.0	36	3.1	0.0	0.0
48	4	4	mar	mon	87.2	23.9	64.7	4.1	11.8	35	1.8	0.0	0.0
49	4	4	mar	mon	87.6	52.2	103.8	5.0	11.0	46	5.8	0.0	0.0
50	4	4	sep	thu	92.9	137.0	706.4	9.2	20.8	17	1.3	0.0	0.0
51	4	3	aug	sun	90.2	99.6	631.2	6.3	21.5	34	2.2	0.0	0.0
52	4	3	aug	wed	92.1	111.2	654.1	9.6	20.4	42	4.9	0.0	0.0
53	4	3	aug	wed	92.1	111.2	654.1	9.6	20.4	42	4.9	0.0	0.0
54	4	3	aug	thu	91.7	114.3	661.3	6.3	17.6	45	3.6	0.0	0.0
55	4	3	sep	thu	92.9	137.0	706.4	9.2	27.7	24	2.2	0.0	0.0
56	4	3	sep	tue	90.3	80.7	730.2	6.3	17.8	63	4.9	0.0	0.0
57	4	3	oct	sun	92.6	46.5	691.8	8.8	13.8	50	2.7	0.0	0.0

58	2	2	feb	mon	84.0	9.3	34.0	2.1	13.9	40	5.4	0.0	0.0
59	2	2	feb	fri	86.6	13.2	43.0	5.3	12.3	51	0.9	0.0	0.0
60	2	2	mar	sun	89.3	51.3	102.2	9.6	11.5	39	5.8	0.0	0.0
61	2	2	mar	sun	89.3	51.3	102.2	9.6	5.5	59	6.3	0.0	0.0
62	2	2	aug	thu	93.0	75.3	466.6	7.7	18.8	35	4.9	0.0	0.0
63	2	2	aug	sun	90.2	99.6	631.2	6.3	20.8	33	2.7	0.0	0.0
64	2	2	aug	mon	91.1	103.2	638.8	5.8	23.1	31	3.1	0.0	0.0
65	2	2	aug	thu	91.7	114.3	661.3	6.3	18.6	44	4.5	0.0	0.0
66	2	2	sep	fri	92.4	117.9	668.0	12.2	23.0	37	4.5	0.0	0.0
67	2	2	sep	fri	92.4	117.9	668.0	12.2	19.6	33	5.4	0.0	0.0
68	2	2	sep	fri	92.4	117.9	668.0	12.2	19.6	33	6.3	0.0	0.0
69	4	5	mar	fri	91.7	33.3	77.5	9.0	17.2	26	4.5	0.0	0.0
70	4	5	mar	fri	91.2	48.3	97.8	12.5	15.8	27	7.6	0.0	0.0
71	4	5	sep	fri	94.3	85.1	692.3	15.9	17.7	37	3.6	0.0	0.0
72	5	4	mar	fri	91.7	33.3	77.5	9.0	15.6	25	6.3	0.0	0.0
73	5	4	aug	tue	88.8	147.3	614.5	9.0	17.3	43	4.5	0.0	0.0
74	5	4	sep	fri	93.3	141.2	713.9	13.9	27.6	30	1.3	0.0	0.0
75	9	9	feb	thu	84.2	6.8	26.6	7.7	6.7	79	3.1	0.0	0.0
76	9	9	feb	fri	86.6	13.2	43.0	5.3	15.7	43	3.1	0.0	0.0
77	13		mar	mon	87.6	52.2	103.8	5.0	8.3	72	3.1	0.0	0.0
78	12		aug	fri	90.1	108.0	529.8	12.5	14.7	66	2.7	0.0	0.0
79	12		aug	tue	91.0	121.2	561.6	7.0	21.6	19	6.7	0.0	0.0
80	12		aug	sun	91.4	142.4	601.4	10.6	19.5	39	6.3	0.0	0.0
81	12		aug	sun	90.2	99.6	631.2	6.3	17.9	44	2.2	0.0	0.0
82	12		aug	tue	94.8	108.3	647.1	17.0	18.6	51	4.5	0.0	0.0
83	12		aug	wed	92.1	111.2	654.1	9.6	16.6	47	0.9	0.0	0.0
84	12		aug	thu	91.7	114.3	661.3	6.3	20.2	45	3.6	0.0	0.0
85	12		sep	thu	92.9	137.0	706.4	9.2	21.5	15	0.9	0.0	0.0
86	12		sep	thu	92.9	137.0	706.4	9.2	25.4	27	2.2	0.0	0.0
87	12		sep	thu	92.9	137.0	706.4	9.2	22.4	34	2.2	0.0	0.0
88	12		sep	sun	93.5	149.3	728.6	8.1	25.3	36	3.6	0.0	0.0
89	6	5	mar	sat	91.7	35.8	80.8	7.8	17.4	25	4.9	0.0	0.0
90	6	5	aug	sat	90.2	96.9	624.2	8.9	14.7	59	5.8	0.0	0.0
91	8	6	mar	fri	91.7	35.8	80.8	7.8	17.4	24	5.4	0.0	0.0
92	8	6	aug	sun	92.3	85.3	488.0	14.7	20.8	32	6.3	0.0	0.0

0.0

93	86	aug	sun	91.4	142.4	601.4	10.6	18.2	43	4.9	0.0	0.0	
94	86	aug	mon	91.1	103.2	638.8	5.8	23.4	22	2.7	0.0	0.0	
95	44	sep	sun	89.7	90.0	704.4	4.8	17.8	64	1.3	0.0	0.0	
96	34	feb	sat	83.9	8.0	30.2	2.6	12.7	48	1.8	0.0	0.0	
97	34	mar	sat	69.0	2.4	15.5	0.7	17.4	24	5.4	0.0	0.0	
98	34	aug	sun	91.4	142.4	601.4	10.6	11.6	87	4.5	0.0	0.0	
99	34	aug	sun	91.4	142.4	601.4	10.6	19.8	39	5.4	0.0	0.0	
100	3	4	aug	sun	91.4	142.4	601.4	10.6	19.8	39	5.4	0.0	0.0
101	3	4	aug	tue	88.8	147.3	614.5	9.0	14.4	66	5.4	0.0	0.0
102	2	4	aug	tue	94.8	108.3	647.1	17.0	20.1	40	4.0	0.0	0.0
103	2	4	sep	sat	92.5	121.1	674.4	8.6	24.1	29	4.5	0.0	0.0
104	2	4	jan	sat	82.1	3.7	9.3	2.9	5.3	78	3.1	0.0	0.0
105	4	5	mar	fri	85.9	19.5	57.3	2.8	12.7	52	6.3	0.0	0.0
106	4	5	mar	thu	91.4	30.7	74.3	7.5	18.2	29	3.1	0.0	0.0
107	4	5	aug	sun	90.2	99.6	631.2	6.3	21.4	33	3.1	0.0	0.0
108	4	5	sep	sat	92.5	88.0	698.6	7.1	20.3	45	3.1	0.0	0.0
109	4	5	sep	mon	88.6	91.8	709.9	7.1	17.4	56	5.4	0.0	0.0
110	4	4	mar	fri	85.9	19.5	57.3	2.8	13.7	43	5.8		0.0

RH wind rain output													
111	3	4	mar	fri	91.7	33.3	77.5	9.0	18.8	18	4.5	0.0	0.0
112	3	4	sep	sun	89.7	90.0	704.4	4.8	22.8	39	3.6	0.0	0.0
113	3	4	sep	mon	91.8	78.5	724.3	9.2	18.9	35	2.7	0.0	0.0
114	3	4	mar	tue	88.1	25.7	67.6	3.8	15.8	27	7.6	0.0	0.0
115	3	5	mar	tue	88.1	25.7	67.6	3.8	15.5	27	6.3	0.0	0.0
116	3	4	mar	sat	91.7	35.8	80.8	7.8	11.6	30	6.3	0.0	0.0
117	3	4	mar	sat	91.7	35.8	80.8	7.8	15.2	27	4.9	0.0	0.0
118	3	4	mar	mon	90.1	39.7	86.6	6.2	10.6	30	4.0	0.0	0.0
119	3	4	aug	thu	93.0	75.3	466.6	7.7	19.6	36	3.1	0.0	0.0
120	3	4	aug	mon	91.5	145.4	608.2	10.7	10.3	74	2.2	0.0	0.0
121	3	4	aug	mon	91.5	145.4	608.2	10.7	17.1	43	5.4	0.0	0.0
122	3	4	sep	sun	92.4	124.1	680.7	8.5	22.5	42	5.4	0.0	0.0
123	3	4	sep	tue	84.4	73.4	671.9	3.2	17.9	45	3.1	0.0	0.0
124	3	4	sep	fri	94.3	85.1	692.3	15.9	19.8	50	5.4	0.0	0.0
125	3	4	oct	sun	92.6	46.5	691.8	8.8	20.6	24	5.4	0.0	0.0
126	3	5	mar	mon	87.6	52.2	103.8	5.0	9.0	49	2.2	0.0	0.0
127	3	5	sep	fri	93.5	149.3	728.6	8.1	17.2	43	3.1	0.0	0.0
128	3	5	oct	wed	91.4	37.9	673.8	5.2	15.9	46	3.6	0.0	0.0
129	2	5	oct	sun	92.6	46.5	691.8	8.8	15.4	35	0.9	0.0	0.0
130	4	6	feb	sat	68.2	21.5	87.2	0.8	15.4	40	2.7	0.0	0.0
131	4	6	mar	mon	87.2	23.9	64.7	4.1	14.0	39	3.1	0.0	0.0
132	4	6	mar	sun	89.3	51.3	102.2	9.6	10.6	46	4.9	0.0	0.0
133	4	6	sep	thu	93.7	80.9	685.2	17.9	17.6	42	3.1	0.0	0.0
134	3	5	mar	tue	88.1	25.7	67.6	3.8	14.9	38	2.7	0.0	0.0
135	3	5	aug	sat	93.5	139.4	594.2	20.3	17.6	52	5.8	0.0	0.0
136	3	6	sep	sun	92.4	124.1	680.7	8.5	17.2	58	1.3	0.0	0.0
137	3	6	sep	mon	90.9	126.5	686.5	7.0	15.6	66	3.1	0.0	0.0
138	9	9	jul	tue	85.8	48.3	313.4	3.9	18.0	42	2.7	0.0	1.0
139	1	4	sep	tue	91.0	129.5	692.6	7.0	21.7	38	2.2	0.0	1.0

