In [ ]:

```
import pandas as pd
import numpy as np
pd.set_option("display.precision", 2)

import matplotlib.pyplot as plt
import seaborn as sns
sns.set()

%config InlineBackend.figure_format = 'svg'
```

Lets import the dataset we have created first

In [ ]:

```
df = pd.read_csv("./Data/data.csv",sep=",")
df.drop(['Unnamed: 0'], axis=1, inplace=True) # There were some formatting issue
                                               # writing the csv
```

BASIC EDA

In [ ]:

```
df.head()
```

Out[ ]:

	DISTRICT	UPAZILA	STATION_ID	STATION_NAME	DATE	RAIN_FALL(mm)	LATITUDE	LONGITUDI
0	Bandarban	Lama	CL317	Lama	01-jan-2017	0.0	21.81	92.1
1	Bandarban	Lama	CL317	Lama	02-jan-2017	0.0	21.81	92.1
2	Bandarban	Lama	CL317	Lama	03-jan-2017	0.0	21.81	92.1
3	Bandarban	Lama	CL317	Lama	04-jan-2017	0.0	21.81	92.1
4	Bandarban	Lama	CL317	Lama	05-jan-2017	0.0	21.81	92.1

The shape of our dataset:

- we have 1826 samples containing 9 features(includes target)

In [ ]:

```
df.shape
```

Out[ ]:

```
(1826, 9)
```

The columns are:

In [ ]:

```
df.columns
```

Out[ ]:
```
Index(['DISTRICT', 'UPAZILA', 'STATION_ID', 'STATION_NAME', 'DATE',
       'RAIN_FALL(mm)', 'LATITUDE', 'LONGITUDE', 'WATER_LEVEL(m)'],
      dtype='object')
```

Lets look at the data types:

In [ ]:
```
df.dtypes
```

Out[ ]:
```
DISTRICT           object
UPAZILA            object
STATION_ID         object
STATION_NAME       object
DATE               object
RAIN_FALL(mm)     float64
LATITUDE          float64
LONGITUDE         float64
WATER_LEVEL(m)    float64
dtype: object
```

- **DATE** is rendered as object! Need to convert it to datatime feature!

In [ ]:
```
df['DATE'] = pd.to_datetime(df['DATE'])
```

In [ ]:
```
df.dtypes
```

Out[ ]:
```
DISTRICT                  object
UPAZILA                   object
STATION_ID                object
STATION_NAME              object
DATE              datetime64[ns]
RAIN_FALL(mm)            float64
LATITUDE                 float64
LONGITUDE                float64
WATER_LEVEL(m)           float64
dtype: object
```

Lets check for general infos!

In [ ]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1826 entries, 0 to 1825
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   DISTRICT        1826 non-null   object
 1   UPAZILA         1826 non-null   object
 2   STATION_ID      1826 non-null   object
 3   STATION_NAME    1826 non-null   object
 4   DATE            1826 non-null   datetime64[ns]
 5   RAIN_FALL(mm)   1826 non-null   float64
 6   LATITUDE        1826 non-null   float64
 7   LONGITUDE       1826 non-null   float64
 8   WATER_LEVEL(m)  1826 non-null   float64
```

```
dtypes: datetime64[ns](1), float64(4), object(4)
memory usage: 128.5+ KB
```

Things to notics:

- Theres no missing values in our dataset!

Lets check statistical properties of the numerical values:

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

Out[ ]:

	RAIN_FALL(mm)	LATITUDE	LONGITUDE	WATER_LEVEL(m)
count	1826.00	1.83e+03	1.83e+03	1826.00
mean	10.00	2.18e+01	9.22e+01	6.81
std	26.09	6.04e-14	1.76e-12	0.97
min	0.00	2.18e+01	9.22e+01	5.86
25%	0.00	2.18e+01	9.22e+01	6.19
50%	0.00	2.18e+01	9.22e+01	6.50
75%	6.28	2.18e+01	9.22e+01	7.15
max	273.00	2.18e+01	9.22e+01	13.54

and for non numerical features:

In [ ]:
```
df.describe(include=["object"])
```

Out[ ]:

	DISTRICT	UPAZILA	STATION_ID	STATION_NAME
count	1826	1826	1826	1826
unique	1	1	1	1
top	Bandarban	Lama	CL317	Lama
freq	1826	1826	1826	1826

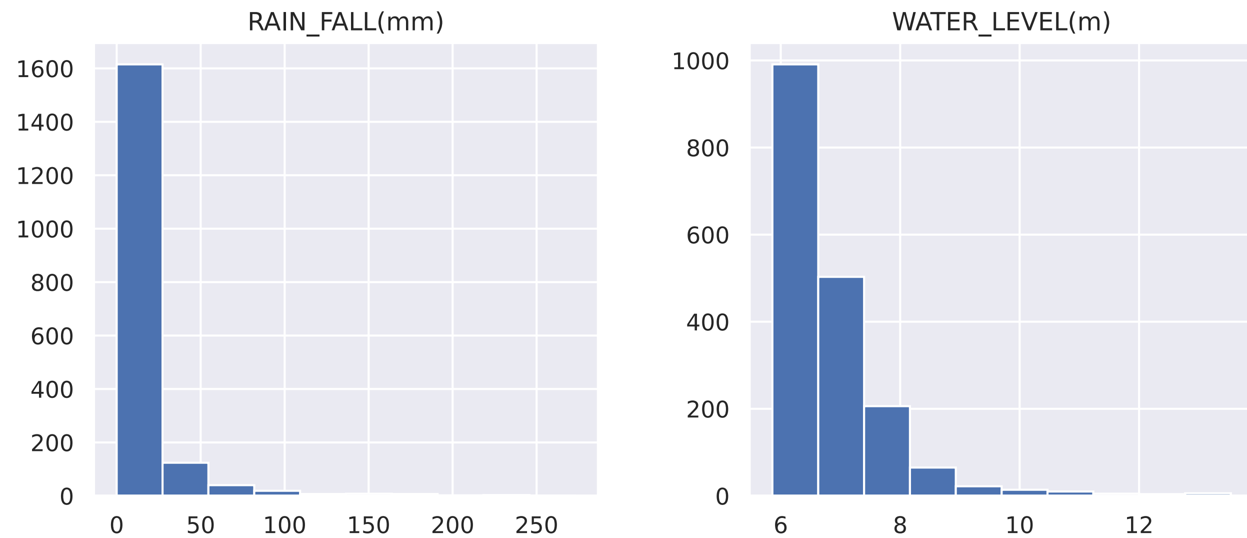
Note:

- as these categorical features only has one values, they wont contribute anything to the model!

Visual Analysis

Histogram and Density plots

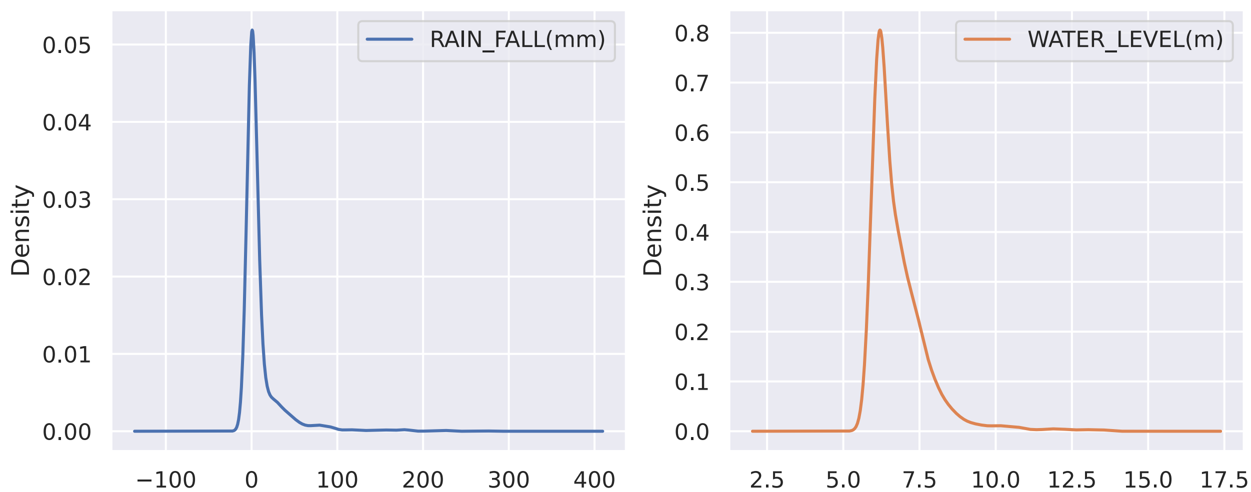
In [ ]:
```
features = ['RAIN_FALL(mm)','WATER_LEVEL(m)']
df[features].hist(figsize=(10,4))
plt.show()
```



Note:

- Not normally distributed! Need to change standarize the dataset later

In [ ]:
```
df[features].plot(
    kind="density",subplots=True,layout=(1,2),sharex=False,figsize=(10,4)
)
plt.show()
```

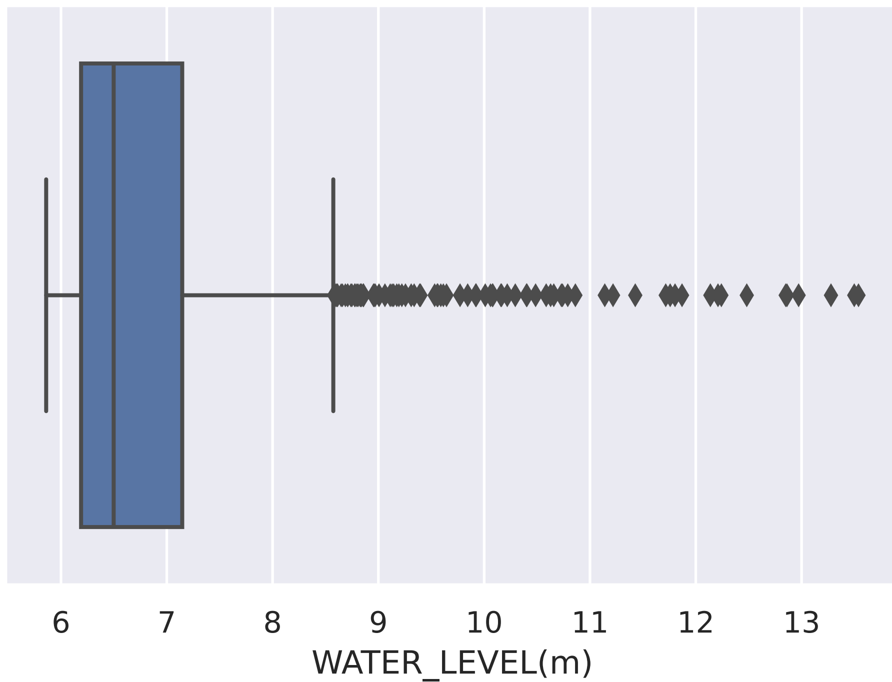


Box Plot

Let’s see how to interpret a box plot. Its components are a box (obviously, this is why it is called a box plot), the so-called whiskers, and a number of individual points (outliers).

The box by itself illustrates the interquartile spread of the distribution; its length is determined by the 25th and 75th percentiles. The vertical line inside the box marks the median (50%) of the distribution.

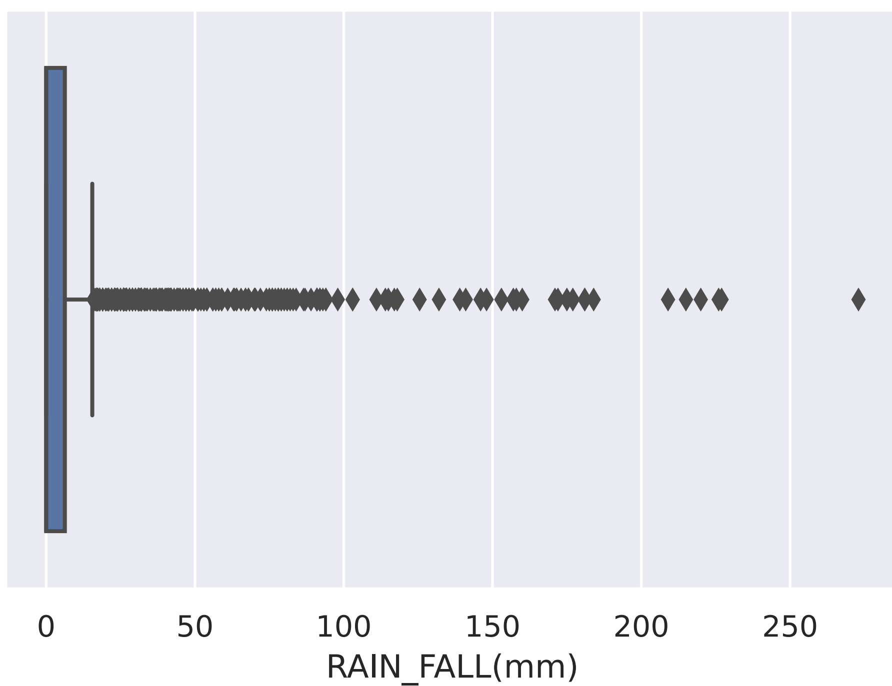
In [ ]:
```
sns.boxplot(x="WATER_LEVEL(m)",data=df)
plt.show()
```



Note:

- Theres so many outliers!

In [ ]:
```
sns.boxplot(x="RAIN_FALL(mm)",data=df)
plt.show()
```



Note:

- Again so many outliers

My general assumption is as this is indeed a time series data, its intrinsic to have these outliers due to trend, seasonality and other factors regarding the weather. But as I'm not going to treat as time series data, I have to decide whether I want these outliers to be removed or not!

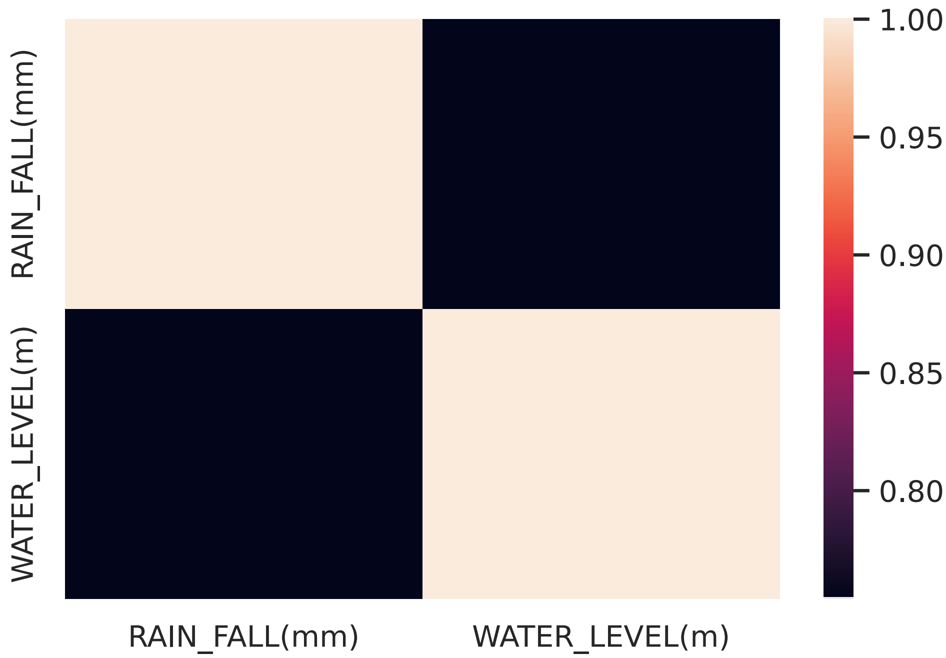
Correlation Matrix

In [ ]:

```
corr_matrix = df[features].corr()
sns.heatmap(corr_matrix)
```

Out[ ]:

```
<AxesSubplot:>
```



Note:

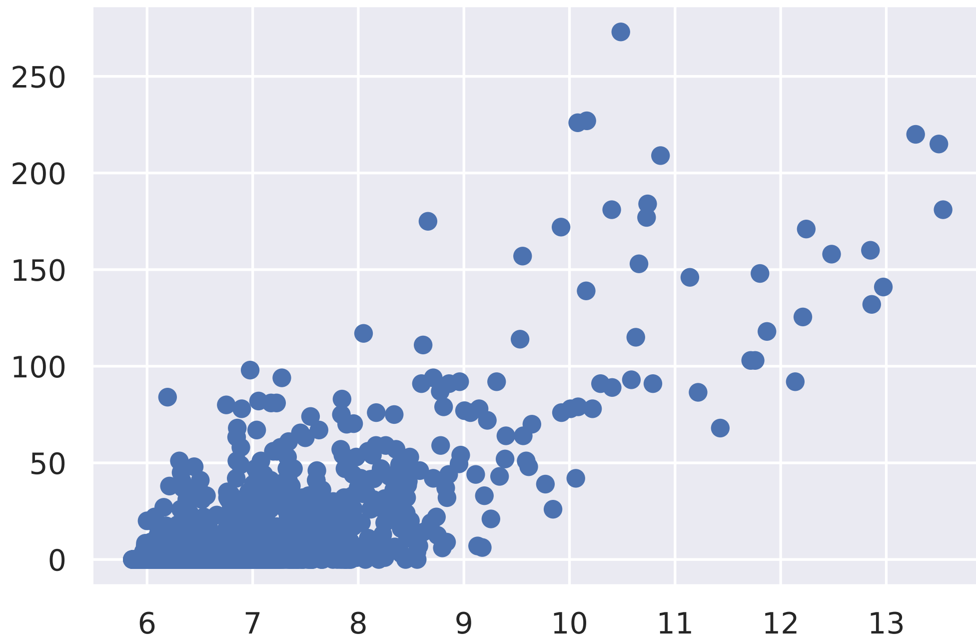
- From the visual it seems like they are around .80 correlation between rain_fall and water_level! (GOOD SIGN!)

Scatter plot

The scatter plot displays values of two numerical variables as Cartesian coordinates in 2D space.

In [ ]:

```
plt.scatter(df['WATER_LEVEL(m)'],df['RAIN_FALL(mm)'])
plt.show()
```



Note:

- Not so linear due to outliers!
- But it obvious there exists positive relationship between these two features!