Problem Statement:

Brest cancer prediction based n respective features.

1.Data Collection

In [1]:

```
import pandas as pd
from matplotlib import pyplot as plt
%matplotlib inline
```

In [2]:

```
df=pd.read_csv(r"C:\Users\DELL\Downloads\BreastCancerPrediction.csv")
df
```

Out[2]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_
0	842302	M	17.99	10.38	122.80	1001.0	0.
1	842517	M	20.57	17.77	132.90	1326.0	0.(
2	84300903	M	19.69	21.25	130.00	1203.0	0.‘
3	84348301	M	11.42	20.38	77.58	386.1	0.‘
4	84358402	M	20.29	14.34	135.10	1297.0	0.‘
...	...	...	...	...	...	...	
564	926424	M	21.56	22.39	142.00	1479.0	0.
565	926682	M	20.13	28.25	131.20	1261.0	0.(
566	926954	M	16.60	28.08	108.30	858.1	0.(
567	927241	M	20.60	29.33	140.10	1265.0	0.
568	92751	B	7.76	24.54	47.92	181.0	0.(

569 rows × 33 columns

2.Data Preprocessing

In [3]:
```
df.head()
```

Out[3]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_me
0	842302	M	17.99	10.38	122.80	1001.0	0.118
1	842517	M	20.57	17.77	132.90	1326.0	0.084
2	84300903	M	19.69	21.25	130.00	1203.0	0.109
3	84348301	M	11.42	20.38	77.58	386.1	0.142
4	84358402	M	20.29	14.34	135.10	1297.0	0.100

5 rows × 33 columns

In [4]:
```
df.tail()
```

Out[4]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_me
564	926424	M	21.56	22.39	142.00	1479.0	0.111
565	926682	M	20.13	28.25	131.20	1261.0	0.097
566	926954	M	16.60	28.08	108.30	858.1	0.084
567	927241	M	20.60	29.33	140.10	1265.0	0.117
568	92751	B	7.76	24.54	47.92	181.0	0.052

5 rows × 33 columns

In [5]:

```
df.describe()
```

Out[5]:

	id	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mea
count	5.690000e+02	569.000000	569.000000	569.000000	569.000000	569.00000
mean	3.037183e+07	14.127292	19.289649	91.969033	654.889104	0.09636
std	1.250206e+08	3.524049	4.301036	24.298981	351.914129	0.01406
min	8.670000e+03	6.981000	9.710000	43.790000	143.500000	0.05263
25%	8.692180e+05	11.700000	16.170000	75.170000	420.300000	0.08637
50%	9.060240e+05	13.370000	18.840000	86.240000	551.100000	0.09587
75%	8.813129e+06	15.780000	21.800000	104.100000	782.700000	0.10530
max	9.113205e+08	28.110000	39.280000	188.500000	2501.000000	0.16340

8 rows × 32 columns

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 569 entries, 0 to 568
Data columns (total 33 columns):
 #   Column                   Non-Null Count  Dtype  
---  ------                   --------------  -----  
 0   id                       569 non-null    int64  
 1   diagnosis                569 non-null    object 
 2   radius_mean              569 non-null    float64
 3   texture_mean             569 non-null    float64
 4   perimeter_mean           569 non-null    float64
 5   area_mean                569 non-null    float64
 6   smoothness_mean          569 non-null    float64
 7   compactness_mean         569 non-null    float64
 8   concavity_mean           569 non-null    float64
 9   concave points_mean      569 non-null    float64
 10  symmetry_mean            569 non-null    float64
 11  fractal_dimension_mean   569 non-null    float64
 12  radius_se                569 non-null    float64
 13  texture_se               569 non-null    float64
 14  perimeter_se             569 non-null    float64
 15  area_se                  569 non-null    float64
 16  smoothness_se            569 non-null    float64
 17  compactness_se           569 non-null    float64
 18  concavity_se             569 non-null    float64
 19  concave points_se        569 non-null    float64
 20  symmetry_se              569 non-null    float64
 21  fractal_dimension_se     569 non-null    float64
 22  radius_worst             569 non-null    float64
 23  texture_worst            569 non-null    float64
 24  perimeter_worst          569 non-null    float64
 25  area_worst               569 non-null    float64
 26  smoothness_worst         569 non-null    float64
 27  compactness_worst        569 non-null    float64
 28  concavity_worst          569 non-null    float64
 29  concave points_worst     569 non-null    float64
 30  symmetry_worst           569 non-null    float64
 31  fractal_dimension_worst  569 non-null    float64
 32  Unnamed: 32              0 non-null      float64
dtypes: float64(31), int64(1), object(1)
memory usage: 146.8+ KB
```

In [7]:

```
df.drop(['Unnamed: 32'],axis=1)
```

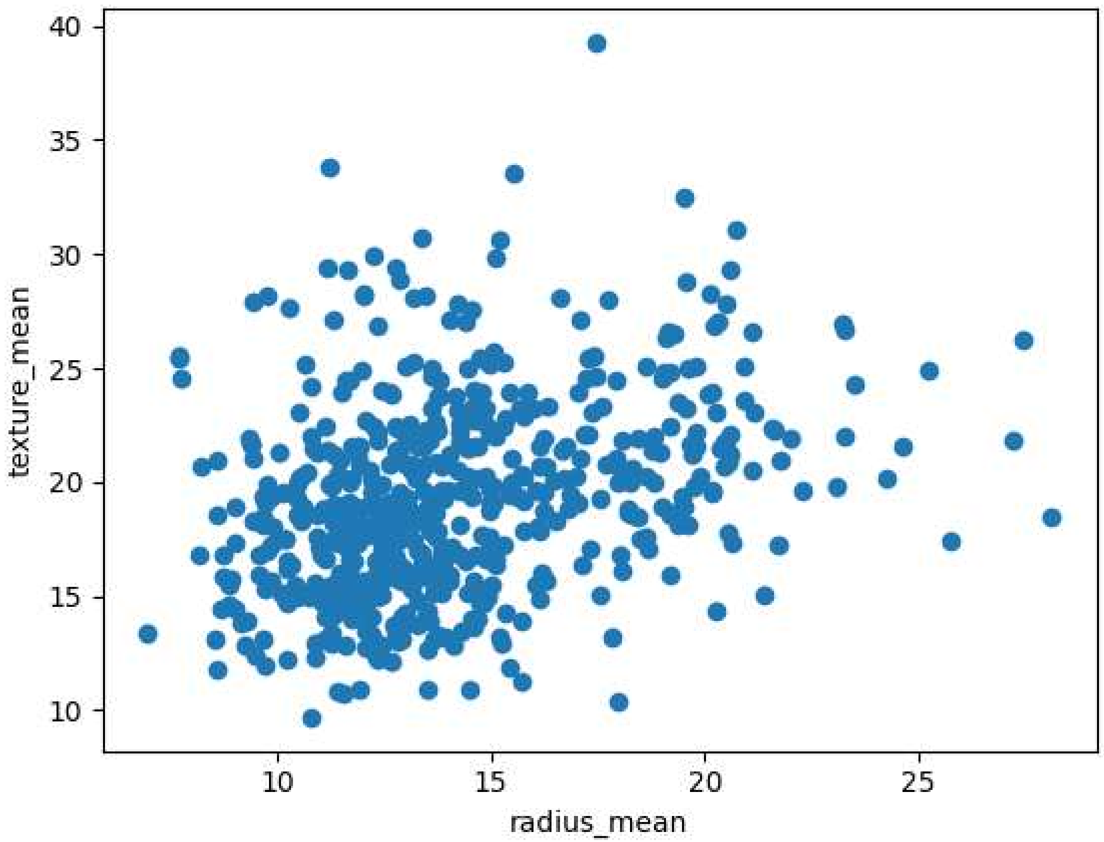
Out[7]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_
0	842302	M	17.99	10.38	122.80	1001.0	0.
1	842517	M	20.57	17.77	132.90	1326.0	0.0
2	84300903	M	19.69	21.25	130.00	1203.0	0.1
3	84348301	M	11.42	20.38	77.58	386.1	0.1
4	84358402	M	20.29	14.34	135.10	1297.0	0.1
...	...	...	...	...	...	...	
564	926424	M	21.56	22.39	142.00	1479.0	0.
565	926682	M	20.13	28.25	131.20	1261.0	0.0
566	926954	M	16.60	28.08	108.30	858.1	0.0
567	927241	M	20.60	29.33	140.10	1265.0	0.
568	92751	B	7.76	24.54	47.92	181.0	0.0

569 rows × 32 columns

In [8]:
```
plt.scatter(df["radius_mean"],df["texture_mean"])
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[8]:
```
Text(0, 0.5, 'texture_mean')
```



