Haberman Dataset EDA

In [2]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np


#load dataset
df = pd.read_csv("haberman.csv")
```

In [3]:
```
df.head(10)
```

Out[3]:

	age	year	nodes	status
0	30	64	1	1
1	30	62	3	1
2	30	65	0	1
3	31	59	2	1
4	31	65	4	1
5	33	58	10	1
6	33	60	0	1
7	34	59	0	2
8	34	66	9	2
9	34	58	30	1

Description of Columns

Age = Patient's age

Year=Operation Year

Nodes=Axillary nodes in breast

Status=1 pointed to the patient who survived 5 years or longer and 2 pointed to the patient died within 5 year

In [5]:
```
print(df.shape)
```
```
(306, 4)
```

306 Datapoints with 4 features

Our Objective is to classify the patient survival status w.r.t Age,Year and Nodes

In [6]:
```
#(Q) What are the column names in our dataset?
print (df.columns)
```
```
Index(['age', 'year', 'nodes', 'status'], dtype='object')
```

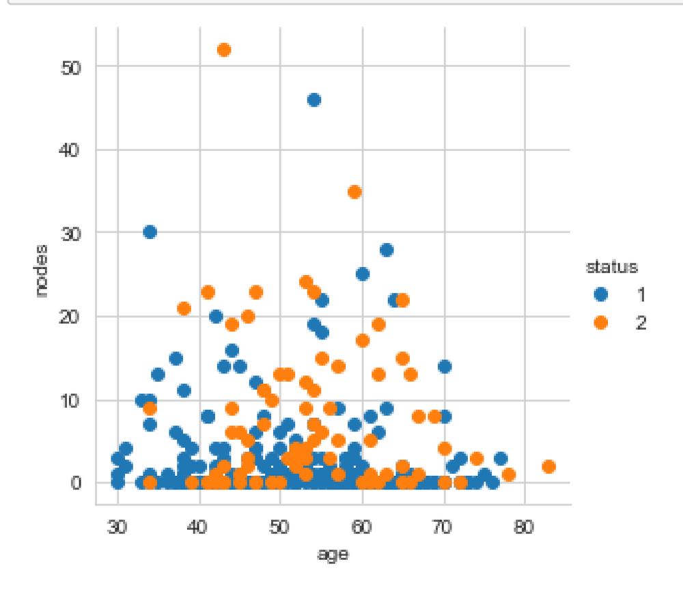
In [7]:
```
#checking data is Balanced or Imbalanced
df["status"].value_counts()
```

Out[7]:
```
1    225
2     81
Name: status, dtype: int64
```

Proportion of 1 ans 2 have a big difference , So it is a *imbalanced* data

Univariate and Bi-variate analysis

In [9]:
```
sns.set_style("whitegrid");
sns.FacetGrid(df, hue="status", height=4) \
   .map(plt.scatter, "age", "nodes") \
   .add_legend();
plt.show();
```



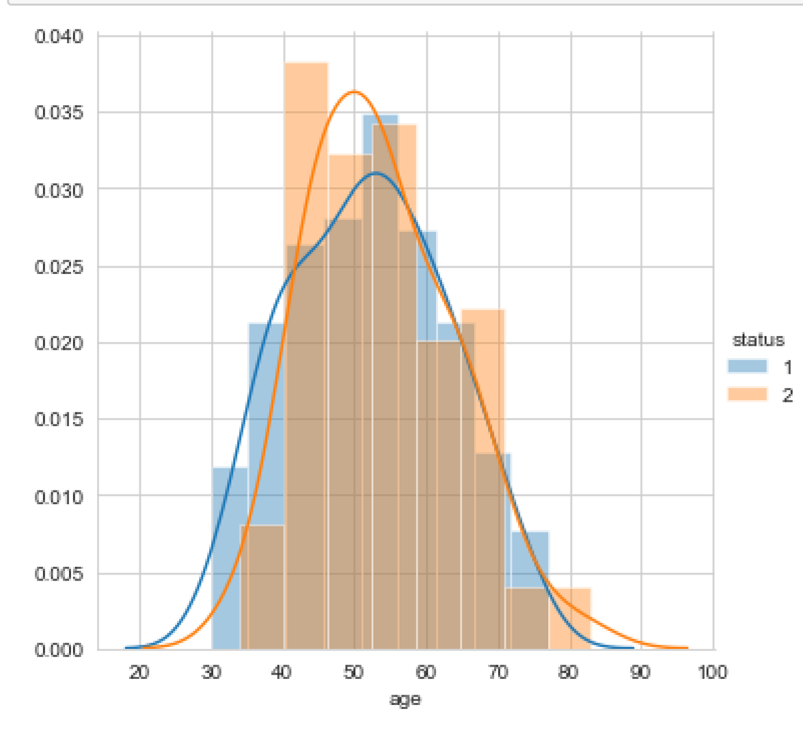
we can't see any separation between patient's age and nodes

Seperating Age from Nodes is much harder as they have considerable overlap. As we know numbers of variables are small , we can use pair plots to check every plot between every variable

In [10]:
```
plt.close();
sns.pairplot(df,hue='status',height=4)
plt.show();
```

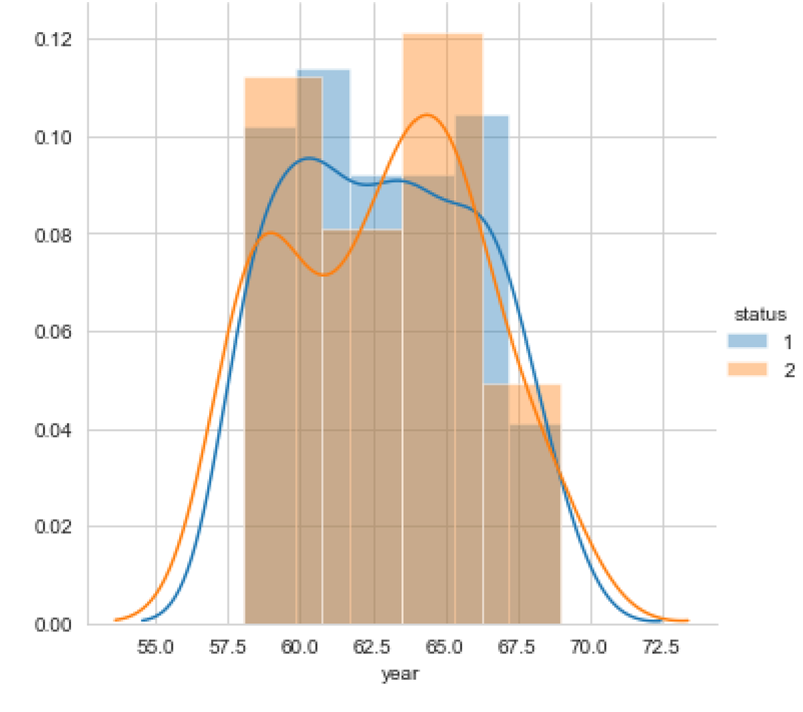
From Pairplot also we can not see much separation between variable and every varibale is overlapping with other

In [11]:
```
#histogram according to Age variable

sns.FacetGrid(df, hue="status", height=5) \
   .map(sns.distplot, "age") \
   .add_legend();
plt.show();
```



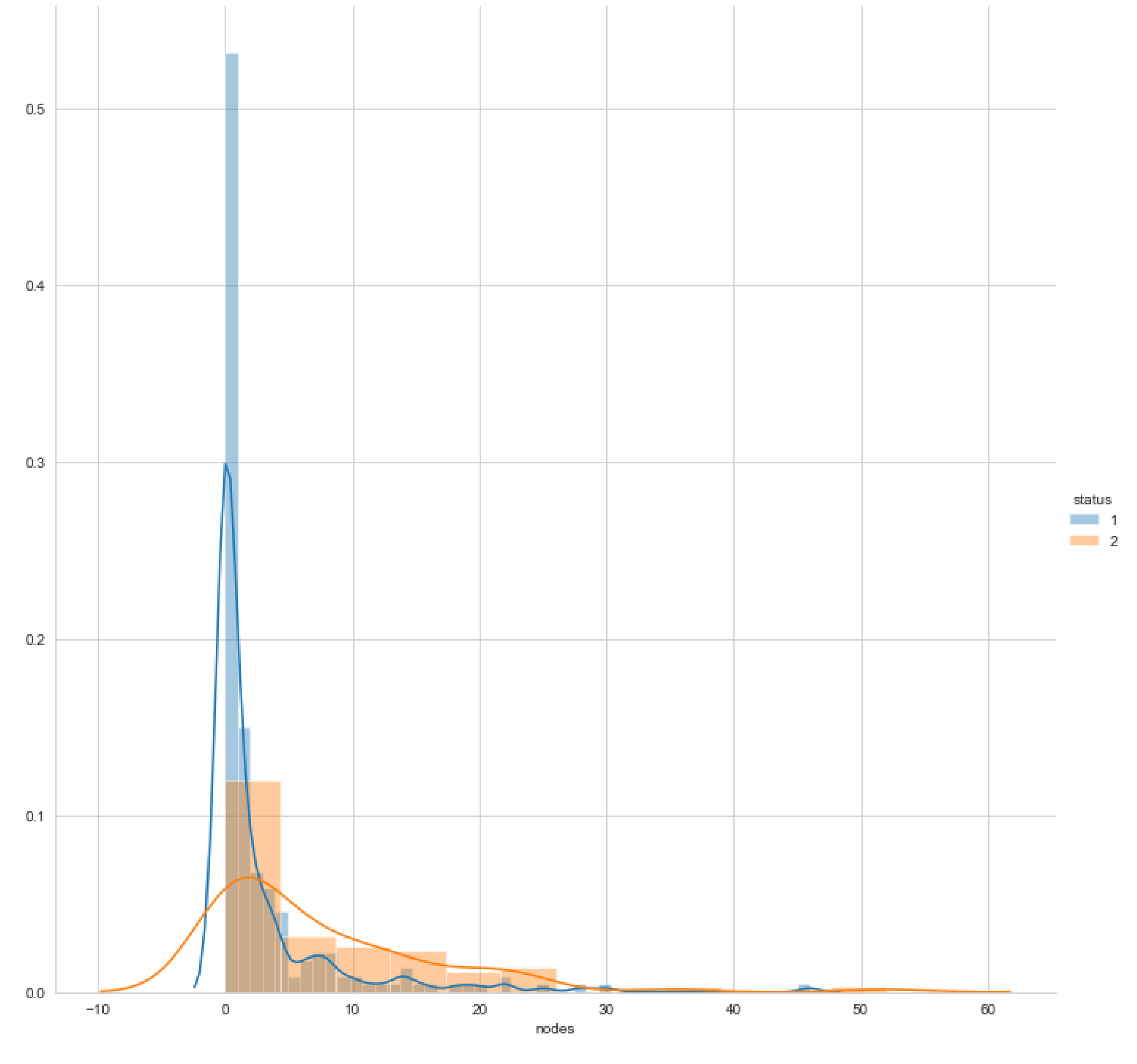
- Age is not good variable for categorization because output of age variable histogram with status is too Dense.

In [12]:
```
#histogram according to year variable

sns.FacetGrid(df, hue="status", height=5) \
   .map(sns.distplot, "year") \
   .add_legend();
plt.show();
```



- Year variable also doesn't explain too much same as age variable

In [13]:
```
#histogram according to nodes

sns.FacetGrid(df, hue="status", height=10) \
   .map(sns.distplot, "nodes") \
   .add_legend();
plt.show();
```

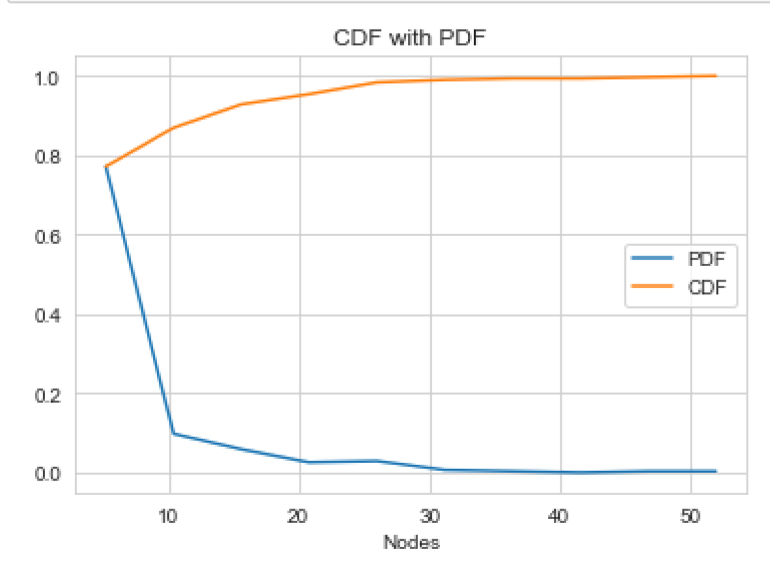


Data is overlaped here also but we can see some changes here if we compare it to our previous variables

- Percentage of survival is high if number of nodes is less than 5 (we can see blue bar peek percentage is high till 5 nodes)

CDF

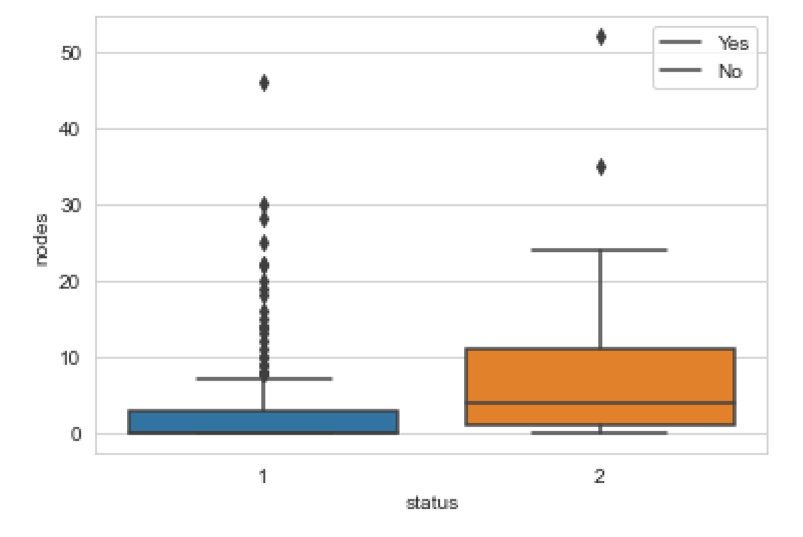
In [14]:
```
counts, bin_edges = np.histogram(df['nodes'], bins=10, density = True)
pdf = counts/(sum(counts))