	X	Y	month	day	FFMC	DMC	DC	ISI	temp				
140	2	5	sep	mon	90.9	126.5	686.5	7.0	21.9	39	1.8	0.0	1.0
141	1	2	aug	wed	95.5	99.9	513.3	13.2	23.3	31	4.5	0.0	1.0
142	8	6	aug	fri	90.1	108.0	529.8	12.5	21.2	51	8.9	0.0	1.0
143	1	2	jul	sat	90.0	51.3	296.3	8.7	16.6	53	5.4	0.0	1.0
144	2	5	aug	wed	95.5	99.9	513.3	13.2	23.8	32	5.4	0.0	1.0
145	6	5	aug	thu	95.2	131.7	578.8	10.4	27.4	22	4.0	0.0	1.0
146	5	4	mar	mon	90.1	39.7	86.6	6.2	13.2	40	5.4	0.0	1.0
147	8	3	sep	tue	84.4	73.4	671.9	3.2	24.2	28	3.6	0.0	1.0
148	2	2	aug	tue	94.8	108.3	647.1	17.0	17.4	43	6.7	0.0	1.0
149	8	6	sep	thu	93.7	80.9	685.2	17.9	23.7	25	4.5	0.0	1.0
150	6	5	jun	fri	92.5	56.4	433.3	7.1	23.2	39	5.4	0.0	1.0
151	9	9	jul	sun	90.1	68.6	355.2	7.2	24.8	29	2.2	0.0	1.0
152	3	4	jul	sat	90.1	51.2	424.1	6.2	24.6	43	1.8	0.0	1.0
153	5	4	sep	fri	94.3	85.1	692.3	15.9	20.1	47	4.9	0.0	1.0
154	1	5	sep	sat	93.4	145.4	721.4	8.1	29.6	27	2.7	0.0	1.0
155	7	4	aug	sun	94.8	108.3	647.1	17.0	16.4	47	1.3	0.0	1.0
156	2	4	sep	sat	93.4	145.4	721.4	8.1	28.6	27	2.2	0.0	1.0
157	2	2	aug	wed	92.1	111.2	654.1	9.6	18.4	45	3.6	0.0	1.0
158	2	4	aug	wed	92.1	111.2	654.1	9.6	20.5	35	4.0	0.0	1.0
159	7	4	sep	fri	92.4	117.9	668.0	12.2	19.0	34	5.8	0.0	1.0
160	7	4	mar	mon	90.1	39.7	86.6	6.2	16.1	29	3.1	0.0	1.0
161	6	4	aug	thu	95.2	131.7	578.8	10.4	20.3	41	4.0	0.0	1.0
162	6	3	mar	sat	90.6	50.1	100.4	7.8	15.2	31	8.5	0.0	1.0
163	8	6	sep	sat	92.5	121.1	674.4	8.6	17.8	56	1.8	0.0	1.0
164	8	5	sep	sun	89.7	90.0	704.4	4.8	17.8	67	2.2	0.0	1.0
165	6	5	mar	thu	84.9	18.2	55.0	3.0	5.3	70	4.5	0.0	1.0
166	6	5	aug	wed	92.1	111.2	654.1	9.6	16.6	47	0.9	0.0	1.0
167	6	5	aug	wed	96.0	127.1	570.5	16.5	23.4	33	4.5	0.0	1.0
168	6	5	mar	fri	91.2	48.3	97.8	12.5	14.6	26	9.4	0.0	1.0
169	8	6	aug	thu	95.2	131.7	578.8	10.4	20.7	45	2.2	0.0	1.0
170	5	4	sep	wed	92.9	133.3	699.6	9.2	21.9	35	1.8	0.0	1.0
171	8	6	aug	wed	85.6	90.4	609.6	6.6	17.4	50	4.0	0.0	1.0
172	7	4	aug	sun	91.4	142.4	601.4	10.6	20.1	39	5.4	0.0	1.0
173	4	4	sep	mon	90.9	126.5	686.5	7.0	17.7	39	2.2	0.0	1.0

174	1	4	aug	sat	90.2	96.9	624.2	8.9	14.2	53	1.8	0.0	1.0
175	1	4	aug	sat	90.2	96.9	624.2	8.9	20.3	39	4.9	0.0	1.0
176	6	5	apr	thu	81.5	9.1	55.2	2.7	5.8	54	5.8	0.0	1.0
177	2	5	aug	sun	90.2	99.6	631.2	6.3	19.2	44	2.7	0.0	1.0
178	2	5	sep	wed	90.1	82.9	735.7	6.2	18.3	45	2.2	0.0	1.0
179	8	6	aug	tue	88.8	147.3	614.5	9.0	14.4	66	5.4	0.0	1.0
180	1	3	sep	sun	92.4	124.1	680.7	8.5	23.9	32	6.7	0.0	1.0
181	8	6	oct	mon	84.9	32.8	664.2	3.0	19.1	32	4.0	0.0	1.0
182	5	4	feb	sun	86.8	15.6	48.3	3.9	12.4	53	2.2	0.0	1.0
183	7	4	oct	mon	91.7	48.5	696.1	11.1	16.8	45	4.5	0.0	1.0
184	8	6	aug	fri	93.9	135.7	586.7	15.1	20.8	34	4.9	1.0	
RH wind rain output													
185	2	5	sep	tue	91.0	129.5	692.6	7.0	17.6	46	3.1	0.0	1.0
186	8	6	mar	sun	89.3	51.3	102.2	9.6	11.5	39	5.8	0.0	1.0
187	1	5	sep	mon	90.9	126.5	686.5	7.0	21.0	42	2.2	0.0	1.0
188	6	4	mar	sat	90.8	41.9	89.4	7.9	13.3	42	0.9	0.0	1.0
189	7	4	mar	sun	90.7	44.0	92.4	5.5	11.5	60	4.0	0.0	1.0
190	6	5	mar	fri	91.2	48.3	97.8	12.5	11.7	33	4.0	0.0	1.0
191	2	5	aug	thu	95.2	131.7	578.8	10.4	24.2	28	2.7	0.0	1.0
192	2	2	aug	tue	94.8	108.3	647.1	17.0	24.6	22	4.5	0.0	1.0
193	4	5	sep	wed	92.9	133.3	699.6	9.2	24.3	25	4.0	0.0	1.0
194	2	2	aug	tue	94.8	108.3	647.1	17.0	24.6	22	4.5	0.0	1.0
195	2	5	aug	fri	93.9	135.7	586.7	15.1	23.5	36	5.4	0.0	1.0
196	6	5	apr	thu	81.5	9.1	55.2	2.7	5.8	54	5.8	0.0	1.0
197	4	5	sep	thu	92.9	137.0	706.4	9.2	21.5	15	0.9	0.0	1.0
198	3	4	sep	tue	91.0	129.5	692.6	7.0	13.9	59	6.3	0.0	1.0
199	2	4	sep	mon	63.5	70.8	665.3	0.8	22.6	38	3.6	0.0	1.0
200	1	5	sep	tue	91.0	129.5	692.6	7.0	21.6	33	2.2	0.0	1.0
201	6	5	mar	sun	90.1	37.6	83.7	7.2	12.4	54	3.6	0.0	1.0
202	7	4	feb	sun	83.9	8.7	32.1	2.1	8.8	68	2.2	0.0	1.0
203	8	6	oct	wed	91.4	37.9	673.8	5.2	20.2	37	2.7	0.0	1.0
204	5	6	mar	sat	90.6	50.1	100.4	7.8	15.1	64	4.0	0.0	1.0

