In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```
df = pd.read_csv('Seed_Data.csv')
```

In [3]:

```
df.head()
```

Out[3]:

	A	P	C	LK	WK	A_Coef	LKG	target
0	15.26	14.84	0.8710	5.763	3.312	2.221	5.220	0
1	14.88	14.57	0.8811	5.554	3.333	1.018	4.956	0
2	14.29	14.09	0.9050	5.291	3.337	2.699	4.825	0
3	13.84	13.94	0.8955	5.324	3.379	2.259	4.805	0
4	16.14	14.99	0.9034	5.658	3.562	1.355	5.175	0

In [4]:

```
df.shape
```

Out[4]:

```
(210, 8)
```

In [5]:

```
df.describe()
```

Out[5]:

	A	P	C	LK	WK	A_Coef	LKG	target
count	210.000000	210.000000	210.000000	210.000000	210.000000	210.000000	210.000000	210.000000
mean	14.847524	14.559286	0.870999	5.628533	3.258605	3.700201	5.408071	1.000000
std	2.909699	1.305959	0.023629	0.443063	0.377714	1.503557	0.491480	0.818448
min	10.590000	12.410000	0.808100	4.899000	2.630000	0.765100	4.519000	0.000000
25%	12.270000	13.450000	0.856900	5.262250	2.944000	2.561500	5.045000	0.000000
50%	14.355000	14.320000	0.873450	5.523500	3.237000	3.599000	5.223000	1.000000
75%	17.305000	15.715000	0.887775	5.979750	3.561750	4.768750	5.877000	2.000000
max	21.180000	17.250000	0.918300	6.675000	4.033000	8.456000	6.550000	2.000000

In [7]:

```
df['target'].value_counts()
```

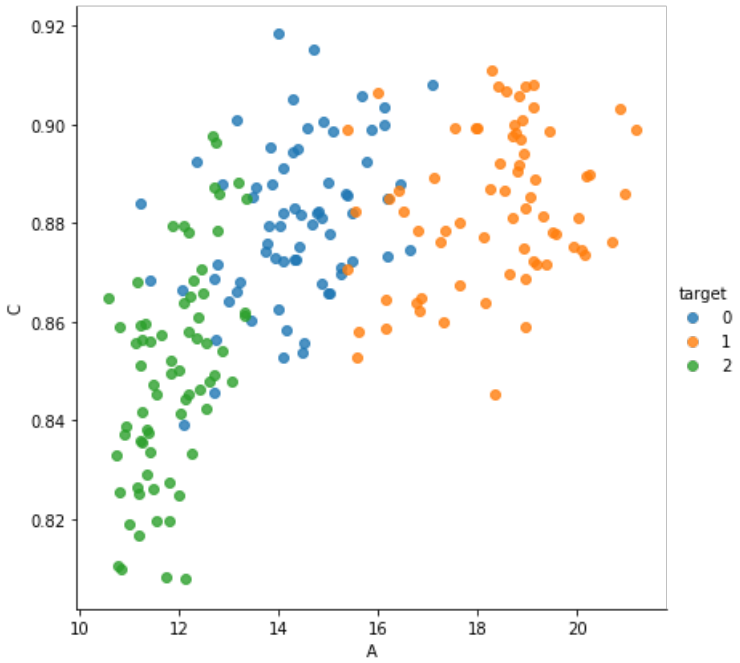
Out[7]:

```
2    70
1    70
0    70
Name: target, dtype: int64
```

In [11]:

```
sns.lmplot('A', 'C', data=df, hue='target', fit_reg=False, size=6);
```

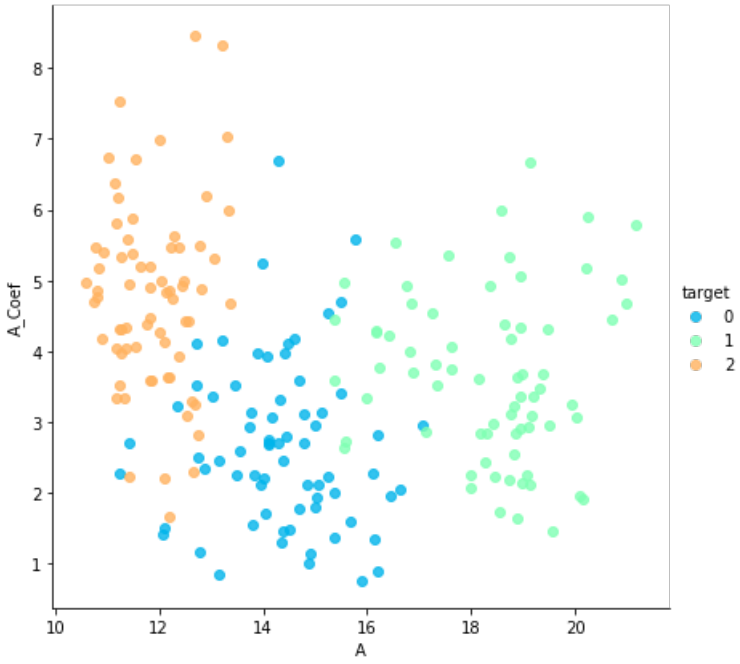
```
/Users/sudeng/anaconda3/lib/python3.7/site-packages/seaborn/regression.py:546: UserWarning: The `size` paramter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
```



In [12]:

```
sns.lmplot('A', 'A_Coef', data=df, hue='target', fit_reg=False, size=6, palette='rainbow');
```

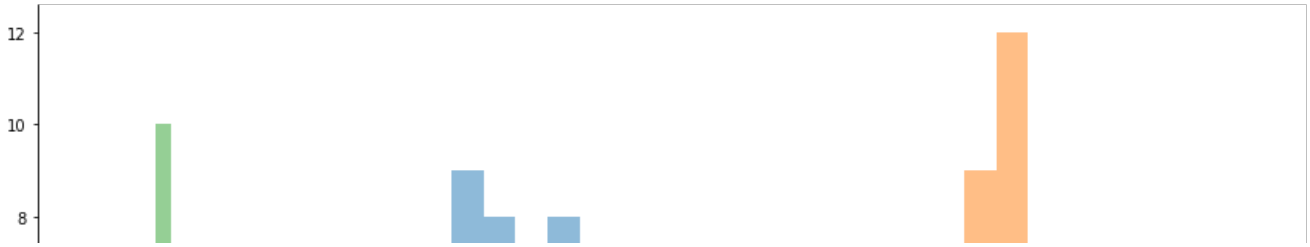
```
/Users/sudeng/anaconda3/lib/python3.7/site-packages/seaborn/regression.py:546: UserWarning: The `size`
paramter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
```

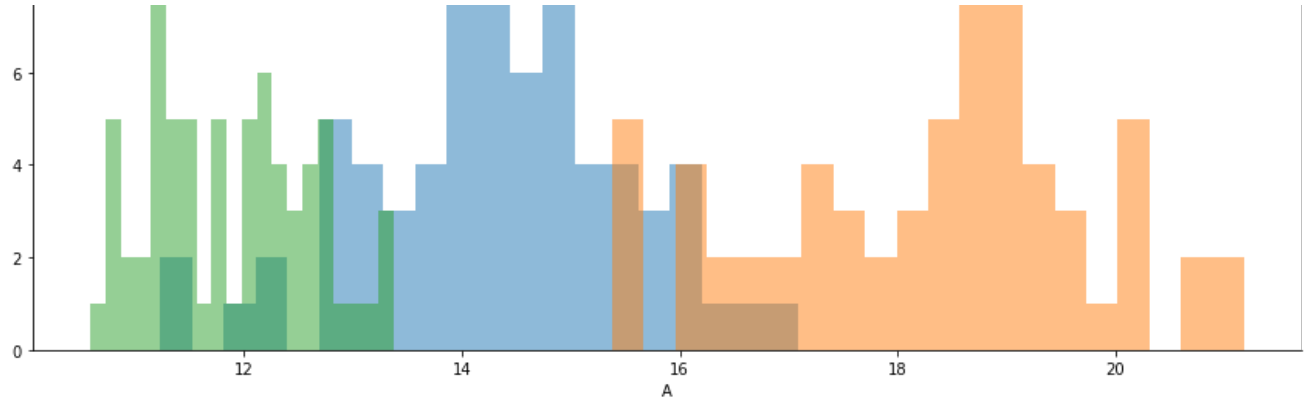


In [17]:

```
g = sns.FacetGrid(data=df, hue='target', size=6, aspect=2)
g = g.map(plt.hist, 'A', bins=20, alpha=0.5);
```

```
/Users/sudeng/anaconda3/lib/python3.7/site-packages/seaborn/axisgrid.py:230: UserWarning: The `size` pa
ramter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
```





In [18]:

```
from sklearn.cluster import KMeans
kmeans = KMeans(n_clusters=3)
```

In [19]:

```
kmeans.fit(df.drop('target', axis=1))
```

Out[19]:

```
KMeans(algorithm='auto', copy_x=True, init='k-means++', max_iter=300,
    n_clusters=3, n_init=10, n_jobs=1, precompute_distances='auto',
    random_state=None, tol=0.0001, verbose=0)
```

In [20]:

```
centers = kmeans.cluster_centers_
centers
```

Out[20]:

```
array([[11.96441558, 13.27480519,  0.8522    ,  5.22928571,  2.87292208,
         4.75974026,  5.08851948],
       [18.72180328, 16.29737705,  0.88508689,  6.20893443,  3.72267213,
         3.60359016,  6.06609836],
       [14.64847222, 14.46041667,  0.87916667,  5.56377778,  3.27790278,
         2.64893333,  5.19231944]])
```

In [21]:

```
df['klabels'] = kmeans.labels_
df.head()
```

Out[21]:

	A	P	C	LK	WK	A_Coef	LKG	target	klabels
0	15.26	14.84	0.8710	5.763	3.312	2.221	5.220	0	2
1	14.88	14.57	0.8811	5.554	3.333	1.018	4.956	0	2
2	14.29	14.09	0.9050	5.291	3.337	2.699	4.825	0	2
3	13.84	13.94	0.8955	5.324	3.379	2.259	4.805	0	2
4	16.14	14.99	0.9034	5.658	3.562	1.355	5.175	0	2

In [28]:

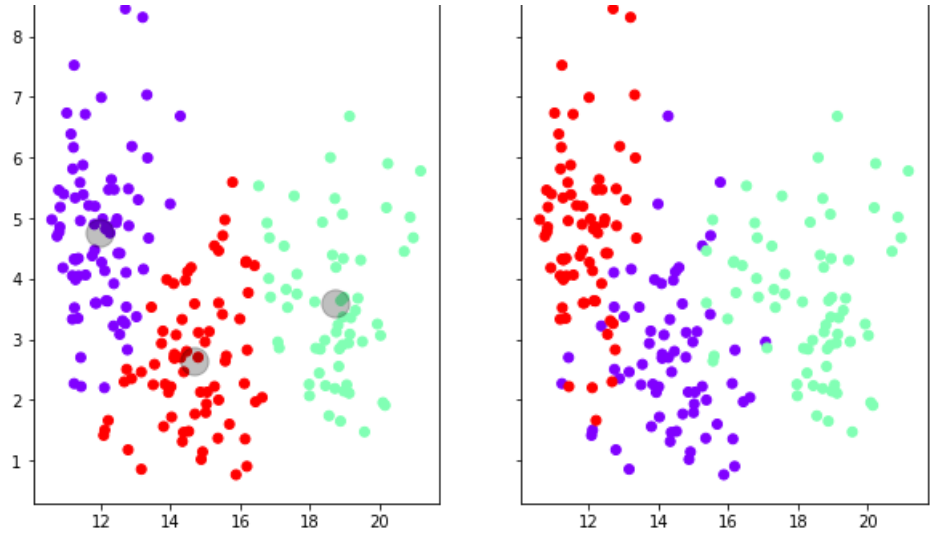
```
f, (ax1, ax2) = plt.subplots(1, 2, sharey=True, figsize=(10, 6))

ax1.scatter(x=df['A'], y=df['A_Coef'], c=df['klabels'], cmap='rainbow')
ax1.set_title('k means (k=3)')
ax1.scatter(x=centers[:, 0], y=centers[:, 5], c='black', s=300, alpha=0.25)

ax2.scatter(x=df['A'], y=df['A_Coef'], c=df['target'], cmap='rainbow');
ax2.set_title('original')
```

Out[28]:

```
Text(0.5,1,'original')
```

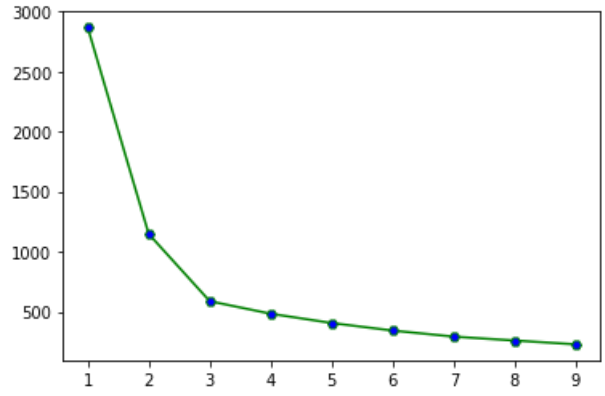


In [30]:

```
sum_dist = {}
for k in range(1, 10):
    k_means = KMeans(n_clusters=k).fit(df.drop('target', axis=1))
    sum_dist[k] = k_means.inertia_
```

In [41]:

```
plt.plot(list(sum_dist.keys()), list(sum_dist.values()), linestyle='-', color='g', marker='H', markerfa
cecolor='b')
plt.show()
```



In [ ]:

```

```