cdf = np.cumsum(pdf)
plt.plot(bin_edges[1:],pdf, label='pdf');
plt.plot(bin_edges[1:], cdf, label='cdf')
plt.title('CDF with PDF')
plt.xlabel('Nodes')
plt.gca().legend(('PDF','CDF'));
plt.show();
```



Blue line is PDF and Red is CDF

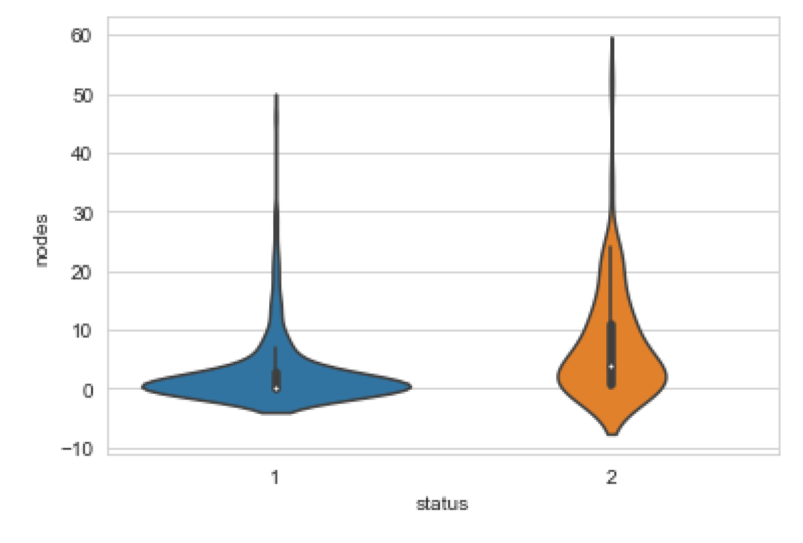
Here we can see that patient has high chance of surviving if patient has less than 5 nodes , After 5 nodes surviving rate starts to decreasing

In [19]:
```
sns.boxplot(x='status',y='nodes', data=df)
plt.gca().legend(('Yes','No'))

plt.show()
```



In above Plot left whisker plot is for Pateint who survived more than 5 year after operation and has nodes less than 5 which we've also seen in histogram (CDF and PDF)

In [20]:
```
sns.violinplot(x="status", y="nodes", data=df, size=8)
plt.show()
```



Violin plot shows same conclusion as above

- we started our exploration of Haberman dataset with pairplots because number of variable were small,But couldn't see much spread and continued to Histograms
- In hisogram of every variable with 'Status' variable , Age and Year has too much overlapping But Nodes shows some different results of patient's Survival
- Then we used Boxplot for verification of Nodes histogram

CONCLUSION

- Among all variables 'nodes' variable is most useful
- Patients who have nodes more than 5 have high chance of death within 5 year of operation

Refrences :https://colab.research.google.com/drive/1Xgf90yMimLEt1eepb6yQp9fTE1ery_y0#scrollTo=g0mtgBgD7eVa

Towardsdatascience.com