1. Partition Based Metjods - KMeans
2. Heirarchical - Agglomerative

In [1]:
```
#1 importing the dataset
import pandas as pd
customers_df = pd.read_csv("Salary_data.csv");
customers_df.head(5)
```

Out[1]:

	age	income
0	25	69343
1	28	66205
2	30	57731
3	29	63525
4	31	69891

KMeans

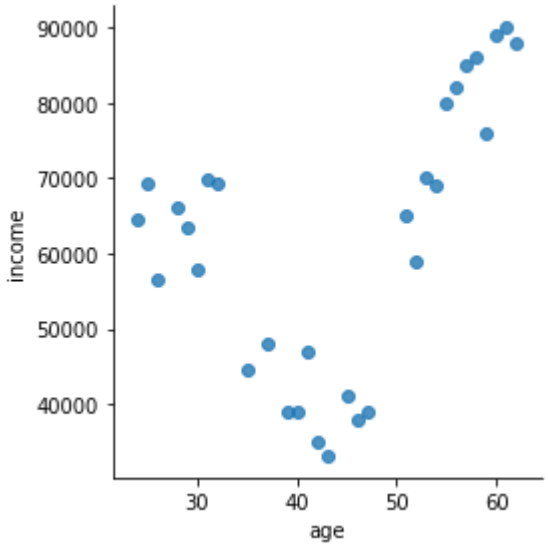
Step 1: It randomly selects 'k' data objects from the dataseteach of which represents a Cluster Center

Step 2: Repeat for each of the remaining data objects, an object is assigned to a cluster to which it is most similar i.e minimum distance (based on the distance between the object and cluster center)

Step 3: It then computes a new mean for each respective cluster until there is no change

In [3]:
```
#2 importing the libraries
import numpy as np
import seaborn as sn
import matplotlib as plt
%matplotlib inline
# here we dont want to use line regression therefore fit_reg = False
# plotting the graph between "income" and "age"
sn.lmplot("age" , "income" , data = customers_df , fit_reg = False , size = 4)
```

Out[3]: <seaborn.axisgrid.FacetGrid at 0x23757a2f248>



In [4]:
```
#3 KMEANS
from sklearn.cluster import KMeans
#KMeans 3 -> choose 3 random centers
clusters = KMeans(3)
clusters.fit(customers_df)
```

Out[4]:
```
KMeans(n_clusters=3)
```

In [5]:
```
# by this we are assignming the cluster number to the repective data item based on first iteration of cluster.fi
customers_df["clusterid"] = clusters.labels_
customers_df.head()
```

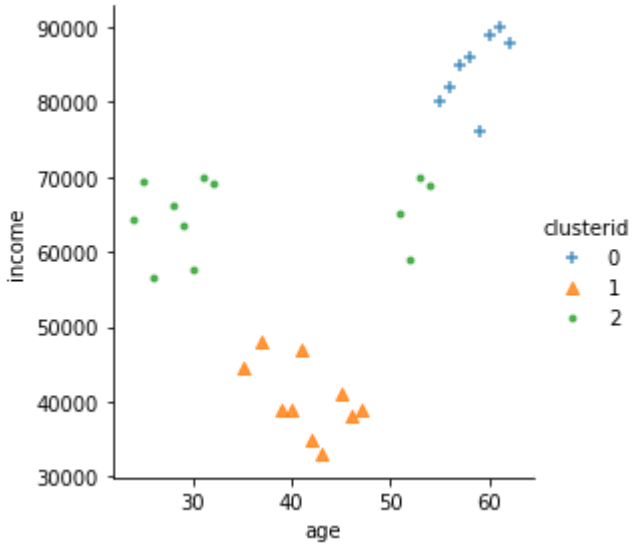
Out[5]:

	age	income	clusterid
0	25	69343	2
1	28	66205	2
2	30	57731	2
3	29	63525	2
4	31	69891	2

In [7]:
```
#4 PLOTTING THE CLUSTERS
# beacuse we are using 3 clusters
marker = ['+' , '^' , '.']
sn.lmplot("age" , "income" , data = customers_df , hue = "clusterid" , fit_reg = False , markers = marker , size
```

```
C:\Users\harsh\anaconda3\lib\site-packages\seaborn\regression.py:574: UserWarning: The `size` parameter has be
en renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
```

Out[7]: <seaborn.axisgrid.FacetGrid at 0x237581c9e48>



In [11]:
```
#5 scaling the features
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
scaled_customers_df = scaler.fit_transform(customers_df[["age" , "income"]])
scaled_customers_df[0:5]
```