In [9]:
```
from sklearn.cluster import KMeans
km=KMeans()
km
```

Out[9]:
```
▾ KMeans

KMeans()
```

In [10]:

```
y_predicted=km.fit_predict(df[["radius_mean","texture_mean"]])
y_predicted
```

```
C:\Users\DELL\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklea
rn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will
change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
```

Out[10]:

```
array([3, 2, 5, 6, 2, 3, 2, 0, 0, 0, 0, 2, 4, 0, 0, 7, 2, 2, 5, 3, 3, 1,
       3, 5, 2, 2, 0, 2, 0, 3, 4, 6, 4, 4, 2, 2, 0, 6, 0, 0, 0, 0, 4, 6,
       0, 2, 6, 6, 1, 0, 0, 3, 6, 2, 0, 6, 2, 0, 6, 1, 1, 6, 0, 1, 0, 0,
       6, 6, 6, 3, 2, 1, 4, 3, 6, 2, 1, 2, 4, 6, 6, 3, 5, 4, 1, 2, 0, 4,
       0, 3, 0, 0, 3, 6, 2, 5, 6, 6, 1, 2, 0, 1, 6, 6, 6, 3, 6, 6, 5, 0,
       6, 0, 6, 6, 1, 0, 1, 3, 0, 2, 1, 2, 5, 3, 3, 3, 0, 2, 3, 4, 1, 2,
       2, 3, 2, 0, 6, 1, 3, 1, 1, 2, 6, 3, 1, 1, 6, 2, 3, 6, 0, 6, 1, 1,
       3, 6, 2, 2, 1, 1, 6, 2, 2, 0, 5, 2, 1, 2, 4, 3, 1, 6, 3, 1, 1, 1,
       6, 2, 0, 1, 5, 4, 2, 1, 0, 1, 2, 6, 6, 3, 0, 0, 6, 7, 0, 3, 0, 2,
       5, 0, 6, 2, 4, 0, 6, 3, 6, 2, 0, 3, 5, 6, 5, 4, 0, 3, 6, 6, 5, 4,
       3, 3, 6, 2, 3, 3, 1, 3, 0, 0, 2, 7, 7, 4, 1, 0, 4, 5, 7, 7, 3, 1,
       6, 0, 4, 6, 6, 3, 0, 1, 5, 6, 2, 2, 2, 3, 4, 3, 0, 7, 4, 2, 2, 2,
       2, 4, 6, 0, 3, 6, 3, 1, 5, 1, 4, 6, 1, 2, 6, 3, 4, 1, 2, 2, 3, 6,
       6, 1, 6, 6, 2, 2, 3, 6, 1, 3, 1, 6, 6, 0, 2, 6, 4, 6, 6, 0, 3, 1,
       3, 3, 6, 3, 1, 1, 6, 6, 1, 2, 6, 6, 1, 5, 1, 5, 1, 6, 3, 6, 2, 2,
       3, 6, 6, 1, 6, 2, 3, 2, 6, 5, 3, 6, 1, 5, 1, 1, 6, 3, 1, 1, 6, 2,
       5, 0, 1, 6, 6, 3, 1, 6, 6, 0, 6, 2, 3, 5, 4, 6, 5, 5, 0, 3, 2, 2,
       3, 3, 6, 7, 3, 6, 1, 1, 0, 6, 3, 0, 1, 3, 1, 5, 1, 6, 2, 5, 6, 3,
       6, 6, 1, 6, 2, 1, 6, 3, 1, 6, 3, 0, 2, 6, 6, 6, 6, 0, 7, 0, 6, 2,
       1, 0, 6, 3, 1, 6, 6, 6, 1, 0, 6, 6, 0, 6, 5, 2, 3, 6, 6, 3, 6, 3,
       6, 4, 3, 6, 2, 0, 4, 3, 2, 5, 0, 4, 7, 3, 6, 7, 7, 0, 0, 7, 4, 5,
       7, 6, 6, 6, 0, 6, 4, 6, 6, 7, 3, 7, 1, 3, 0, 3, 1, 2, 6, 6, 3, 6,
       3, 3, 3, 2, 1, 2, 0, 3, 2, 1, 0, 2, 6, 6, 2, 5, 3, 0, 3, 5, 1, 1,
       6, 6, 3, 0, 1, 3, 0, 3, 2, 6, 2, 5, 6, 3, 1, 5, 6, 6, 1, 1, 6, 1,
       3, 1, 6, 6, 3, 5, 6, 5, 0, 0, 0, 0, 1, 0, 0, 7, 0, 0, 1, 6, 6, 0,
       0, 0, 7, 0, 7, 7, 6, 7, 0, 0, 7, 7, 7, 4, 5, 4, 4, 4, 0])
```

In [11]:

```
df["cluster"]=y_predicted
df.head()
```

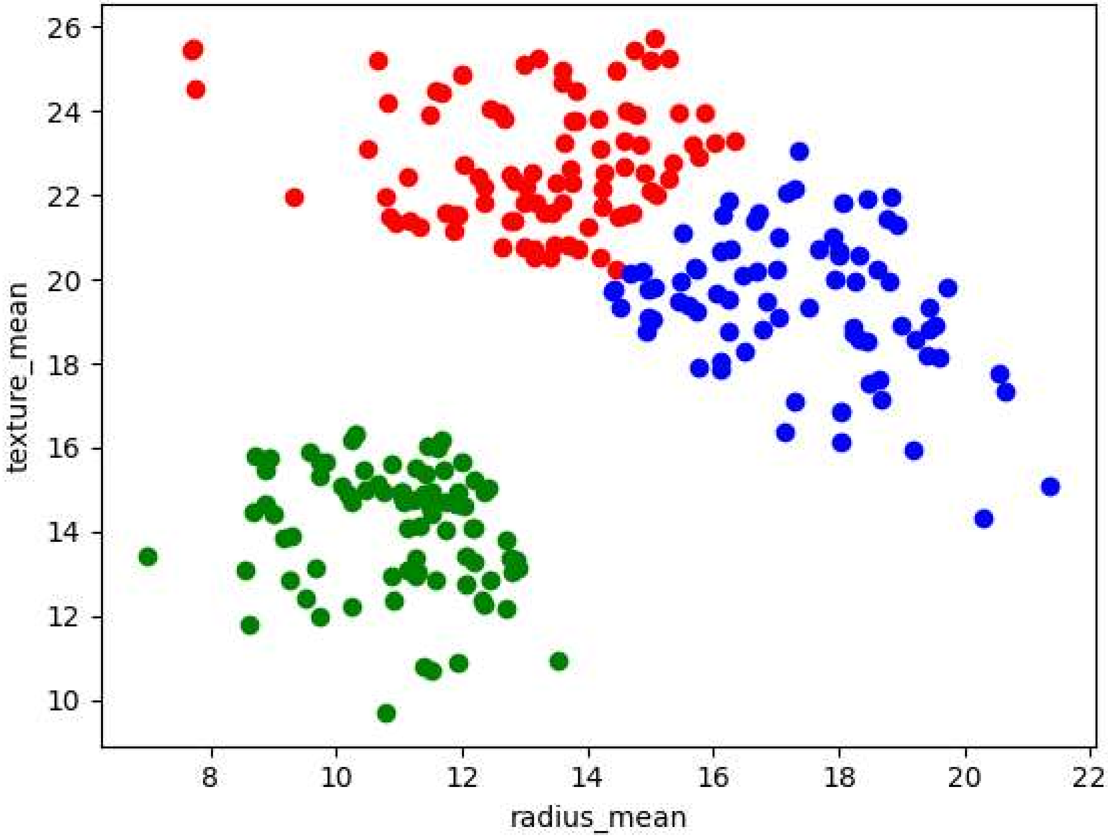
Out[11]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_me
0	842302	M	17.99	10.38	122.80	1001.0	0.118
1	842517	M	20.57	17.77	132.90	1326.0	0.084
2	84300903	M	19.69	21.25	130.00	1203.0	0.109
3	84348301	M	11.42	20.38	77.58	386.1	0.142
4	84358402	M	20.29	14.34	135.10	1297.0	0.100

5 rows × 34 columns

In [12]:
```
df1=df[df.cluster==0]
df2=df[df.cluster==1]
df3=df[df.cluster==2]
plt.scatter(df1["radius_mean"],df1["texture_mean"],color="red")
plt.scatter(df2["radius_mean"],df2["texture_mean"],color="green")
plt.scatter(df3["radius_mean"],df3["texture_mean"],color="blue")
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[12]:
```
Text(0, 0.5, 'texture_mean')
```



In [13]:
```
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler()
scaler.fit(df[["texture_mean"]])
df["texture_mean"]=scaler.transform(df[["texture_mean"]])
```

In [14]:
```
scaler.fit(df[["radius_mean"]])
df["radius_mean"]=scaler.transform(df[["radius_mean"]])
df.head()
```

Out[14]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_me
0	842302	M	0.521037	0.022658	122.80	1001.0	0.118
1	842517	M	0.643144	0.272574	132.90	1326.0	0.084
2	84300903	M	0.601496	0.390260	130.00	1203.0	0.109
3	84348301	M	0.210090	0.360839	77.58	386.1	0.142
4	84358402	M	0.629893	0.156578	135.10	1297.0	0.100

5 rows × 34 columns

In [15]:
```
y_predicted=km.fit_predict(df[["radius_mean","texture_mean"]])
y_predicted
```

