College code: 4212
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WATER QUALITY ANALYSIS

DATA ANALYTICS WITH COGNOS:GROUP2

PHASE:3

This phase involves in designing of the steps that defining in each phase of the previous documentation this involves importing necessary functions, data processing and so on in this phase we have to begin our project by loading and preprocessing the dataset.

The IBM suggests using the jupyter notebook for loading and preprocess the dataset:

Here for this project title we need to define the loading the libraries, understand the data and visualize the missing values.

For this certain inputs are defined for this project.in this phase each of the input lines of the project is given as follows:

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phase3

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[1]:
```
import pandas as pd
import numpy as np
```

[2]:
```
df = pd.read_csv("water_potability.csv")
```

[3]:
```
df.head
```

[3]:
```
<bound method NDFrame.head of             ph    Hardness       Solids
Chloramines     Sulfate  \
0          NaN  204.890456  20791.31898     7.300212  368.516441
1     3.716080  129.422921  18630.05786     6.635246         NaN
2     8.099124  224.236259  19909.54173     9.275884         NaN
3     8.316766  214.373394  22018.41744     8.059332  356.886136
4     9.092223  181.101509  17978.98634     6.546600  310.135738
…          …         …           …           …          …
3271  4.668102  193.681736  47580.99160     7.166639  359.948574
3272  7.808856  193.553212  17329.80216     8.061362         NaN
3273  9.419510  175.762646  33155.57822     7.350233         NaN
3274  5.126763  230.603758  11983.86938     6.303357         NaN
3275  7.874671  195.102299  17404.17706     7.509306         NaN

      Conductivity  Organic_carbon  Trihalomethanes  Turbidity  Potability
0       564.308654       10.379783        86.990970   2.963135           0
1       592.885359       15.180013        56.329076   4.500656           0
2       418.606213       16.868637        66.420093   3.055934           0
3       363.266516       18.436525       100.341674   4.628771           0
4       398.410813       11.558279        31.997993   4.075075           0
…              …               …                …          …          …
3271    526.424171       13.894419        66.687695   4.435821           1
3272    392.449580       19.903225              NaN   2.798243           1
3273    432.044783       11.039070        69.845400   3.298875           1
3274    402.883113       11.168946        77.488213   4.708658           1
3275    327.459761       16.140368        78.698446   2.309149           1

[3276 rows x 10 columns]>
```

[4]:
```
df.info(memory_usage="deep")
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3276 entries, 0 to 3275
Data columns (total 10 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   ph               2785 non-null   float64
 1   Hardness         3276 non-null   float64
 2   Solids           3276 non-null   float64
 3   Chloramines      3276 non-null   float64
 4   Sulfate          2495 non-null   float64
 5   Conductivity     3276 non-null   float64
 6   Organic_carbon   3276 non-null   float64
 7   Trihalomethanes  3114 non-null   float64
 8   Turbidity        3276 non-null   float64
 9   Potability       3276 non-null   int64  
dtypes: float64(9), int64(1)
memory usage: 256.1 KB
```

[5]:
```
print(df.shape)
print(len(df))
print(f'Number of rows: {df.shape[0]} \nNumber of columns: {df.shape[1]}')
```

```
(3276, 10)
3276
Number of rows: 3276
Number of columns: 10
```

[6]:
```
df.describe()
```

[6]:

	ph	Hardness	Solids	Chloramines	Sulfate	\
count	2785.000000	3276.000000	3276.000000	3276.000000	2495.000000	
mean	7.080795	196.369496	22014.092526	7.122277	333.775777	
std	1.594320	32.879761	8768.570828	1.583085	41.416840	
min	0.000000	47.432000	320.942611	0.352000	129.000000	
25%	6.093092	176.850538	15666.690300	6.127421	307.699498	
50%	7.036752	196.967627	20927.833605	7.130299	333.073546	
75%	8.062066	216.667456	27332.762125	8.114887	359.950170	
max	14.000000	323.124000	61227.196010	13.127000	481.030642	

	Conductivity	Organic_carbon	Trihalomethanes	Turbidity	Potability
count	3276.000000	3276.000000	3114.000000	3276.000000	3276.000000
mean	426.205111	14.284970	66.396293	3.966786	0.390110
std	80.824064	3.308162	16.175008	0.780382	0.487849
min	181.483754	2.200000	0.738000	1.450000	0.000000
25%	365.734414	12.065801	55.844536	3.439711	0.000000
50%	421.884968	14.218338	66.622485	3.955028	0.000000
75%	481.792305	16.557652	77.337473	4.500320	1.000000

```
max       753.342620       28.300000       124.000000      6.739000      1.000000
```

[7]:
```
df.describe?
```

[8]:
```
df.isnull().sum()
```

[8]:
```
ph                 491
Hardness             0
Solids               0
Chloramines          0
Sulfate            781
Conductivity         0
Organic_carbon       0
Trihalomethanes    162
Turbidity            0
Potability           0
dtype: int64
```

[9]:
```
def isnull_prop(df):
    total_rows = df.shape[0]
    missing_val_dict = {}
    for col in df.columns:
        missing_val_dict[col] = [df[col].isnull().sum(), (df[col].isnull().
 ↪sum() / total_rows)]
    return missing_val_dict
null_dict = isnull_prop(df)
print(null_dict.items())
```

```
dict_items([('ph', [491, 0.14987789987789987]), ('Hardness', [0, 0.0]),
('Solids', [0, 0.0]), ('Chloramines', [0, 0.0]), ('Sulfate', [781,
0.23840048840048841]), ('Conductivity', [0, 0.0]), ('Organic_carbon', [0, 0.0]),
('Trihalomethanes', [162, 0.04945054945054945]), ('Turbidity', [0, 0.0]),
('Potability', [0, 0.0])])
```

[10]:
```
df_missing = pd.DataFrame.from_dict(null_dict,
                                    orient="index",
                                    columns=['missing', 'miss_percent'])
df_missing
```

[10]:
```
                missing  miss_percent
ph                  491      0.149878
Hardness              0      0.000000
Solids                0      0.000000
Chloramines           0      0.000000
Sulfate             781      0.238400
Conductivity          0      0.000000
Organic_carbon        0      0.000000
```

Trihalomethanes	162	0.049451
Turbidity	0	0.000000
Potability	0	0.000000