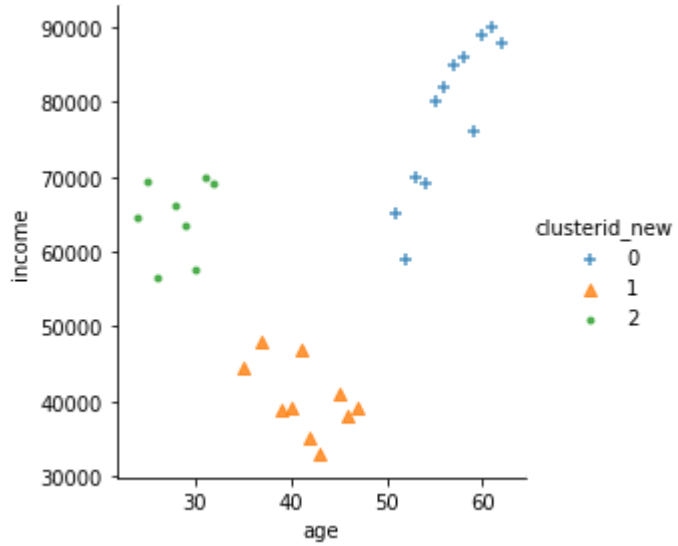
Out[11]:
```
array([[-1.58294052,  0.41411441],
       [-1.33212248,  0.23763705],
       [-1.16491046, -0.23893055],
       [-1.24851647,  0.08691707],
       [-1.08130444,  0.44493328]])
```

In [14]:
```
#6 KMEANS again after scaling the features
from sklearn.cluster import KMeans
#KMeans 3 -> choose 3 random centers
clusters_new = KMeans(3)
clusters_new.fit(scaled_customers_df)
customers_df["clusterid_new"] = clusters_new.labels_
```

In [15]:
```
#7 PLOTTING AGAIN
marker = ['+' , '^' , '.']
sn.lmplot("age" , "income" , data = customers_df , hue = "clusterid_new" , fit_reg = False , markers = marker ,
```

```
C:\Users\harsh\anaconda3\lib\site-packages\seaborn\regression.py:574: UserWarning: The `size` parameter has be
en renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
```

Out[15]:
```
<seaborn.axisgrid.FacetGrid at 0x237582f2948>
```



In [16]:
```
#PROBLEM STATEMENT
# Use the bev.csv dataset and apply KMeans and Agglomerative clustering; Compare the cluster
```

In [18]:
```
#1 Importing the dataset
bev_df = pd.read_csv("bev.csv")
bev_df.head()
```

Out[18]:

	Name	Potassium	Sodium	Caffeine	Cost
0	new_england_coffee	144	15	4.7	0.43
1	post_alley_blend	151	19	4.9	0.43
2	stumpdown_coffee	157	15	0.9	0.48
3	bizzy_organic_coffee	170	7	5.2	0.73
4	indian_bean	152	11	5.0	0.77

In [20]:
```
# we have already imported the libraries :-)
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
scaled_bev_df = scaler.fit_transform(bev_df[["Potassium" , "Sodium" , "Caffeine" , "Cost"]])
scaled_bev_df[0:5]
```

Out[20]:
```
array([[ 0.38791334,  0.00779468,  0.43380786, -0.45682969],
       [ 0.6250656 ,  0.63136906,  0.62241997, -0.45682969],
       [ 0.82833896,  0.00779468, -3.14982226, -0.10269815],
       [ 1.26876459, -1.23935408,  0.90533814,  1.66795955],
       [ 0.65894449, -0.6157797 ,  0.71672602,  1.95126478]])
```

In [24]:
```
from sklearn.cluster import KMeans
#KMeans 3 -> choose 3 random centers
clusters = KMeans(3)
clusters.fit(scaled_bev_df)
bev_df["clusterid"] = clusters.labels_
```

In [27]:
```
# TO LOOK AT THE CLUSTERS
bev_df[bev_df.clusterid == 0]
```

Out[27]:

	Name	Potassium	Sodium	Caffeine	Cost	clusterid_new	clusterid
0	new_england_coffee	144	15	4.7	0.43	0	0
1	post_alley_blend	151	19	4.9	0.43	0	0
5	jacobs_coffee	145	23	4.6	0.28	0	0
6	grounds_hounds_coffee	175	24	5.5	0.40	0	0
7	la_columbe_corisca	149	27	4.7	0.42	0	0
10	red_bay_coffee	140	18	4.6	0.44	0	0
16	irish_hazelnut_coffee	139	19	4.4	0.43	0	0
17	cremoso_coffee	144	24	4.9	0.43	0	0

In [ ]:
```
# AGGLOMERATIVE -> bottom up approach , initially every dataitem is considered as clusters and
# then they are merged together until their is no change
from sklearn.
```