Loading the Fish_Pond Dataset

In [1]:

```
import pandas as pd
```

working on only 1 part of data

In [2]:

```
df = pd.read_csv('IoTpond1.csv')
```

Performing EDA on dataset

In [3]:

```
df.head()
```

Out[3]:

	created_at	entry_id	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
0	2021-06-19 00:00:05 CET	1889	24.8750	100	4.505	8.43365	0.45842	193	50	7.11	2.91
1	2021-06-19 00:01:02 CET	1890	24.9375	100	6.601	8.43818	0.45842	194	50	7.11	2.91
2	2021-06-19 00:01:22 CET	1891	24.8750	100	15.797	8.42457	0.45842	192	50	7.11	2.91
3	2021-06-19 00:01:44 CET	1892	24.9375	100	5.046	8.43365	0.45842	193	50	7.11	2.91
4	2021-06-19 00:02:07 CET	1893	24.9375	100	38.407	8.40641	0.45842	192	50	7.11	2.91

In [4]:

```
df.isnull()
```

Out[4]:

	created_at	entry_id	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g
0	False	False	False	False	False	False	False	False	False	False	Fals
1	False	False	False	False	False	False	False	False	False	False	Fals
2	False	False	False	False	False	False	False	False	False	False	Fals
3	False	False	False	False	False	False	False	False	False	False	Fals
4	False	False	False	False	False	False	False	False	False	False	Fals
...	...	...	...	...	...	...	...	...	...	...	
83121	False	False	False	False	False	False	False	False	False	False	Fals
83122	False	False	False	False	False	False	False	False	False	False	Fals
83123	False	False	False	False	False	False	False	False	False	False	Fals
83124	False	False	False	False	False	False	False	False	False	False	Fals
83125	False	False	False	False	False	False	False	False	False	False	Fals

83126 rows × 11 columns

In [5]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 83126 entries, 0 to 83125
Data columns (total 11 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   created_at             83126 non-null  object 
 1   entry_id               83126 non-null  int64  
 2   Temperature (C)        83126 non-null  float64
 3   Turbidity(NTU)         83126 non-null  int64  
 4   Dissolved Oxygen(g/ml)  83126 non-null  float64
 5   PH                     83126 non-null  float64
 6   Ammonia(g/ml)          83074 non-null  float64
 7   Nitrate(g/ml)          83126 non-null  int64  
 8   Population             83126 non-null  int64  
 9   Fish_Length(cm)        83124 non-null  float64
 10  Fish_Weight(g)         83124 non-null  float64
dtypes: float64(6), int64(4), object(1)
memory usage: 7.0+ MB
```

Finding Noise and removing it from dataset

Dealing with Null values

In [6]:

```
df.isnull().sum()
```

Out[6]:

```
created_at                 0
entry_id                   0
Temperature (C)            0
Turbidity(NTU)             0
Dissolved Oxygen(g/ml)     0
PH                         0
Ammonia(g/ml)             52
Nitrate(g/ml)              0
Population                 0
Fish_Length(cm)            2
Fish_Weight(g)             2
dtype: int64
```

In [7]:

```
# Check for missing values and handle them
print("Count of missing values in each column before handling:")
print(df.isnull().sum())

df = df.dropna()

print("\nCount of missing values in each column after handling:")
print(df.isnull().sum())
```

```
Count of missing values in each column before handling:
created_at                 0
entry_id                   0
Temperature (C)            0
Turbidity(NTU)             0
Dissolved Oxygen(g/ml)     0
PH                         0
Ammonia(g/ml)             52
Nitrate(g/ml)              0
Population                 0
Fish_Length(cm)            2
Fish_Weight(g)             2
dtype: int64

Count of missing values in each column after handling:
created_at                0
entry_id                  0
Temperature (C)           0
Turbidity(NTU)            0
Dissolved Oxygen(g/ml)    0
PH                        0
Ammonia(g/ml)             0
Nitrate(g/ml)             0
Population                0
Fish_Length(cm)           0
Fish_Weight(g)            0
dtype: int64
```

Dealing with duplicate values

In [8]:

```
# Identify duplicate values
print("Original DataFrame:")
print(df)

print("\nRows that are duplicates of a previous row:")
print(df.duplicated())
```

```
Original DataFrame:
                    created_at  entry_id  Temperature (C)  Turbidity(NTU)  \
0      2021-06-19 00:00:05 CET      1889          24.8750             100   
1      2021-06-19 00:01:02 CET      1890          24.9375             100   
2      2021-06-19 00:01:22 CET      1891          24.8750             100   
3      2021-06-19 00:01:44 CET      1892          24.9375             100   
4      2021-06-19 00:02:07 CET      1893          24.9375             100   
...                        ...       ...              ...             ...   
83121  2021-10-13 02:48:31 CET    247201          26.5625             100   
83122  2021-10-13 03:17:36 CET    247273          26.5625             100   
83123  2021-10-13 03:46:49 CET    247336          26.5000             100   
83124  2021-10-13 04:13:23 CET    247402          26.3750             100   
83125  2021-10-13 04:14:22 CET    247405          26.3750             100   

       Dissolved Oxygen(g/ml)       PH  Ammonia(g/ml)  Nitrate(g/ml)  \
0                       4.505  8.43365        0.45842            193   
1                       6.601  8.43818        0.45842            194   
2                      15.797  8.42457        0.45842            192   
3                       5.046  8.43365        0.45842            193   
4                      38.407  8.40641        0.45842            192   
...                       ...      ...            ...            ...   
83121                   0.441  2.56412        5.91282            946   
83122                   1.020  2.67760        4.21414            985   
83123                   0.852  2.45063        8.18873            963   
83124                   4.850  2.41885       10.62411            944   
83125                   1.279  2.40524       10.07556            943   

       Population  Fish_Length(cm)  Fish_Weight(g)  
0              50             7.11            2.91  
1              50             7.11            2.91  
2              50             7.11            2.91  
3              50             7.11            2.91  
4              50             7.11            2.91  
...           ...              ...             ...  
83121          50            33.45          318.64  
83122          50            33.45          318.64  
83123          50            33.45          318.64  
83124          50            33.45          318.64  
83125          50            33.45          318.64  

[83072 rows x 11 columns]

Rows that are duplicates of a previous row:
0        False
1        False
2        False
3        False
4        False
         ...  
83121    False
83122    False
83123    False
83124    False
83125    False
Length: 83072, dtype: bool
```

```
In [9]: # Drop duplicate values
        df = df.drop_duplicates()

        print("\nDataFrame after dropping duplicate rows:")
        print(df)
```

```
DataFrame after dropping duplicate rows:
                   created_at  entry_id  Temperature (C)  Turbidity(NTU)  \
0      2021-06-19 00:00:05 CET      1889          24.8750             100
1      2021-06-19 00:01:02 CET      1890          24.9375             100
2      2021-06-19 00:01:22 CET      1891          24.8750             100
3      2021-06-19 00:01:44 CET      1892          24.9375             100
4      2021-06-19 00:02:07 CET      1893          24.9375             100
...                        ...       ...              ...             ...
83121  2021-10-13 02:48:31 CET    247201          26.5625             100
83122  2021-10-13 03:17:36 CET    247273          26.5625             100
83123  2021-10-13 03:46:49 CET    247336          26.5000             100
83124  2021-10-13 04:13:23 CET    247402          26.3750             100
83125  2021-10-13 04:14:22 CET    247405          26.3750             100

       Dissolved Oxygen(g/ml)       PH  Ammonia(g/ml)  Nitrate(g/ml)  \
0                       4.505  8.43365        0.45842            193
1                       6.601  8.43818        0.45842            194
2                      15.797  8.42457        0.45842            192
3                       5.046  8.43365        0.45842            193
4                      38.407  8.40641        0.45842            192
...                       ...      ...            ...            ...
83121                   0.441  2.56412        5.91282            946
83122                   1.020  2.67760        4.21414            985
83123                   0.852  2.45063        8.18873            963
83124                   4.850  2.41885       10.62411            944
83125                   1.279  2.40524       10.07556            943

       Population  Fish_Length(cm)  Fish_Weight(g)
0              50             7.11            2.91
1              50             7.11            2.91
2              50             7.11            2.91
3              50             7.11            2.91
4              50             7.11            2.91
...           ...              ...             ...
83121          50            33.45          318.64
83122          50            33.45          318.64
83123          50            33.45          318.64
83124          50            33.45          318.64
83125          50            33.45          318.64

[83072 rows x 11 columns]
```

In [10]:

```
df.head()
```

Out[10]:

	created_at	entry_id	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
0	2021-06-19 00:00:05 CET	1889	24.8750	100	4.505	8.43365	0.45842	193	50	7.11	2.91
1	2021-06-19 00:01:02 CET	1890	24.9375	100	6.601	8.43818	0.45842	194	50	7.11	2.91
2	2021-06-19 00:01:22 CET	1891	24.8750	100	15.797	8.42457	0.45842	192	50	7.11	2.91
3	2021-06-19 00:01:44 CET	1892	24.9375	100	5.046	8.43365	0.45842	193	50	7.11	2.91
4	2021-06-19 00:02:07 CET	1893	24.9375	100	38.407	8.40641	0.45842	192	50	7.11	2.91

Note: One can observe that form original dataset there are 83126 values from which we have removed null and duplicacy and now we have about 83072 values

In [11]:

```
print(df.dtypes)
```

```
created_at                 object
entry_id                    int64
Temperature (C)           float64
Turbidity(NTU)              int64
Dissolved Oxygen(g/ml)    float64
PH                        float64
Ammonia(g/ml)             float64
Nitrate(g/ml)               int64
Population                  int64
Fish_Length(cm)           float64
Fish_Weight(g)            float64
dtype: object
```

In [12]:
```
print(df.describe())
```

```
            entry_id  Temperature (C)  Turbidity(NTU)  Dissolved Oxygen(g/ml)  \
count   83072.000000     83072.000000    83072.000000            83072.000000   
mean    84048.115466        24.573335       87.482028               12.393208   
std     53581.214847         0.861756       25.865811               12.520521   
min      1889.000000      -127.000000        1.000000                0.007000   
25%     24898.750000        24.125000       91.000000                3.440000   
50%    103611.500000        24.562500      100.000000                7.133000   
75%    131088.250000        24.937500      100.000000               15.836750   
max    247405.000000        27.750000      100.000000               41.046000   

                PH  Ammonia(g/ml)  Nitrate(g/ml)  Population  Fish_Length(cm)  \
count  83072.00000   8.307200e+04   83072.000000     83072.0     83072.000000   
mean       7.51818   2.030866e+08     458.500277        50.0        16.417063   
std        0.53491   7.866325e+09     338.325468         0.0         5.272846   
min       -0.58627   6.770000e-03      45.000000        50.0         7.110000   
25%        7.15352   4.584200e-01     146.000000        50.0        11.790000   
50%        7.35779   6.116600e-01     347.000000        50.0        18.080000   
75%        7.83898   1.558803e+01     823.000000        50.0        21.000000   
max        8.55167   4.270000e+11    1936.000000        50.0        33.450000   

       Fish_Weight(g)  
count    83072.000000  
mean        44.584918  
std         33.218724  
min          2.910000  
25%         14.190000  
50%         54.700000  
75%         67.520000  
max        318.640000  
```

Removing the irrelavnt columns from dataset there are two columns which are not affecting the target values so we are removing "created_at" and "entry_id" from original data.

In [13]:
```
df = df.drop(['created_at', 'entry_id'], axis=1)
```

In [14]:
```
df
```

Out[14]:

	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
0	24.8750	100	4.505	8.43365	0.45842	193	50	7.11	2.91
1	24.9375	100	6.601	8.43818	0.45842	194	50	7.11	2.91
2	24.8750	100	15.797	8.42457	0.45842	192	50	7.11	2.91
3	24.9375	100	5.046	8.43365	0.45842	193	50	7.11	2.91
4	24.9375	100	38.407	8.40641	0.45842	192	50	7.11	2.91
...	...	...	...	...	...	...	...	...	...
83121	26.5625	100	0.441	2.56412	5.91282	946	50	33.45	318.64
83122	26.5625	100	1.020	2.67760	4.21414	985	50	33.45	318.64
83123	26.5000	100	0.852	2.45063	8.18873	963	50	33.45	318.64
83124	26.3750	100	4.850	2.41885	10.62411	944	50	33.45	318.64
83125	26.3750	100	1.279	2.40524	10.07556	943	50	33.45	318.64

83072 rows × 9 columns

Assignment_2

Performing EDA operations on dataset (After removing the noise in it!)

Showing dataset

In [15]:
```
df.head(15)
```

Out[15]:

	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
0	24.8750	100	4.505	8.43365	0.45842	193	50	7.11	2.91
1	24.9375	100	6.601	8.43818	0.45842	194	50	7.11	2.91
2	24.8750	100	15.797	8.42457	0.45842	192	50	7.11	2.91
3	24.9375	100	5.046	8.43365	0.45842	193	50	7.11	2.91
4	24.9375	100	38.407	8.40641	0.45842	192	50	7.11	2.91
5	24.9375	100	3.862	8.42003	0.45842	193	50	7.11	2.91
6	24.8750	100	2.831	8.43818	0.45842	194	50	7.11	2.91
7	24.9375	100	5.012	8.42911	0.45842	193	50	7.11	2.91
8	24.9375	100	2.916	8.42911	0.45842	192	50	7.11	2.91
9	24.8750	100	17.005	8.43365	0.45842	192	50	7.11	2.91
10	24.8750	100	6.964	8.48358	0.45842	191	50	7.11	2.91
11	24.9375	100	3.465	8.42911	0.45842	187	50	7.11	2.91
12	24.9375	100	4.319	8.42911	0.45842	191	50	7.11	2.91
13	24.8750	100	24.266	8.43365	0.45842	190	50	7.11	2.91
14	24.9375	100	25.204	8.42911	0.45842	188	50	7.11	2.91

Describing the dataset

In [16]:

```
df.describe()
```

Out[16]:

	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
count	83072.000000	83072.000000	83072.000000	83072.00000	8.307200e+04	83072.000000	83072.0	83072.000000	83072.000000
mean	24.573335	87.482028	12.393208	7.51818	2.030866e+08	458.500277	50.0	16.417063	44.584918
std	0.861756	25.865811	12.520521	0.53491	7.866325e+09	338.325468	0.0	5.272846	33.218724
min	-127.000000	1.000000	0.007000	-0.58627	6.770000e-03	45.000000	50.0	7.110000	2.910000
25%	24.125000	91.000000	3.440000	7.15352	4.584200e-01	146.000000	50.0	11.790000	14.190000
50%	24.562500	100.000000	7.133000	7.35779	6.116600e-01	347.000000	50.0	18.080000	54.700000
75%	24.937500	100.000000	15.836750	7.83898	1.558803e+01	823.000000	50.0	21.000000	67.520000
max	27.750000	100.000000	41.046000	8.55167	4.270000e+11	1936.000000	50.0	33.450000	318.640000

Datatypes of each column

In [17]:

```
print(df.dtypes)
```

```
Temperature (C)           float64
Turbidity(NTU)              int64
Dissolved Oxygen(g/ml)    float64
PH                        float64
Ammonia(g/ml)             float64
Nitrate(g/ml)               int64
Population                  int64
Fish_Length(cm)           float64
Fish_Weight(g)            float64
dtype: object
```

Frequency Table

Frequency table for Temperature

In [18]:

```
from collections import Counter
# Assuming 'category' is the column you want to calculate the frequency for
Temperature_counts = Counter(df['Temperature (C)'])

# Print the frequency table
for category, count in Temperature_counts.items():
    print(f'{category}: {count}', end='||')
```

```
24.875: 3262||24.9375: 2679||24.8125: 3098||24.75: 3118||24.6875: 3917||24.625: 4234||24.5625: 3460||24.5: 3188||24.4375: 3455||2
4.375: 3565||24.3125: 2912||25.0: 1922||25.0625: 2487||25.125: 2125||25.1875: 1616||25.3125: 792||25.25: 1065||25.375: 642||25.43
75: 621||25.5: 887||25.5625: 849||25.625: 831||25.6875: 432||25.75: 372||25.8125: 380||25.875: 604||25.9375: 355||26.0: 275||26.0
625: 361||26.125: 314||26.1875: 366||26.25: 373||26.3125: 426||26.375: 394||26.4375: 240||26.5: 126||26.5625: 124||26.625: 135||2
6.6875: 208||26.75: 34||26.8125: 19||24.25: 2049||24.1875: 2069||24.125: 2360||24.0625: 2363||24.0: 2101||23.9375: 1747||23.875: 
1685||23.8125: 1888||23.75: 1998||23.6875: 1697||23.625: 1554||23.5625: 1379||23.5: 889||23.4375: 492||23.375: 459||23.3125: 459|
|23.1875: 429||23.125: 459||23.0: 2||23.25: 333||23.0625: 288||-127.0: 1||27.75: 1||27.6875: 14||27.625: 1||27.5625: 6||27.4375: 
4||27.5: 1||27.375: 5||27.3125: 1||27.25: 5||27.1875: 5||27.125: 4||27.0625: 23||27.0: 14||26.9375: 14||26.875: 10||
In [19]: # Sort the frequency table by frequency counts in descending order
         sorted_category_counts = sorted(Temperature_counts.items(), key=lambda x: x[1], reverse=True)

         # Print the sorted frequency table
         for category, count in sorted_category_counts:
             print(f'{category}: {count}',end='||')
```

```
24.625: 4234||24.6875: 3917||24.375: 3565||24.5625: 3460||24.4375: 3455||24.875: 3262||24.5: 3188||24.75: 3118||24.8125: 3098||2
4.3125: 2912||24.9375: 2679||25.0625: 2487||24.0625: 2363||24.125: 2360||25.125: 2125||24.0: 2101||24.1875: 2069||24.25: 2049||2
3.75: 1998||25.0: 1922||23.8125: 1888||23.9375: 1747||23.6875: 1697||23.875: 1685||25.1875: 1616||23.625: 1554||23.5625: 1379||2
5.25: 1065||23.5: 889||25.5: 887||25.5625: 849||25.625: 831||25.3125: 792||25.375: 642||25.4375: 621||25.875: 604||23.4375: 492||
23.375: 459||23.3125: 459||23.125: 459||25.6875: 432||23.1875: 429||26.3125: 426||26.375: 394||25.8125: 380||26.25: 373||25.75: 3
72||26.1875: 366||26.0625: 361||25.9375: 355||23.25: 333||26.125: 314||23.0625: 288||26.0: 275||26.4375: 240||26.6875: 208||26.62
5: 135||26.5: 126||26.5625: 124||26.75: 34||27.0625: 23||26.8125: 19||27.6875: 14||27.0: 14||26.9375: 14||26.875: 10||27.5625: 6|
|27.375: 5||27.25: 5||27.1875: 5||27.4375: 4||27.125: 4||23.0: 2||-127.0: 1||27.75: 1||27.625: 1||27.5: 1||27.3125: 1||
```

```
In [20]: type(Temperature_counts)
```

```
Out[20]: collections.Counter
```

```
In [21]: import pandas as pd
```

```
In [22]: # Convert the Counter object into a DataFrame
         d = pd.DataFrame(list(Temperature_counts.items()), columns=['Temperature', 'count'])

         # Sort the DataFrame by the count in descending order
         d = d.sort_values(by='count', ascending=False)

         # Display the DataFrame
         print(d)
```

```
    Temperature  count
5       24.6250   4234
4       24.6875   3917
9       24.3750   3565
6       24.5625   3460
8       24.4375   3455
..          ...    ...
70      27.3125      1
68      27.5000      1
65      27.6250      1
63      27.7500      1
62    -127.0000      1

[78 rows x 2 columns]
```

Frequency_table for Turbudity(NTU)

```
In [23]: Turbudity_counts = Counter(df['Turbidity(NTU)'])
         # Convert the Counter object into a DataFrame
         d = pd.DataFrame(list(Turbudity_counts.items()), columns=['Turbudity', 'count'])
         # Sort the DataFrame by the count in descending order
         d = d.sort_values(by='count', ascending=False)
         # Display the DataFrame
         print(d)
```

```
    Turbudity  count
0         100  46800
85         93   4111
84         92   4062
82         91   2685
71         94   2367
..        ...    ...
14         37      7
52         38      7
47         44      6
28         46      5
61         45      3

[100 rows x 2 columns]
```

Frequency_table fo Dissolved Oxygen(g/ml)

```
In [24]: Dissolved_counts = Counter(df['Dissolved Oxygen(g/ml)'])
         # Convert the Counter object into a DataFrame
         d = pd.DataFrame(list(Dissolved_counts.items()), columns=['Dissolved Oxygen(g/ml)', 'count'])
         # Sort the DataFrame by the count in descending order
         d = d.sort_values(by='count', ascending=False)
         # Display the DataFrame
         print(d)
```

```
      Dissolved Oxygen(g/ml)  count
4630                   2.040   1903
3956                  38.686   1124
354                   38.669   1078
4434                  38.702    926
512                   38.694    920
...                      ...    ...
3167                  17.011      1
3166                   6.404      1
3164                  33.353      1
3163                  22.700      1
9197                   4.850      1

[9198 rows x 2 columns]
```

Frequency_table for PH

In [25]:

```
PH_counts = Counter(df['PH'])
# Convert the Counter object into a DataFrame
d = pd.DataFrame(list(PH_counts.items()), columns=['PH', 'count'])
# Sort the DataFrame by the count in descending order
d = d.sort_values(by='count', ascending=False)
# Display the DataFrame
print(d)
```

```
          PH  count
272  7.12174   2262
269  7.12628   2109
246  7.09904   2002
233  7.31694   1814
268  7.13990   1787
..       ...    ...
465 -0.39107      1
466 -0.31844      1
467 -0.58627      1
468 -0.40923      1
595  2.40524      1

[596 rows x 2 columns]
```

Freq table for Ammonia(g/ml)

In [26]:

```
k = Counter(df['Ammonia(g/ml)'])
# Convert the Counter object into a DataFrame
d = pd.DataFrame(list(k.items()), columns=['Ammonia(g/ml)', 'count'])
# Sort the DataFrame by the count in descending order
d = d.sort_values(by='count', ascending=False)
# Display the DataFrame
print(d)
```

```
      Ammonia(g/ml)  count
0           0.45842  23861
2343        0.49303    316
1963        0.55658    292
1977        0.43649    281
1958        0.62801    257
...             ...    ...
2822        1.52331      1
2821        1.40748      1
2820        1.04325      1
2819        0.67770      1
3102       10.07556      1

[3103 rows x 2 columns]
```

Freq table for Nitrate(g/ml)

In [27]:

```
k = Counter(df['Nitrate(g/ml)'])
# Convert the Counter object into a DataFrame
d = pd.DataFrame(list(k.items()), columns=['Nitrate(g/ml)', 'count'])
# Sort the DataFrame by the count in descending order
d = d.sort_values(by='count', ascending=False)
# Display the DataFrame
print(d)
```

```
      Nitrate(g/ml)  count
127             144   2467
151             128   1571
150             123    793
94              176    779
121             145    764
...             ...    ...
181              81      1
1163           1240      1
177              98      1
175              84      1
1289           1305      1

[1290 rows x 2 columns]
```

Freq table for Population

In [28]:

```
k = Counter(df['Population'])
# Convert the Counter object into a DataFrame
d = pd.DataFrame(list(k.items()), columns=['Population', 'count'])
# Sort the DataFrame by the count in descending order
d = d.sort_values(by='count', ascending=False)
# Display the DataFrame
print(d)
```

```
   Population  count
0          50  83072
```

Freq table for Fish_Length(cm)

In [29]:

```
k = Counter(df['Fish_Length(cm)'])
# Convert the Counter object into a DataFrame
d = pd.DataFrame(list(k.items()), columns=['Fish_Length(cm)', 'count'])
# Sort the DataFrame by the count in descending order
d = d.sort_values(by='count', ascending=False)
# Display the DataFrame
print(d)
```

```
    Fish_Length(cm)  count
10            11.79   4017
8             11.01   3895
43            21.52   3743
32            18.72   3331
1              7.50   3205
..              ...    ...
72            31.57      5
39            20.48      3
71            31.45      2
74            31.82      2
55            23.51      1

[81 rows x 2 columns]
```

Freq table for Fish_Weight(g)

In [30]:

```
k = Counter(df['Fish_Weight(g)'])
# Convert the Counter object into a DataFrame
d = pd.DataFrame(list(k.items()), columns=['Fish_Weight(g)', 'count'])
# Sort the DataFrame by the count in descending order
d = d.sort_values(by='count', ascending=False)
# Display the DataFrame
print(d)
```

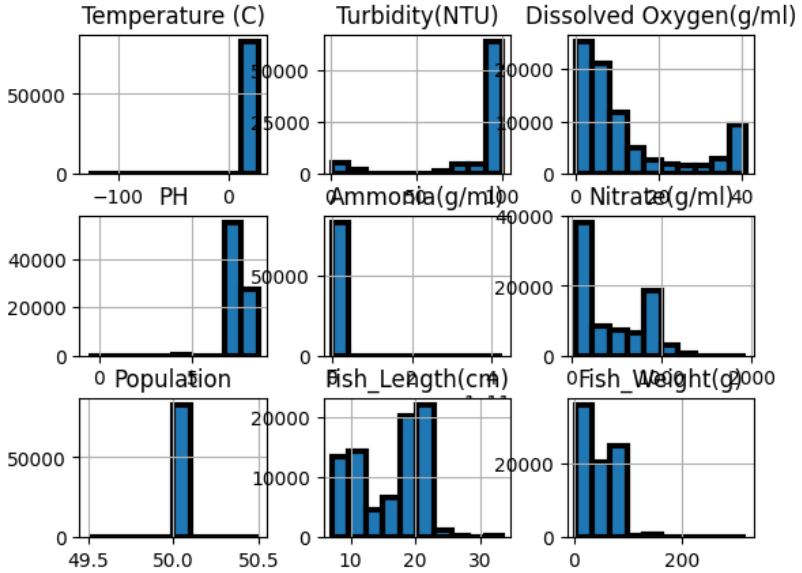
```
    Fish_Weight(g)  count
10           14.19   4017
8            12.31   3895
43           68.40   3743
32           61.69   3331
1             3.85   3205
..             ...    ...
72          267.39      5
39           66.64      3
71          264.20      2
74          273.77      2
55          104.49      1

[81 rows x 2 columns]
```

In [31]:

```
import matplotlib.pyplot as plt
```

In [32]:

```
# Plot a histogram for each numerical column
df.hist(edgecolor='black', linewidth=3.0)
plt.show()
```

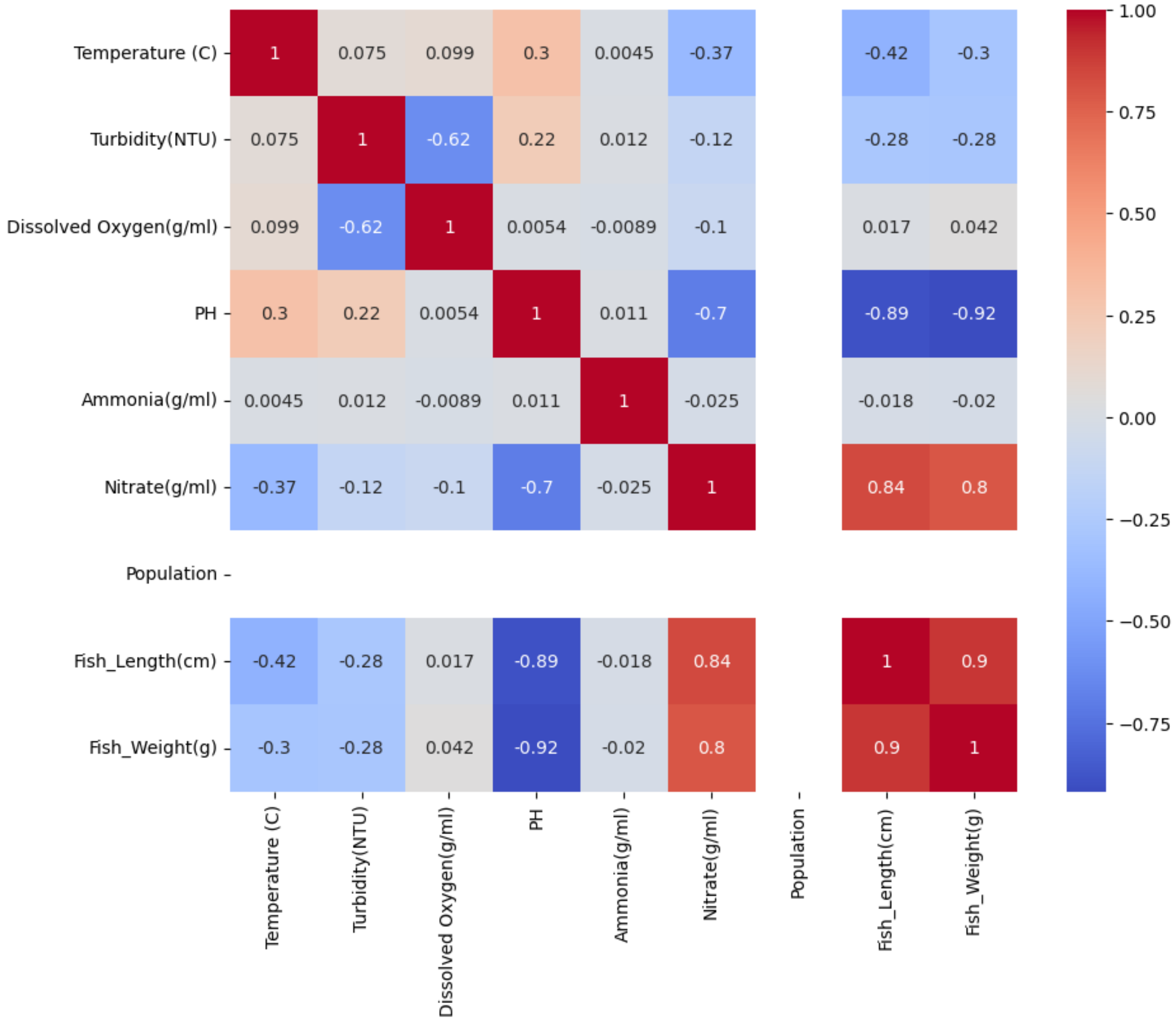


In [33]:

```python
import seaborn as sns
```

In [34]:

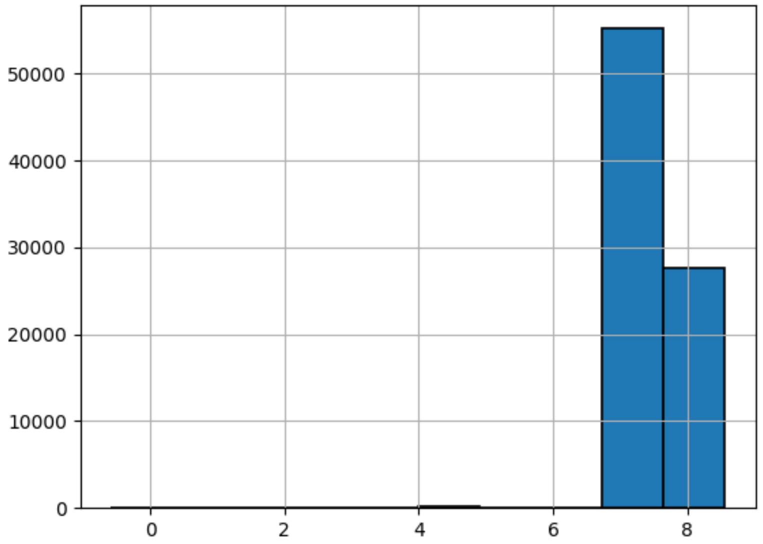
```python
# Calculate the correlation matrix
corr = df.corr()

# Display the correlation matrix as a heatmap
plt.figure(figsize=(10, 8))
sns.heatmap(corr, annot=True, cmap='coolwarm')
plt.show()
```



	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
Temperature (C)	1	0.075	0.099	0.3	0.0045	-0.37		-0.42	-0.3
Turbidity(NTU)	0.075	1	-0.62	0.22	0.012	-0.12		-0.28	-0.28
Dissolved Oxygen(g/ml)	0.099	-0.62	1	0.0054	-0.0089	-0.1		0.017	0.042
PH	0.3	0.22	0.0054	1	0.011	-0.7		-0.89	-0.92
Ammonia(g/ml)	0.0045	0.012	-0.0089	0.011	1	-0.025		-0.018	-0.02
Nitrate(g/ml)	-0.37	-0.12	-0.1	-0.7	-0.025	1		0.84	0.8
Population									
Fish_Length(cm)	-0.42	-0.28	0.017	-0.89	-0.018	0.84		1	0.9
Fish_Weight(g)	-0.3	-0.28	0.042	-0.92	-0.02	0.8		0.9	1

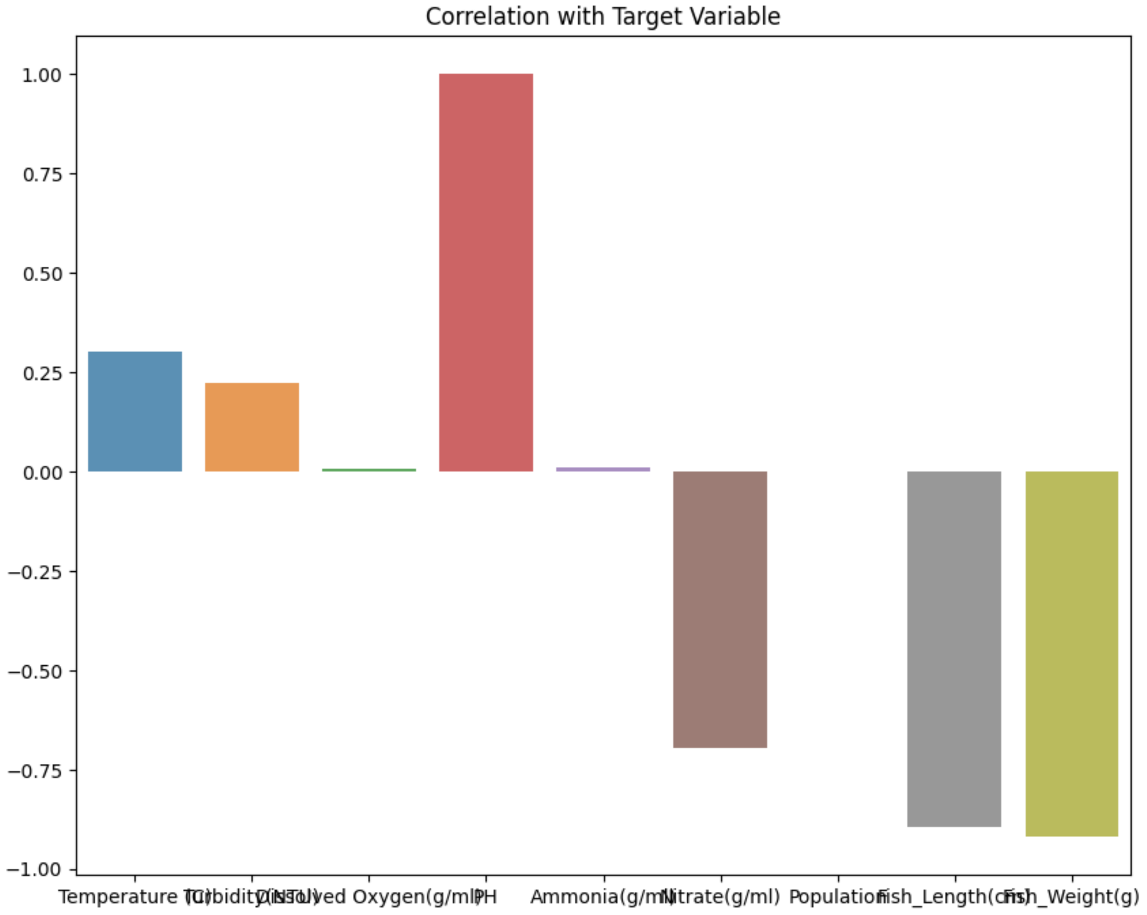
In [35]:

```python
# Plot a histogram for the target variable
df['PH'].hist(edgecolor='black', linewidth=1.2)
plt.show()
```



In [36]:

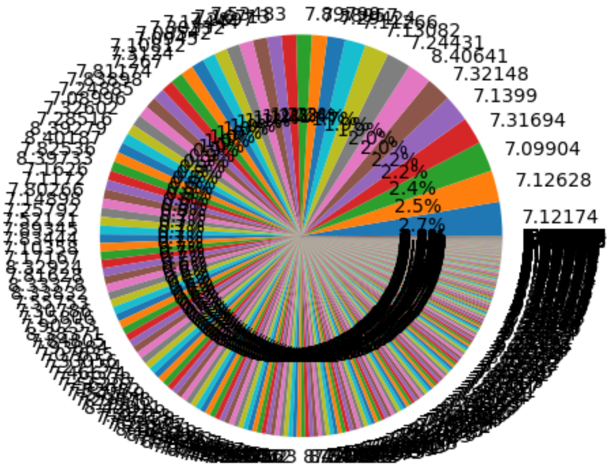
```
# Calculate the correlation between the numerical columns and the target variable
corr_target = df.corr()['PH']

# Display the correlation as a bar chart
plt.figure(figsize=(10, 8))
sns.barplot(x=corr_target.index, y=corr_target.values, alpha=0.8)
plt.title('Correlation with Target Variable')
plt.show()
```



PH values

In [39]:

```
# Calculate the proportion of each unique value in the 'status' column
proportions = df['PH'].value_counts(normalize=True)

# Create a pie chart
plt.pie(proportions, labels=proportions.index, autopct='%1.1f%%')

# Show the plot
plt.show()
```



In [40]:

```
df.describe()
```

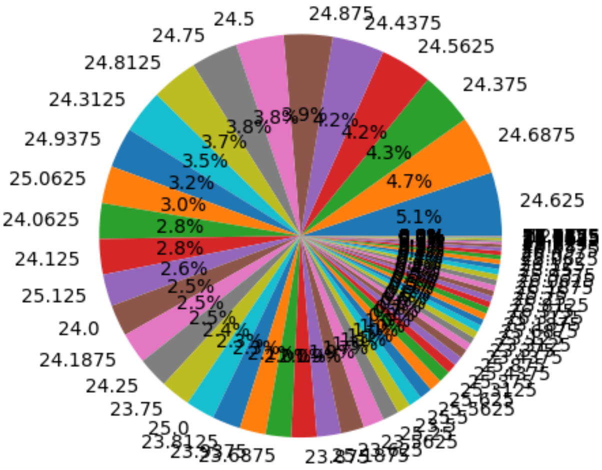
Out[40]:

	Temperature (C)	Turbidity(NTU)	Dissolved Oxygen(g/ml)	PH	Ammonia(g/ml)	Nitrate(g/ml)	Population	Fish_Length(cm)	Fish_Weight(g)
count	83072.000000	83072.000000	83072.000000	83072.00000	8.307200e+04	83072.000000	83072.0	83072.000000	83072.000000
mean	24.573335	87.482028	12.393208	7.51818	2.030866e+08	458.500277	50.0	16.417063	44.584918
std	0.861756	25.865811	12.520521	0.53491	7.866325e+09	338.325468	0.0	5.272846	33.218724
min	-127.000000	1.000000	0.007000	-0.58627	6.770000e-03	45.000000	50.0	7.110000	2.910000
25%	24.125000	91.000000	3.440000	7.15352	4.584200e-01	146.000000	50.0	11.790000	14.190000
50%	24.562500	100.000000	7.133000	7.35779	6.116600e-01	347.000000	50.0	18.080000	54.700000
75%	24.937500	100.000000	15.836750	7.83898	1.558803e+01	823.000000	50.0	21.000000	67.520000
max	27.750000	100.000000	41.046000	8.55167	4.270000e+11	1936.000000	50.0	33.450000	318.640000

Temperature (C)

In [41]:

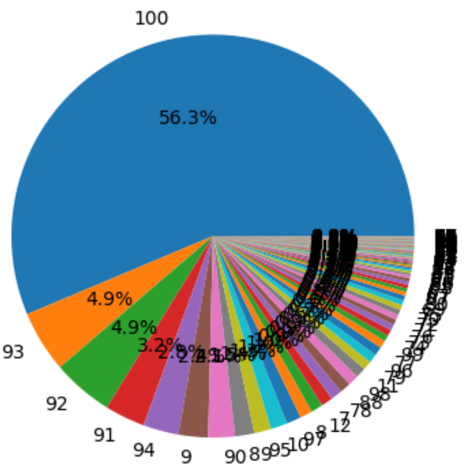
```
# Calculate the proportion of each unique value in the 'status' column
proportions = df['Temperature (C)'].value_counts(normalize=True)

# Create a pie chart
plt.pie(proportions, labels=proportions.index, autopct='%1.1f%%')

# Show the plot
plt.show()
```



Turbidity(NTU)

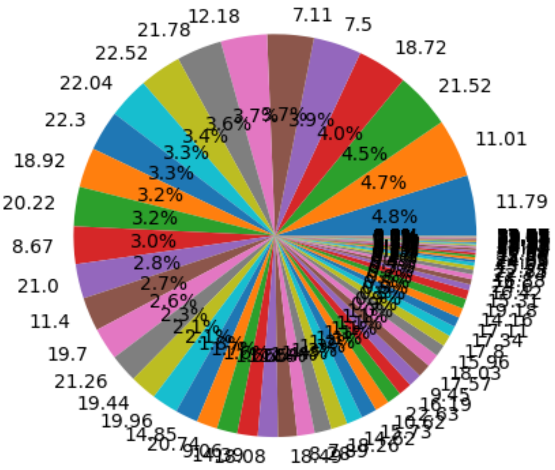
In [42]:

```
# Calculate the proportion of each unique value in the 'status' column
proportions = df['Turbidity(NTU)'].value_counts(normalize=True)

# Create a pie chart
plt.pie(proportions, labels=proportions.index, autopct='%1.1f%%')

# Show the plot
plt.show()
```



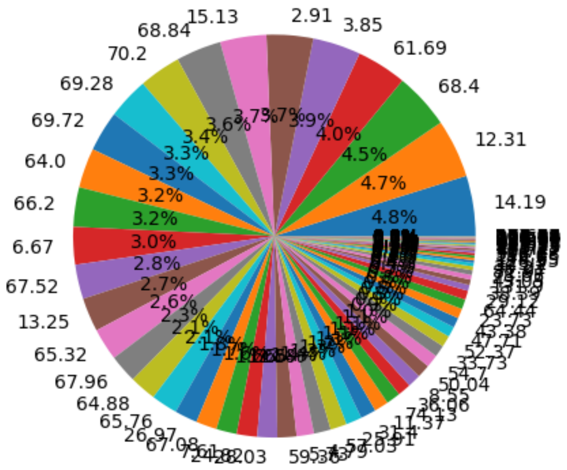
Fish_Length(cm)

In [44]:
```
# Calculate the proportion of each unique value in the 'status' column
proportions = df['Fish_Length(cm)'].value_counts(normalize=True)

# Create a pie chart
plt.pie(proportions, labels=proportions.index, autopct='%1.1f%%')

# Show the plot
plt.show()
```



Fish_Weight(g)

In [45]:
```
# Calculate the proportion of each unique value in the 'status' column
proportions = df['Fish_Weight(g)'].value_counts(normalize=True)

# Create a pie chart
plt.pie(proportions, labels=proportions.index, autopct='%1.1f%%')

# Show the plot
plt.show()
```



Conclusion: We have performed Data Analysis(EDA)/ preprocessing of dataset. After certain pre-processing we have drwan frequency table,histpgram, pichart for each attributes. We have also drawn correlation heat matrix and correlation with respect to target[PH] values. In our dataset we are focusing on maintain the Ph qaulity of water for certain sets conditions.

My GitHub_proje Link: https://github.com/shivam2952002/L-and-T-project-