	X	Y	month	day	FFMC	DMC	DC	ISI	temp				
205	4	5	sep	thu	92.9	137.0	706.4	9.2	22.1	34	1.8	0.0	1.0
206	2	2	aug	sat	93.5	139.4	594.2	20.3	22.9	31	7.2	0.0	1.0
207	7	5	sep	tue	91.0	129.5	692.6	7.0	20.7	37	2.2	0.0	1.0
208	6	5	sep	fri	92.4	117.9	668.0	12.2	19.6	33	6.3	0.0	1.0
209	8	3	sep	thu	93.7	80.9	685.2	17.9	23.2	26	4.9	0.0	1.0
210	4	4	oct	sat	90.6	43.7	686.9	6.7	18.4	25	3.1	0.0	1.0
211	7	4	aug	sat	93.5	139.4	594.2	20.3	5.1	96	5.8	0.0	1.0
212	7	4	sep	fri	94.3	85.1	692.3	15.9	20.1	47	4.9	0.0	1.0
213	7	3	mar	mon	87.6	52.2	103.8	5.0	11.0	46	5.8	0.0	1.0
214	4	4	mar	sat	91.7	35.8	80.8	7.8	17.0	27	4.9	0.0	1.0
215	4	4	mar	sat	91.7	35.8	80.8	7.8	17.0	27	4.9	0.0	1.0
216	4	4	sep	sun	92.4	124.1	680.7	8.5	16.9	60	1.3	0.0	1.0
217	1	3	sep	mon	88.6	91.8	709.9	7.1	12.4	73	6.3	0.0	1.0
218	4	5	sep	wed	92.9	133.3	699.6	9.2	19.4	19	1.3	0.0	1.0
219	6	5	mar	mon	90.1	39.7	86.6	6.2	15.2	27	3.1	0.0	1.0
220	8	6	aug	sun	90.2	99.6	631.2	6.3	16.2	59	3.1	0.0	1.0
221	3	4	sep	fri	93.3	141.2	713.9	13.9	18.6	49	3.6	0.0	1.0

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	output
249	3	4	aug	wed	93.1	157.3	666.7	13.5	21.7	40	0.4	0.0	1.0
250	8	5	aug	wed	93.1	157.3	666.7	13.5	26.8	25	3.1	0.0	1.0
251	8	5	aug	wed	93.1	157.3	666.7	13.5	24.0	36	3.1	0.0	1.0
252	6	5	aug	wed	93.1	157.3	666.7	13.5	22.1	37	3.6	0.0	1.0
253	7	4	aug	thu	91.9	109.2	565.5	8.0	21.4	38	2.7	0.0	1.0
254	6	3	aug	thu	91.6	138.1	621.7	6.3	18.9	41	3.1	0.0	1.0
255	2	5	aug	thu	87.5	77.0	694.8	5.0	22.3	46	4.0	0.0	0.0
256	8	6	aug	sat	94.2	117.2	581.1	11.0	23.9	41	2.2	0.0	1.0
257	4	3	aug	sat	94.2	117.2	581.1	11.0	21.4	44	2.7	0.0	1.0
258	3	4	aug		91.8	170.9	692.3	13.7	20.6	59	0.9		0.0
259	7	4	aug	sat	91.8	170.9	692.3	13.7	23.7	40	1.8	0.0	1.0
260	2	4	aug	mon	93.6	97.9	542.0	14.4	28.3	32	4.0	0.0	1.0
261	3	4	aug	fri	91.6	112.4	573.0	8.9	11.2	84	7.6	0.0	1.0
262	2	4	aug	fri	91.6	112.4	573.0	8.9	21.4	42	3.1	0.0	1.0
263	6	3	aug	fri	91.1	141.1	629.1	7.1	19.3	39	3.6	0.0	1.0
264	4	4	aug	fri	94.3	167.6	684.4	13.0	21.8	53	3.1	0.0	1.0
265	4	4	aug	tue	93.7	102.2	550.3	14.6	22.1	54	7.6	0.0	1.0
266	6	5	aug	tue	94.3	131.7	607.1	22.7	19.4	55	4.0	0.0	1.0
267	2	2	aug	tue	92.1	152.6	658.2	14.3	23.7	24	3.1	0.0	0.0
268	3	4	aug	tue	92.1	152.6	658.2	14.3	21.0	32	3.1	0.0	0.0
269	4	4	aug	tue	92.1	152.6	658.2	14.3	19.1	53	2.7	0.0	1.0
270	2	2	aug	tue	92.1	152.6	658.2	14.3	21.8	56	3.1	0.0	1.0
271	8	6	aug	tue	92.1	152.6	658.2	14.3	20.1	58	4.5	0.0	1.0
272	2	5	aug	tue	92.1	152.6	658.2	14.3	20.2	47	4.0	0.0	1.0
273	4	6	dec	sun	84.4	27.2	353.5	6.8	4.8	57	8.5	0.0	1.0
274	8	6	dec	wed	84.0	27.8	354.6	5.3	5.1	61	8.0	0.0	1.0
275	4	6	dec	thu	84.6	26.4	352.0	2.0	5.1	61	4.9	0.0	1.0

[illegible]

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	output
303	3	6	jun	fri	91.1	94.1	232.1	7.1	19.2	38	4.5	0.0	0.0
304	6	5	may	sat	85.1	28.0	113.8	3.5	11.3	94	4.9	0.0	0.0
305	1	4	sep	sun	89.6	84.1	714.3	5.7	19.0	52	2.2	0.0	0.0
306	7	4	sep	sun	89.6	84.1	714.3	5.7	17.1	53	5.4	0.0	1.0
307	3	4	sep	sun	89.6	84.1	714.3	5.7	23.8	35	3.6	0.0	1.0
308	2	4	sep	sun	92.4	105.8	758.1	9.9	16.0	45	1.8	0.0	0.0
309	2	4	sep	sun	92.4	105.8	758.1	9.9	24.9	27	2.2	0.0	0.0
310	7	4	sep	sun	92.4	105.8	758.1	9.9	25.3	27	2.7	0.0	0.0
311	6	3	sep	sun	92.4	105.8	758.1	9.9	24.8	28	1.8	0.0	1.0
312	2	4	sep	sun	50.4	46.2	706.6	0.4	12.2	78	6.3	0.0	0.0
313	6	5	sep	wed	92.6	115.4	777.1	8.8	24.3	27	4.9	0.0	0.0
314	4	4	sep	wed	92.6	115.4	777.1	8.8	19.7	41	1.8	0.0	1.0
315	3	4	sep	wed	91.2	134.7	817.5	7.2	18.5	30	2.7	0.0	0.0
316	4	5	sep	thu	92.4	96.2	739.4	8.6	18.6	24	5.8	0.0	0.0
317	4	4	sep	thu	92.4	96.2	739.4	8.6	19.2	24	4.9	0.0	1.0
318	6	5	sep	thu	92.8	119.0	783.5	7.5	21.6	27	2.2	0.0	0.0
319	5	4	sep	thu	92.8	119.0	783.5	7.5	21.6	28	6.3	0.0	1.0
320	6	3	sep	thu	92.8	119.0	783.5	7.5	18.9	34	7.2	0.0	1.0
321	1	4	sep	thu	92.8	119.0	783.5	7.5	16.8	28	4.0	0.0	1.0
322	6	5	sep	thu	92.8	119.0	783.5	7.5	16.8	28	4.0	0.0	1.0
323	3	5	sep	thu	90.7	136.9	822.8	6.8	12.9	39	2.7	0.0	1.0
324	6	5	sep	thu	88.1	53.3	726.9	5.4	13.7	56	1.8	0.0	1.0
325	1	4	sep	sat	92.2	102.3	751.5	8.4	24.2	27	3.1	0.0	0.0
326	5	4	sep	sat	92.2	102.3	751.5	8.4	24.1	27	3.1	0.0	0.0
327	6	5	sep	sat	92.2	102.3	751.5	8.4	21.2	32	2.2	0.0	0.0
328	6	5	sep	sat	92.2	102.3	751.5	8.4	19.7	35	1.8	0.0	0.0
329	4	3	sep	sat	92.2	102.3	751.5	8.4	23.5	27	4.0	0.0	1.0

[illegible]

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	output
357	6	3	sep	fri	92.5	122.0	789.7	10.2	15.9	55	3.6	0.0	0.0
358	6	3	sep	fri	92.5	122.0	789.7	10.2	19.7	39	2.7	0.0	0.0
359	1	4	sep	fri	92.5	122.0	789.7	10.2	21.1	39	2.2	0.0	1.0
360	6	5	sep	fri	92.5	122.0	789.7	10.2	18.4	42	2.2	0.0	1.0
361	4	3	sep	fri	92.5	122.0	789.7	10.2	17.3	45	4.0	0.0	1.0
362	7	4	sep	fri	88.2	55.2	732.3	11.6	15.2	64	3.1	0.0	1.0
363	4	3	sep	tue	91.9	111.7	770.3	6.5	15.9	53	2.2	0.0	1.0
364	6	5	sep	tue	91.9	111.7	770.3	6.5	21.1	35	2.7	0.0	1.0
365	6	5	sep	tue	91.9	111.7	770.3	6.5	19.6	45	3.1	0.0	1.0
366	4	5	sep	tue	91.1	132.3	812.1	12.5	15.9	38	5.4	0.0	1.0
367	4	5	sep	tue	91.1	132.3	812.1	12.5	16.4	27	3.6	0.0	0.0
368	6	5	sep	sat	91.2	94.3	744.4	8.4	16.8	47	4.9	0.0	1.0
369	4	5	sep	sun	91.0	276.3	825.1	7.1	13.8	77	7.6	0.0	0.0

