In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
from sklearn.linear_model import LogisticRegression
```

In [2]:
```
df=pd.read_csv("C4_framingham - C4_framingham.csv")
df
```

Out[2]:

	male	age	education	currentSmoker	cigsPerDay	BPMeds	prevalentStroke	prevalentHyp
0	1	39	4.0	0	0.0	0.0	0	0
1	0	46	2.0	0	0.0	0.0	0	0
2	1	48	1.0	1	20.0	0.0	0	0
3	0	61	3.0	1	30.0	0.0	0	1
4	0	46	3.0	1	23.0	0.0	0	0
...	...	...	...	...	...	...	...	...
4233	1	50	1.0	1	1.0	0.0	0	1
4234	1	51	3.0	1	43.0	0.0	0	0
4235	0	48	2.0	1	20.0	NaN	0	0
4236	0	44	1.0	1	15.0	0.0	0	0
4237	0	52	2.0	0	0.0	0.0	0	0

4238 rows × 16 columns

In [10]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4238 entries, 0 to 4237
Data columns (total 16 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   male             4238 non-null   int64  
 1   age              4238 non-null   int64  
 2   education        4133 non-null   float64
 3   currentSmoker    4238 non-null   int64  
 4   cigsPerDay       4209 non-null   float64
 5   BPMeds           4185 non-null   float64
 6   prevalentStroke  4238 non-null   int64  
 7   prevalentHyp     4238 non-null   int64  
 8   diabetes         4238 non-null   int64  
 9   totChol          4188 non-null   float64
 10  sysBP            4238 non-null   float64
 11  diaBP            4238 non-null   float64
 12  BMI              4219 non-null   float64
 13  heartRate        4237 non-null   float64
 14  glucose          3850 non-null   float64
 15  TenYearCHD       4238 non-null   int64  
dtypes: float64(9), int64(7)
memory usage: 529.9 KB
```

In [11]:
```
df1=df.fillna(value=0)
df1
```

Out[11]:

	male	age	education	currentSmoker	cigsPerDay	BPMeds	prevalentStroke	prevalentHyp
0	1	39	4.0	0	0.0	0.0	0	0
1	0	46	2.0	0	0.0	0.0	0	0
2	1	48	1.0	1	20.0	0.0	0	0
3	0	61	3.0	1	30.0	0.0	0	1
4	0	46	3.0	1	23.0	0.0	0	0
...	...	...	...	...	...	...	...	...
4233	1	50	1.0	1	1.0	0.0	0	1
4234	1	51	3.0	1	43.0	0.0	0	0
4235	0	48	2.0	1	20.0	0.0	0	0
4236	0	44	1.0	1	15.0	0.0	0	0
4237	0	52	2.0	0	0.0	0.0	0	0

4238 rows × 16 columns

In [27]:
```
feature_matrix=df1.iloc[:,0:15]
target_vector=df1.iloc[:,-1]
```

In [28]:
```
feature_matrix.shape
```

Out[28]:
```
(4238, 15)
```

In [29]:
```
target_vector.shape
```

Out[29]:
```
(4238,)
```

In [30]:
```
from sklearn.preprocessing import StandardScaler
```

In [31]:
```
fs=StandardScaler().fit_transform(feature_matrix)
```

In [32]:
```
logr =LogisticRegression()
logr.fit(fs,target_vector)
```

Out[32]:
```
LogisticRegression()
```

In [35]:
```
observation=[[1.4,2.3,5.0,11,12,13,14,15,3,4,5,7,6,7,13]]
```

In [36]:
```
prediction=logr.predict(observation)
print(prediction)
```

```
[1]
```

In [37]:
```
logr.classes_
```

Out[37]:
```
array([0, 1], dtype=int64)
```

In [38]:
```
logr.predict_proba(observation)[0][0]
```

Out[38]:
```
0.00016936367260200758
```

In [39]:
```
logr.predict_proba(observation)[0][1]
```

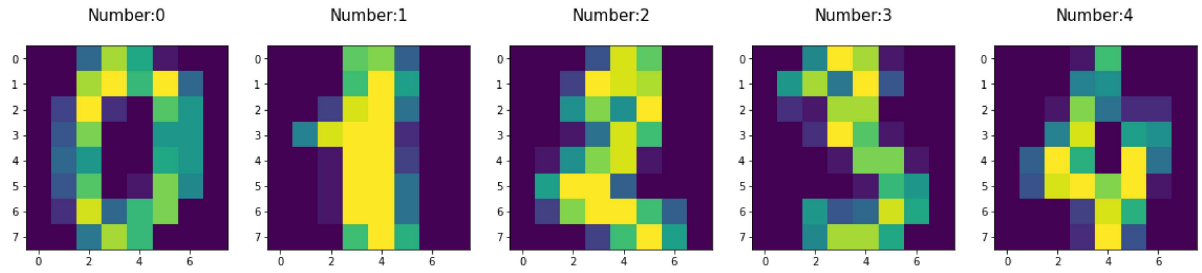
Out[39]:
```
0.999830636327398
```

In [40]:
```
import re
from sklearn.datasets import load_digits
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
```

In [41]:
```
digits = load_digits()
digits
```

Out[41]:
```
{'data': array([[ 0.,  0.,  5., ...,  0.,  0.,  0.],
        [ 0.,  0.,  0., ..., 10.,  0.,  0.],
        [ 0.,  0.,  0., ..., 16.,  9.,  0.],
        ...,
        [ 0.,  0.,  1., ...,  6.,  0.,  0.],
        [ 0.,  0.,  2., ..., 12.,  0.,  0.],
        [ 0.,  0., 10., ..., 12.,  1.,  0.]]),
 'target': array([0, 1, 2, ..., 8, 9, 8]),
 'frame': None,
 'feature_names': ['pixel_0_0',
  'pixel_0_1',
  'pixel_0_2',
  'pixel_0_3',
  'pixel_0_4',
  'pixel_0_5',
  'pixel_0_6',
  'pixel_0_7',
  'pixel_1_0',
  'pixel_1_1',
```

In [42]:
```
plt.figure(figsize=(20,4))
for index,(image,label)in enumerate(zip(digits.data[0:5],digits.target[0:5])):
    plt.subplot(1,5,index+1)
    plt.imshow(np.reshape(image,(8,8)))
    plt.title('Number:%i\n' %label,fontsize=15)
```



In [45]:
```
x_train,x_test,y_train,y_test=train_test_split(digits.data,digits.target,test_s
```

In [46]:
```
print(x_train.shape)
print(x_test.shape)
print(y_train.shape)
print(y_test.shape)
```

```
(1257, 64)
(540, 64)
(1257,)
(540,)
```

In [47]:
```
logre=LogisticRegression(max_iter=10000) # if error comes declare max_iter=1000
logre.fit(x_train,y_train)
```

Out[47]:
```
LogisticRegression(max_iter=10000)
```

In [49]:
```
print(logre.predict(x_test))
```

```
[3 6 2 5 4 3 7 6 7 0 5 3 3 2 5 1 1 0 4 5 2 5 5 4 2 2 4 6 8 6 6 8 9 8 6 5 5
 5 2 8 5 6 6 8 7 6 2 2 2 3 4 5 9 5 0 9 1 4 2 6 4 0 3 9 7 2 6 1 9 7 5 7 7 5
 3 2 4 8 7 5 7 6 1 1 5 3 5 2 7 1 8 3 1 1 3 5 7 7 9 2 7 6 2 4 1 5 0 3 7 8 3
 9 4 2 3 4 9 2 6 0 9 6 4 6 5 0 5 4 4 6 5 6 1 3 9 2 6 2 5 8 6 9 5 3 3 5 7 1
 9 1 7 7 7 4 3 1 9 0 0 1 6 1 1 8 4 0 5 9 3 1 3 0 6 7 8 2 2 0 2 3 5 6 4 2 6
 6 2 8 4 7 7 4 8 5 2 6 8 4 0 8 3 9 1 0 2 9 4 2 8 0 9 9 5 1 9 4 4 9 4 7 1 3
 4 6 9 6 3 2 0 9 8 0 7 7 8 1 1 0 6 0 4 5 6 0 0 8 9 8 6 9 3 2 5 8 7 5 6 3 2
 6 6 2 5 7 5 1 9 7 8 4 4 5 7 3 2 8 6 1 2 5 3 8 3 7 0 5 5 3 5 4 3 6 9 5 5 7
 9 5 7 4 2 6 3 9 6 1 8 9 6 2 7 9 4 4 2 2 3 1 5 5 0 2 3 5 8 3 8 3 6 1 9 2 3
 9 7 6 4 8 4 7 2 3 2 2 2 8 5 0 8 7 3 5 7 2 0 9 0 4 6 4 8 3 9 5 8 5 0 7 5 8
 4 6 7 0 0 7 8 8 5 1 2 9 2 9 9 0 3 5 5 5 1 9 3 4 8 9 5 0 0 2 5 6 9 9 7 3 5
 1 9 0 8 3 1 4 0 8 2 0 1 4 0 5 2 8 2 9 8 7 0 2 9 3 8 0 0 2 0 4 2 7 1 1 5 9
 4 2 8 6 4 5 3 6 6 4 3 9 4 2 8 0 8 1 0 4 6 5 7 7 7 3 9 4 8 0 7 5 9 2 7 9 9
 0 0 2 1 7 5 4 9 5 8 0 2 9 1 4 5 8 0 4 2 9 8 5 9 8 9 7 4 6 3 6 9 2 2 2 3 5
 8 8 1 9 3 0 3 7 3 7 2 8 0 0 1 5 1 1 3 3 1 0]
```

In [48]:
```
print(logre.score(x_test,y_test))
```

```
0.9685185185185186
```

In [ ]: