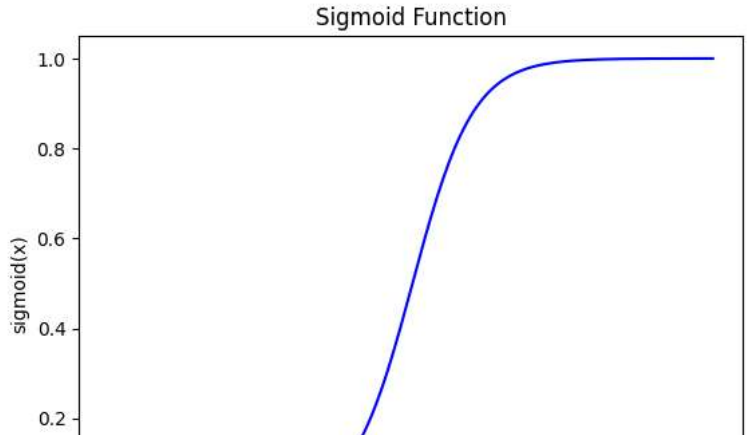
```
#logistic regression sigmoid plot
#import library
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np


# Define the logistic function
def sigmoid(x):
 return 1 / (1 + np.exp(-x))


# Define the range of the x-axis
x = np.arange(-10, 10, 0.1)
x
```

```
array([-1.00000000e+01, -9.90000000e+00, -9.80000000e+00, -9.70000000e+00,
       -9.60000000e+00, -9.50000000e+00, -9.40000000e+00, -9.30000000e+00,
       -9.20000000e+00, -9.10000000e+00, -9.00000000e+00, -8.90000000e+00,
       -8.80000000e+00, -8.70000000e+00, -8.60000000e+00, -8.50000000e+00,
       -8.40000000e+00, -8.30000000e+00, -8.20000000e+00, -8.10000000e+00,
       -8.00000000e+00, -7.90000000e+00, -7.80000000e+00, -7.70000000e+00,
       -7.60000000e+00, -7.50000000e+00, -7.40000000e+00, -7.30000000e+00,
       -7.20000000e+00, -7.10000000e+00, -7.00000000e+00, -6.90000000e+00,
       -6.80000000e+00, -6.70000000e+00, -6.60000000e+00, -6.50000000e+00,
       -6.40000000e+00, -6.30000000e+00, -6.20000000e+00, -6.10000000e+00,
       -6.00000000e+00, -5.90000000e+00, -5.80000000e+00, -5.70000000e+00,
       -5.60000000e+00, -5.50000000e+00, -5.40000000e+00, -5.30000000e+00,
       -5.20000000e+00, -5.10000000e+00, -5.00000000e+00, -4.90000000e+00,
       -4.80000000e+00, -4.70000000e+00, -4.60000000e+00, -4.50000000e+00,
       -4.40000000e+00, -4.30000000e+00, -4.20000000e+00, -4.10000000e+00,
       -4.00000000e+00, -3.90000000e+00, -3.80000000e+00, -3.70000000e+00,
       -3.60000000e+00, -3.50000000e+00, -3.40000000e+00, -3.30000000e+00,
       -3.20000000e+00, -3.10000000e+00, -3.00000000e+00, -2.90000000e+00,
       -2.80000000e+00, -2.70000000e+00, -2.60000000e+00, -2.50000000e+00,
       -2.40000000e+00, -2.30000000e+00, -2.20000000e+00, -2.10000000e+00,
       -2.00000000e+00, -1.90000000e+00, -1.80000000e+00, -1.70000000e+00,
       -1.60000000e+00, -1.50000000e+00, -1.40000000e+00, -1.30000000e+00,
       -1.20000000e+00, -1.10000000e+00, -1.00000000e+00, -9.00000000e-01,
       -8.00000000e-01, -7.00000000e-01, -6.00000000e-01, -5.00000000e-01,
       -4.00000000e-01, -3.00000000e-01, -2.00000000e-01, -1.00000000e-01,
       -3.55271368e-14,  1.00000000e-01,  2.00000000e-01,  3.00000000e-01,
        4.00000000e-01,  5.00000000e-01,  6.00000000e-01,  7.00000000e-01,
        8.00000000e-01,  9.00000000e-01,  1.00000000e+00,  1.10000000e+00,
        1.20000000e+00,  1.30000000e+00,  1.40000000e+00,  1.50000000e+00,
        1.60000000e+00,  1.70000000e+00,  1.80000000e+00,  1.90000000e+00,
        2.00000000e+00,  2.10000000e+00,  2.20000000e+00,  2.30000000e+00,
        2.40000000e+00,  2.50000000e+00,  2.60000000e+00,  2.70000000e+00,
        2.80000000e+00,  2.90000000e+00,  3.00000000e+00,  3.10000000e+00,
        3.20000000e+00,  3.30000000e+00,  3.40000000e+00,  3.50000000e+00,
        3.60000000e+00,  3.70000000e+00,  3.80000000e+00,  3.90000000e+00,
        4.00000000e+00,  4.10000000e+00,  4.20000000e+00,  4.30000000e+00,
        4.40000000e+00,  4.50000000e+00,  4.60000000e+00,  4.70000000e+00,
        4.80000000e+00,  4.90000000e+00,  5.00000000e+00,  5.10000000e+00,
        5.20000000e+00,  5.30000000e+00,  5.40000000e+00,  5.50000000e+00,
        5.60000000e+00,  5.70000000e+00,  5.80000000e+00,  5.90000000e+00,
        6.00000000e+00,  6.10000000e+00,  6.20000000e+00,  6.30000000e+00,
        6.40000000e+00,  6.50000000e+00,  6.60000000e+00,  6.70000000e+00,
        6.80000000e+00,  6.90000000e+00,  7.00000000e+00,  7.10000000e+00,
        7.20000000e+00,  7.30000000e+00,  7.40000000e+00,  7.50000000e+00,
        7.60000000e+00,  7.70000000e+00,  7.80000000e+00,  7.90000000e+00,
        8.00000000e+00,  8.10000000e+00,  8.20000000e+00,  8.30000000e+00,
        8.40000000e+00,  8.50000000e+00,  8.60000000e+00,  8.70000000e+00,
        8.80000000e+00,  8.90000000e+00,  9.00000000e+00,  9.10000000e+00,
        9.20000000e+00,  9.30000000e+00,  9.40000000e+00,  9.50000000e+00,
        9.60000000e+00,  9.70000000e+00,  9.80000000e+00,  9.90000000e+00])
```

```
# Plot the sigmoid function
plt.plot(x, sigmoid(x), color='blue')
plt.xlabel("x")
plt.ylabel("sigmoid(x)")
plt.title("Sigmoid Function")
```

```
Text(0.5, 1.0, 'Sigmoid Function')
```

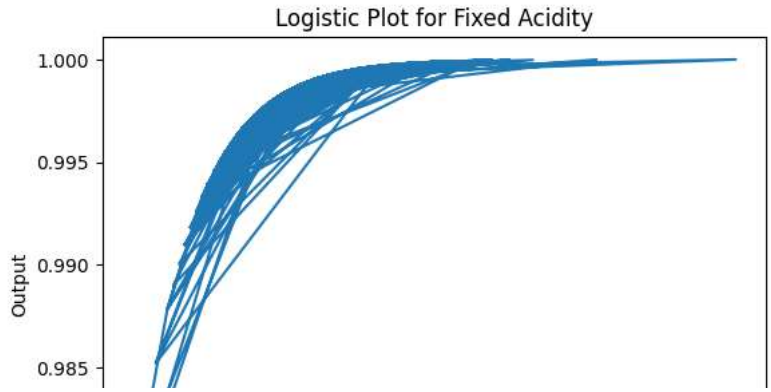



```
##Wine quality white dataset
```

```
url = "https://archive.ics.uci.edu/ml/machine-learning-databases/wine-quality/winequality-white.csv"
data = pd.read_csv(url, sep=';')
data
```

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	su
0	7.0	0.27	0.36	20.7	0.045	45.0	170.0	1.00100	3.00	
1	6.3	0.30	0.34	1.6	0.049	14.0	132.0	0.99400	3.30	
2	8.1	0.28	0.40	6.9	0.050	30.0	97.0	0.99510	3.26	
3	7.2	0.23	0.32	8.5	0.058	47.0	186.0	0.99560	3.19	
4	7.2	0.23	0.32	8.5	0.058	47.0	186.0	0.99560	3.19	
...	...	...	...	...	...	...	...	...	...	
4893	6.2	0.21	0.29	1.6	0.039	24.0	92.0	0.99114	3.27	
4894	6.6	0.32	0.36	8.0	0.047	57.0	168.0	0.99490	3.15	
4895	6.5	0.24	0.19	1.2	0.041	30.0	111.0	0.99254	2.99	
4896	5.5	0.29	0.30	1.1	0.022	20.0	110.0	0.98869	3.34	
4897	6.0	0.21	0.38	0.8	0.020	22.0	98.0	0.98941	3.26	

```
# This example assumes that the dataset has already been preprocessed
# and is available as a pandas dataframe called "data"
# x_input is the input feature that we want to use for the sigmoid plot
x_input = data['fixed acidity']


# Calculate the y-values for the sigmoid plot
y_output = sigmoid(x_input)


# Create the plot
plt.plot(x_input, y_output)
# Set the plot title and labels
plt.title("Logistic Plot for Fixed Acidity")
plt.xlabel("Fixed Acidity")
plt.ylabel("Output")
# Show the plot
plt.show()
```




```
url = "https://archive.ics.uci.edu/ml/machine-learning-databases/wine-quality/winequality-red.csv"
wine_data = pd.read_csv(url, sep=';')
wine_data
```

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
0	7.4	0.700	0.00	1.9	0.076	11.0	34.0	0.99780	3.51	0.56	9.4	5
1	7.8	0.880	0.00	2.6	0.098	25.0	67.0	0.99680	3.20	0.68	9.8	5
2	7.8	0.760	0.04	2.3	0.092	15.0	54.0	0.99700	3.26	0.65	9.8	5
3	11.2	0.280	0.56	1.9	0.075	17.0	60.0	0.99800	3.16	0.58	9.8	6
4	7.4	0.700	0.00	1.9	0.076	11.0	34.0	0.99780	3.51	0.56	9.4	5
...	...	...	...	...	...	...	...	...	...	...	...	...
1594	6.2	0.600	0.08	2.0	0.090	32.0	44.0	0.99490	3.45	0.58	10.5	5
1595	5.9	0.550	0.10	2.2	0.062	39.0	51.0	0.99512	3.52	0.76	11.2	6
1596	6.3	0.510	0.13	2.3	0.076	29.0	40.0	0.99574	3.42	0.75	11.0	6
1597	5.9	0.645	0.12	2.0	0.075	32.0	44.0	0.99547	3.57	0.71	10.2	5
1598	6.0	0.310	0.47	3.6	0.067	18.0	42.0	0.99549	3.39	0.66	11.0	6

1599 rows × 12 columns

```
# Define the features and target variable
X = wine_data.iloc[:,:-1].values
y = wine_data.iloc[:, -1].values


X = wine_data.iloc[:,:-1].values ##slicin function
X
```

```
array([[ 7.4  ,  0.7  ,  0.   , ...,  3.51 ,  0.56 ,  9.4  ],
       [ 7.8  ,  0.88 ,  0.   , ...,  3.2  ,  0.68 ,  9.8  ],
       [ 7.8  ,  0.76 ,  0.04 , ...,  3.26 ,  0.65 ,  9.8  ],
       ...,
       [ 6.3  ,  0.51 ,  0.13 , ...,  3.42 ,  0.75 , 11.   ],
       [ 5.9  ,  0.645,  0.12 , ...,  3.57 ,  0.71 , 10.2  ],
       [ 6.   ,  0.31 ,  0.47 , ...,  3.39 ,  0.66 , 11.   ]])
```

```
# Calculate the y-values for the sigmoid plot
y_output = sigmoid(X)


plt.plot(X,y_output)
```

```
[<matplotlib.lines.Line2D at 0x7f5c2f593280>,
 <matplotlib.lines.Line2D at 0x7f5c2f5932e0>,
 <matplotlib.lines.Line2D at 0x7f5c2f593310>,
 <matplotlib.lines.Line2D at 0x7f5c2f593400>,
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 <matplotlib.lines.Line2D at 0x7f5c2f5937c0>,
 <matplotlib.lines.Line2D at 0x7f5c2f5938b0>,
 <matplotlib.lines.Line2D at 0x7f5c2f552c20>,
 <matplotlib.lines.Line2D at 0x7f5c2f552c50>]
```