396	4 3	sep	sun	90.5	96.7	750.5	11.4	20.4	55	4.9	0.0	1.0
397	5 6	aug	sun	91.6	181.3	613.0	7.6	24.3	33	3.6	0.0	1.0
398	1 2	aug	sat	93.7	231.1	715.1	8.4	25.9	32	3.1	0.0	0.0
399	9 5	jun	wed	93.3	49.5	297.7	14.0	28.0	34	4.5	0.0	0.0
400	9 5	jun	wed	93.3	49.5	297.7	14.0	28.0	34	4.5	0.0	1.0
401	3 4	sep	thu	91.1	88.2	731.7	8.3	22.8	46	4.0	0.0	1.0
402	9 9	aug	fri	94.8	227.0	706.7	12.0	25.0	36	4.0	0.0	0.0
403	8 6	aug	thu	90.7	194.1	643.0	6.8	21.3	41	3.6	0.0	0.0
404	2 4	sep	wed	87.9	84.8	725.1	3.7	21.8	34	2.2	0.0	1.0
405	2 2	aug	tue	94.6	212.1	680.9	9.5	27.9	27	2.2	0.0	0.0
406	6 5	sep		87.1	291.3	860.6	4.0	17.0	67	4.9	0.0	
407	4 5	feb	sat	84.7	8.2	55.0	2.9	14.2	46	4.0	0.0	0.0
408	4 3	sep	fri	90.3	290.0	855.3	7.4	19.9	44	3.1	0.0	1.0
409	1 4	jul	tue	92.3	96.2	450.2	12.1	23.4	31	5.4	0.0	0.0
410	6 3	feb	fri	84.1	7.3	52.8	2.7	14.7	42	2.7	0.0	0.0
411	7 4	feb	fri	84.6	3.2	43.6	3.3	8.2	53	9.4	0.0	1.0
412	9 4	jul	mon	92.3	92.1	442.1	9.8	22.8	27	4.5	0.0	1.0
413	7 5	aug	sat	93.7	231.1	715.1	8.4	26.4	33	3.6	0.0	0.0
414	5 4	aug	sun	93.6	235.1	723.1	10.1	24.1	50	4.0	0.0	0.0
415	8 6	aug	thu	94.8	222.4	698.6	13.9	27.5	27	4.9	0.0	1.0
416	6 3	jul	tue	92.7	164.1	575.8	8.9	26.3	39	3.1	0.0	1.0
417	6 5	mar	wed	93.4	17.3	28.3	9.9	13.8	24	5.8	0.0	0.0
418	2 4	aug	sun	92.0	203.2	664.5	8.1	24.9	42	5.4	0.0	1.0
419	2 5	aug	sun	91.6	181.3	613.0	7.6	24.8	36	4.0	0.0	1.0
420	8 8	aug	wed	91.7	191.4	635.9	7.8	26.2	36	4.5	0.0	1.0
421	2 4	aug	wed	95.2	217.7	690.0	18.0	30.8	19	4.5	0.0	0.0
422	8 6	jul	sun	88.9	263.1	795.9	5.2	29.3	27	3.6	0.0	1.0

423	1	3	sep	sat	91.2	94.3	744.4	8.4	22.3	48	4.0	0.0	1.0
424	8	6	aug	sat	93.7	231.1	715.1	8.4	26.9	31	3.6	0.0	1.0
425	2	2	aug	thu	91.6	248.4	753.8	6.3	20.4	56	2.2	0.0	0.0
426	8	6	aug	thu	91.6	248.4	753.8	6.3	20.4	56	2.2	0.0	0.0
427	2	4	aug	mon	92.1	207.0	672.6	8.2	27.9	33	2.2	0.0	1.0
428	1	3	aug	thu	94.8	222.4	698.6	13.9	26.2	34	5.8	0.0	0.0
429	3	4	aug	sun	91.6	181.3	613.0	7.6	24.6	44	4.0	0.0	1.0
430	7	4	sep	thu	89.7	287.2	849.3	6.8	19.4	45	3.6	0.0	0.0
431	1	3	aug	sat	92.1	178.0	605.3	9.6	23.3	40	4.0	0.0	1.0
432	8	6	aug	thu	94.8	222.4	698.6	13.9	23.9	38	6.7	0.0	0.0
433	2	4	aug	sun	93.6	235.1	723.1	10.1	20.9	66	4.9	0.0	1.0
434	1	4	aug	fri	90.6	269.8	811.2	5.5	22.2	45	3.6	0.0	0.0
435	2	5	jul	sat	90.8	84.7	376.6	5.6	23.8	51	1.8	0.0	0.0
436	8	6	aug	mon	92.1	207.0	672.6	8.2	26.8	35	1.3	0.0	1.0
437	8	6	aug	sat	89.4	253.6	768.4	9.7	14.2	73	2.7	0.0	0.0
438	2	5	aug	sat	93.7	231.1	715.1	8.4	23.6	53	4.0	0.0	1.0
439	1	3	sep	fri	91.1	91.3	738.1	7.2	19.1	46	2.2	0.0	1.0
440	5	4	sep	fri	90.3	290.0	855.3	7.4	16.2	58	3.6	0.0	0.0
441	8	6	aug	mon	92.1	207.0	672.6	8.2	25.5	29	1.8	0.0	1.0
442	6	5	apr	mon	87.9	24.9	41.6	3.7	10.9	64	3.1	0.0	1.0
443	1	2	jul	fri	90.7	80.9	368.3	16.8	14.8	78	8.0	0.0	0.0

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X	Y	month	day	FFMC	DMC	DC	ISI	temp					RH
444	2	5	sep	fri	90.3	290.0	855.3	7.4	16.2	58	3.6	0.0	1.0
445	5	5	aug	sun	94.0	47.9	100.7	10.7	17.3	80	4.5	0.0	0.0
446	6	5	aug	sun	92.0	203.2	664.5	8.1	19.1	70	2.2	0.0	0.0
447	3	4	mar	wed	93.4	17.3	28.3	9.9	8.9	35	8.0	0.0	0.0

448	7 4	sep	wed	89.7	284.9	844.0	10.1	10.5	77	4.0	0.0	0.0
449	7 4	aug	sun	91.6	181.3	613.0	7.6	19.3	61	4.9	0.0	0.0
450	4 5	aug	wed	95.2	217.7	690.0	18.0	23.4	49	5.4	0.0	1.0
451	1 4	aug	fri	90.5	196.8	649.9	16.3	11.8	88	4.9	0.0	1.0
452	7 4	aug	mon	91.5	238.2	730.6	7.5	17.7	65	4.0	0.0	0.0
453	4 5	aug	thu	89.4	266.2	803.3	5.6	17.4	54	3.1	0.0	0.0
454	3 4	aug	thu	91.6	248.4	753.8	6.3	16.8	56	3.1	0.0	0.0
455	3 4	jul	mon	94.6	160.0	567.2	16.7	17.9	48	2.7	0.0	0.0
456	2 4	aug	thu	91.6	248.4	753.8	6.3	16.6	59	2.7	0.0	0.0
457	1 4	aug	wed	91.7	191.4	635.9	7.8	19.9	50	4.0	0.0	1.0
458	8 6	aug	sat	93.7	231.1	715.1	8.4	18.9	64	4.9	0.0	1.0
459	7 4	aug	sat	91.6	273.8	819.1	7.7	15.5	72	8.0	0.0	1.0
460	2 5	aug	sat	93.7	231.1	715.1	8.4	18.9	64	4.9	0.0	0.0
461	8 6	aug	sat	93.7	231.1	715.1	8.4	18.9	64	4.9	0.0	0.0
462	1 4	sep	sun	91.0	276.3	825.1	7.1	14.5	76	7.6	0.0	1.0
463	6 5	feb	tue	75.1	4.4	16.2	1.9	4.6	82	6.3	0.0	1.0
464	6 4	feb	tue	75.1	4.4	16.2	1.9	5.1	77	5.4	0.0	1.0
465	2 2	feb	sat	79.5	3.6	15.3	1.8	4.6	59	0.9	0.0	1.0
466	6 5	mar	mon	87.2	15.1	36.9	7.1	10.2	45	5.8	0.0	1.0
467	3 4	mar	wed	90.2	18.5	41.1	7.3	11.2	41	5.4	0.0	1.0
468	6 5	mar	thu	91.3	20.6	43.5	8.5	13.3	27	3.6	0.0	1.0
469	6 3	apr	sun	91.0	14.6	25.6	12.3	13.7	33	9.4	0.0	1.0
470	5 4	apr	sun	91.0	14.6	25.6	12.3	17.6	27	5.8	0.0	0.0
471	4 3	may	fri	89.6	25.4	73.7	5.7	18.0	40	4.0	0.0	1.0
472	8 3	jun	mon	88.2	96.2	229.0	4.7	14.3	79	4.0	0.0	1.0
473	9 4	jun	sat	90.5	61.1	252.6	9.4	24.5	50	3.1	0.0	1.0
474	4 3	jun	thu	93.0	103.8	316.7	10.8	26.4	35	2.7	0.0	1.0

475	2 5	jun	thu	93.7	121.7	350.2	18.0	22.7	40	9.4	0.0	1.0
476	4 3	jul	thu	93.5	85.3	395.0	9.9	27.2	28	1.3	0.0	1.0
477	4 3	jul	sun	93.7	101.3	423.4	14.7	26.1	45	4.0	0.0	1.0
478	7 4	jul	sun	93.7	101.3	423.4	14.7	18.2	82	4.5	0.0	1.0
479	7 4	jul	mon	89.2	103.9	431.6	6.4	22.6	57	4.9	0.0	1.0
480	9 9	jul	thu	93.2	114.4	560.0	9.5	30.2	25	4.5	0.0	
	X Y	month	day	FFMC	DMC	DC	ISI	temp		RH	wind	rain
481	4 3	jul	thu	93.2	114.4	560.0	9.5	30.2	22	4.9	0.0	0.0
482	3 4	aug	sun	94.9	130.3	587.1	14.1	23.4	40	5.8	0.0	1.0
483	8 6	aug	sun	94.9	130.3	587.1	14.1	31.0	27	5.4	0.0	0.0
484	2 5	aug	sun	94.9	130.3	587.1	14.1	33.1	25	4.0	0.0	1.0
485	2 4	aug	mon	95.0	135.5	596.3	21.3	30.6	28	3.6	0.0	1.0
486	5 4	aug	tue	95.1	141.3	605.8	17.7	24.1	43	6.3	0.0	1.0
487	5 4	aug	tue	95.1	141.3	605.8	17.7	26.4	34	3.6	0.0	1.0
488	4 4	aug	tue	95.1	141.3	605.8	17.7	19.4	71	7.6	0.0	1.0
489	4 4	aug	wed	95.1	141.3	605.8	17.7	20.6	58	1.3	0.0	0.0
490	4 4	aug	wed	95.1	141.3	605.8	17.7	28.7	33	4.0	0.0	0.0
491	4 4	aug	thu	95.8	152.0	624.1	13.8	32.4	21	4.5	0.0	0.0
492	1 3	aug	fri	95.9	158.0	633.6	11.3	32.4	27	2.2	0.0	0.0
493	1 3	aug	fri	95.9	158.0	633.6	11.3	27.5	29	4.5	0.0	1.0
494	6 6	aug	sat	96.0	164.0	643.0	14.0	30.8	30	4.9	0.0	1.0
495	6 6	aug	mon	96.2	175.5	661.8	16.8	23.9	42	2.2	0.0	0.0
496	4 5	aug	mon	96.2	175.5	661.8	16.8	32.6	26	3.1	0.0	1.0
497	3 4	aug	tue	96.1	181.1	671.2	14.3	32.3	27	2.2	0.0	1.0
498	6 5	aug	tue	96.1	181.1	671.2	14.3	33.3	26	2.7	0.0	1.0
499	7 5	aug	tue	96.1	181.1	671.2	14.3	27.3	63	4.9	6.4	1.0
500	8 6	aug	tue	96.1	181.1	671.2	14.3	21.6	65	4.9	0.8	0.0
501	7 5	aug	tue	96.1	181.1	671.2	14.3	21.6	65	4.9	0.8	0.0
502	4 4	aug	tue	96.1	181.1	671.2	14.3	20.7	69	4.9	0.4	0.0

503	2	4	aug	wed	94.5	139.4	689.1	20.0	29.2	30	4.9	0.0	1.0
504	4	3	aug	wed	94.5	139.4	689.1	20.0	28.9	29	4.9	0.0	1.0
505	1	2	aug	thu	91.0	163.2	744.4	10.1	26.7	35	1.8	0.0	1.0
506	1	2	aug	fri	91.0	166.9	752.6	7.1	18.5	73	8.5	0.0	0.0
507	2	4	aug	fri	91.0	166.9	752.6	7.1	25.9	41	3.6	0.0	0.0
508	1	2	aug	fri	91.0	166.9	752.6	7.1	25.9	41	3.6	0.0	0.0
509	5	4	aug	fri	91.0	166.9	752.6	7.1	21.1	71	7.6	1.4	1.0
510	6	5	aug	fri	91.0	166.9	752.6	7.1	18.2	62	5.4	0.0	1.0
511	8	6	aug	sun	81.6	56.7	665.6	1.9	27.8	35	2.7	0.0	0.0
512	4	3	aug	sun	81.6	56.7	665.6	1.9	27.8	32	2.7	0.0	1.0
513	2	4	aug	sun	81.6	56.7	665.6	1.9	21.9	71	5.8	0.0	1.0
514	7	4	aug	sun	81.6	56.7	665.6	1.9	21.2	70	6.7	0.0	1.0
515	1	4	aug	sat	94.4	146.0	614.7	11.3	25.6	42	4.0	0.0	0.0
516	6	3	nov	tue	79.5	3.0	106.7	1.1	11.8	31	4.5	0.0	0.0

In []:

```
In [1]: import keras from keras.preprocessing.image import
ImageDataGenerator
```

```
In [2]: #Define the parameters/arguments for ImageDataGenerator class
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,rotation_range=180,zoom_range
```

```
test_datagen=ImageDataGenerator(rescale=1./255)
```

```
In [3]: #Applying ImageDataGenerator functionality to trainset
x_train=train_datagen.flow_from_directory(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\
target_size=(128,128),batch_size=32,
class_mode='binary')
```

Found 436 images belonging to 2 classes.

```
In [4]: #Applying ImageDataGenerator functionality to testset
x_test=test_datagen.flow_from_directory(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\te
target_size=(128,128),batch_size=32,
class_mode='binary')
```

Found 121 images belonging to 2 classes.

```
In [5]: #importmodelbuilding libraries

#Todefine Linearinitialisation import Sequential from
keras.models import Sequential
#To add layers import Dense from
keras.layers import Dense
#Tocreate Convolutionkernelimport Convolution2D
from keras.layers import Convolution2D
#import Maxpooling layer from
keras.layers import MaxPooling2D
#import flatten layer from keras.layers
import Flatten import warnings
warnings.filterwarnings('ignore')
```

```
In [7]: #initializing the model model=Sequential()
```

```
In [8]: #add convolutional layer
model.add(Convolution2D(32,(3,3),input_shape=(128,128,3),activation='relu')) #add
maxpooling layer model.add(MaxPooling2D(pool_size=(2,2)))
#add flatten layer model.add(Flatten())
```

```
In [9]: #add hidden layer
In [10]: model.add(Dense(150,activation='relu')) #add output
In [11]: layer model.add(Dense(1,activation='sigmoid'))

#configure the learning process model.compile(loss='binary_crossentropy',optimizer="adam",metrics=["accuracy"])

#Training the model model.fit_generator(x_train,steps_per_epoch=14,epochs=10,validation_data=x_test,validation_st
```

Epoch 1/10

14/14 [=====] - 84s 6s/step - loss: 4.2334 - accuracy: 0.5619 - val_loss: 1.3686 - val_accuracy: 0.5950

Epoch 2/10

14/14 [=====] - 74s 5s/step - loss: 0.5689 - accuracy: 0.7362 - val_loss: 0.2423 - val_accuracy: 0.8926

Epoch 3/10

14/14 [=====] - 123s 9s/step - loss: 0.2231 - accuracy: 0.9197 - val_loss: 0.1323 - val_accuracy: 0.9669

Epoch 4/10

14/14 [=====] - 75s 5s/step - loss: 0.2170 - accuracy: 0.9128 - val_loss: 0.1082 - val_accuracy: 0.9669

Epoch 5/10

14/14 [=====] - 129s 10s/step - loss: 0.1918 - accuracy: 0.9151 - val_loss: 0.1145 - val_accuracy: 0.9669

Epoch 6/10

14/14 [=====] - 111s 8s/step - loss: 0.1938 - accuracy: 0.9037 - val_loss: 0.1030 - val_accuracy: 0.9669

Epoch 7/10

====]

- 88s 6s/step - loss: 0.1756 - accuracy: 0.9312 - val_loss: 0.0831 - val_accuracy: 0.9752

Epoch

14/14 [=====] - 86s 6s/step - loss: 0.1564 - accuracy: 0.9404 - val_loss: 0.0754 - val_accuracy: 0.9835

Epoch 0.1073 - val_accuracy: 0.9669

14/14 [=====]

====] - 77s 6s/step - loss: 0.1480 - accuracy: 0.9427 - val_loss: 0.0754 - val_accuracy: 0.9835

Epoch

[=====]

14/14 [=====]

- 81s 6s/step - loss: 0.1641 - accuracy: 0.9289 - val_loss: 0.0601 - val_accuracy: 0.9835

loss: 0.0601 - val_accuracy: 0.9835

<keras.callbacks.History at 0x2546507bf10> Out[11]:

In [12]: model.save("forest1.h5")

In [13]:

```
#import load_model from keras.models
from keras.models import load_model
#import image
class from keras from tensorflow.keras.preprocessing
import image
#import numpy import
numpy as np
#import cv2 import
```

In [15]: #load the saved model model = load_model("forest1.h5")

In [16]:

```
img=image.load_img(r'C:\Users\dhine\Downloads\archive\Dataset\Dataset\test_set\with  
fire\skynx=image.img_to_array(img) res = cv2.resize(x, dsize=(128, 128), interpolation=cv2.INTER_CUBIC)  
#expand the image shape x=np.expand_dims(res,axis=0)
```

In [17]:

```
pred=model.predict(x)
```

```
1/1 [=====] - 5s 5s/step
```

```
pred
```