```
C:\Users\DELL\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklea
rn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will
change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
```

Out[15]:
```
array([6, 1, 1, 0, 1, 6, 1, 7, 7, 3, 7, 6, 5, 7, 7, 3, 7, 7, 1, 6, 6, 4,
       6, 2, 7, 1, 7, 1, 7, 6, 5, 0, 5, 5, 6, 7, 7, 0, 7, 7, 7, 0, 5, 7,
       7, 1, 4, 0, 4, 7, 0, 6, 0, 1, 7, 0, 1, 7, 0, 4, 4, 0, 7, 4, 3, 7,
       0, 0, 0, 6, 1, 4, 5, 6, 0, 7, 6, 1, 5, 0, 0, 6, 2, 5, 4, 1, 7, 5,
       7, 6, 7, 7, 6, 0, 7, 5, 0, 0, 4, 7, 3, 4, 0, 0, 0, 6, 0, 0, 2, 0,
       0, 0, 7, 0, 4, 0, 4, 6, 7, 1, 4, 1, 2, 6, 6, 6, 3, 1, 6, 5, 4, 7,
       7, 6, 1, 7, 0, 4, 6, 4, 4, 6, 0, 6, 4, 4, 0, 7, 6, 6, 7, 0, 4, 4,
       6, 0, 1, 1, 4, 4, 0, 1, 1, 7, 2, 7, 4, 1, 5, 6, 4, 7, 6, 4, 4, 4,
       0, 7, 7, 6, 2, 5, 7, 4, 7, 4, 1, 0, 0, 6, 7, 7, 0, 3, 7, 6, 7, 1,
       1, 7, 0, 1, 2, 7, 0, 6, 0, 1, 7, 6, 1, 0, 2, 5, 7, 6, 0, 0, 1, 5,
       6, 6, 0, 7, 6, 6, 4, 6, 3, 7, 1, 3, 3, 5, 4, 7, 2, 1, 3, 5, 6, 6,
       0, 7, 5, 0, 6, 6, 3, 4, 5, 0, 1, 1, 1, 6, 5, 6, 7, 3, 5, 1, 1, 7,
       1, 5, 0, 7, 6, 0, 6, 4, 2, 4, 5, 0, 4, 1, 6, 6, 5, 4, 1, 7, 6, 0,
       0, 6, 0, 0, 7, 7, 6, 0, 6, 6, 4, 0, 6, 0, 1, 0, 5, 0, 0, 3, 6, 4,
       6, 6, 0, 6, 6, 4, 0, 0, 4, 1, 0, 0, 4, 1, 6, 1, 4, 0, 6, 0, 7, 7,
       6, 0, 0, 4, 0, 1, 6, 1, 0, 2, 6, 4, 4, 1, 4, 4, 0, 6, 4, 4, 0, 7,
       2, 3, 4, 0, 0, 6, 4, 0, 0, 7, 0, 1, 6, 1, 5, 0, 1, 2, 7, 6, 1, 1,
       6, 6, 0, 3, 6, 0, 4, 4, 7, 0, 6, 7, 4, 6, 4, 5, 4, 4, 7, 2, 0, 6,
       7, 0, 4, 0, 1, 4, 0, 6, 4, 0, 6, 7, 1, 0, 0, 0, 0, 7, 3, 0, 0, 7,
       4, 0, 0, 6, 4, 7, 0, 0, 4, 0, 0, 0, 7, 0, 1, 1, 6, 7, 0, 6, 7, 6,
       0, 5, 6, 0, 1, 3, 5, 6, 7, 1, 0, 5, 3, 6, 0, 3, 3, 3, 3, 3, 5, 2,
       3, 0, 0, 7, 7, 0, 5, 0, 0, 3, 6, 3, 4, 6, 7, 6, 4, 7, 0, 7, 6, 6,
       6, 6, 6, 1, 4, 1, 7, 6, 1, 4, 7, 7, 0, 0, 1, 1, 6, 3, 6, 2, 4, 4,
       0, 0, 6, 7, 4, 6, 7, 6, 7, 0, 1, 1, 0, 6, 4, 2, 0, 7, 4, 4, 0, 4,
       6, 4, 0, 0, 6, 1, 0, 1, 7, 3, 3, 3, 4, 3, 3, 3, 7, 7, 4, 4, 0, 3,
       0, 0, 3, 0, 3, 3, 0, 3, 7, 3, 3, 3, 3, 5, 2, 5, 5, 5, 3])
```

In [18]:
```
df["New Cluster"]=y_predicted
df.head()
```

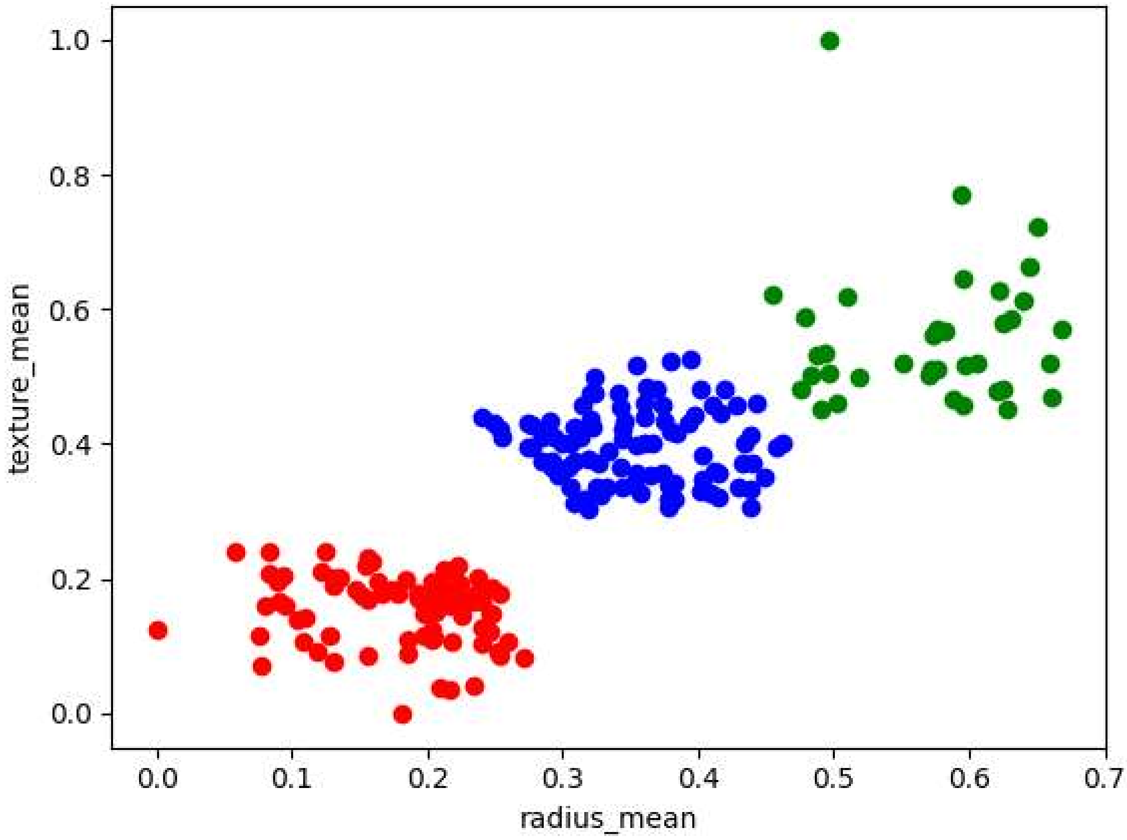
Out[18]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_me
0	842302	M	0.521037	0.022658	122.80	1001.0	0.118
1	842517	M	0.643144	0.272574	132.90	1326.0	0.084
2	84300903	M	0.601496	0.390260	130.00	1203.0	0.109
3	84348301	M	0.210090	0.360839	77.58	386.1	0.142
4	84358402	M	0.629893	0.156578	135.10	1297.0	0.100

5 rows × 35 columns

In [19]:
```
df1=df[df["New Cluster"]==0]
df2=df[df["New Cluster"]==1]
df3=df[df["New Cluster"]==2]
plt.scatter(df1["radius_mean"],df1["texture_mean"],color="red")
plt.scatter(df2["radius_mean"],df2["texture_mean"],color="green")
plt.scatter(df3["radius_mean"],df3["texture_mean"],color="blue")
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[19]:
```
Text(0, 0.5, 'texture_mean')
```

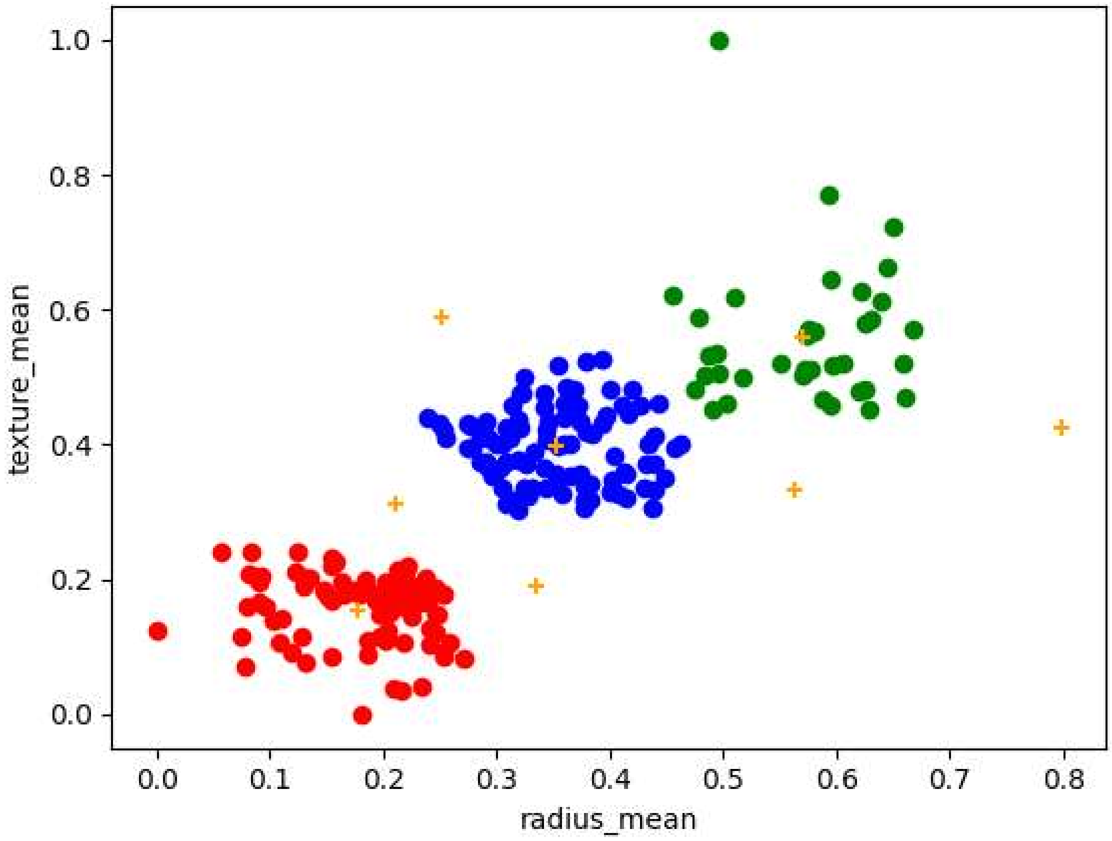


In [20]:
```
km.cluster_centers_
```

Out[20]:
```
array([[0.17694105, 0.15527139],
       [0.57132058, 0.55893025],
       [0.35310079, 0.39677038],
       [0.25223338, 0.58802181],
       [0.56287997, 0.33184226],
       [0.2104771 , 0.31042356],
       [0.33570532, 0.19063107],
       [0.79840767, 0.42469846]])
```

In [21]:
```
df1=df[df["New Cluster"]==0]
df2=df[df["New Cluster"]==1]
df3=df[df["New Cluster"]==2]
plt.scatter(df1["radius_mean"],df1["texture_mean"],color="red")
plt.scatter(df2["radius_mean"],df2["texture_mean"],color="green")
plt.scatter(df3["radius_mean"],df3["texture_mean"],color="blue")
plt.scatter(km.cluster_centers_[:,0],km.cluster_centers_[:,1],color="orange",ma
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[21]:
```
Text(0, 0.5, 'texture_mean')
```



In [22]:

```
k_rng=range(1,10)
sse=[]
```

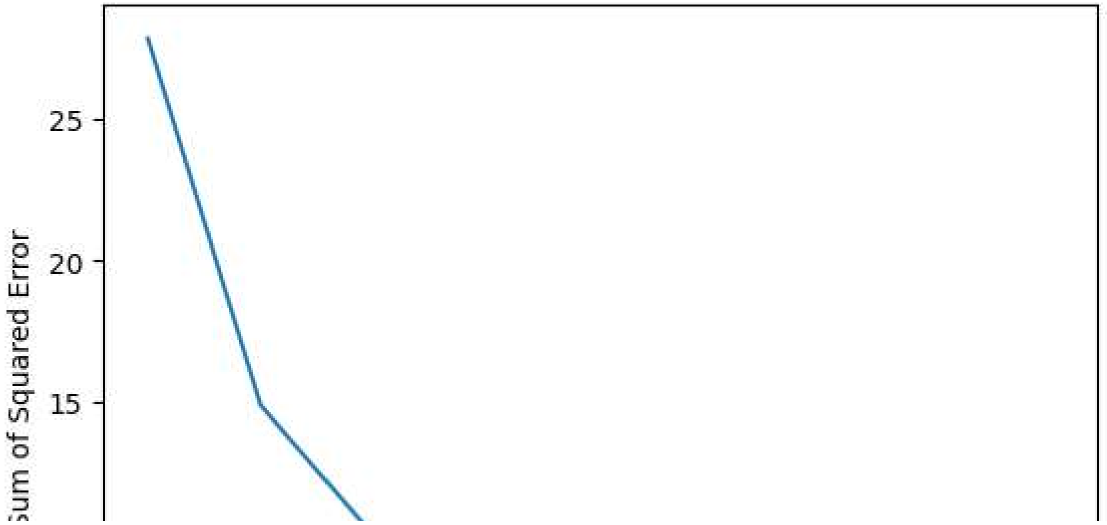
In [23]:

```
for k in k_rng:
 km=KMeans(n_clusters=k)
 km.fit(df[["radius_mean","texture_mean"]])
 sse.append(km.inertia_)
#km.inertia_ will give you the value of sum of square error
print(sse)
plt.plot(k_rng,sse)
plt.xlabel("K")
plt.ylabel("Sum of Squared Error")
```

```
4, 7.030021844241491, 6.036748958802498, 5.119019063393385, 4.44272771188761
5, 3.9963232799582853]
```

Out[23]:

```
Text(0, 0.5, 'Sum of Squared Error')
```



CONCLUSION

for the given dataset we can use multiple models,for that models we get different types of accuracies but that accuracies is not good so,that's why we will take it as a clustering and done with K-Means Clustering.

In [ ]:

In [ ]: