In [5]:
```
cd "D:\AppliedAI\"
```

```
D:\AppliedAI
```

Importing packages

In [6]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings

warnings.filterwarnings('ignore')
```

loading the dataset and peeking into it

Haberman's Survival : Exploratory Data Analysis Haberman's Cancer survival :EDA

Haberman's survival dataset contains cases from a study that was conducted between 1958 and 1970 at the University of Chicago's Billings Hospital on the survival of patients who had undergone surgery for breast cancer.

Attribute Information: Age of patient at the time of operation (numerical)
Patient's year of operation (year - 1900, numerical)
Number of positive axillary nodes detected (numerical)
Survival status (class attribute) 1 = the patient survived 5 years or longer 2 = the patient died within 5 years

Goal is to find the chances of survival for more than 5 years after treatment

Age group, gender,etc. which are likely to die early after treatment

Typesetting math: 0%

In [7]:
```
data = pd.read_csv("haberman.csv")                    # Uploading .csv file
data.head()
```

Out[7]:

	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

In [8]:
```
data.info()                                           # checking for number of
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 306 entries, 0 to 305
Data columns (total 4 columns):
age       306 non-null int64
year      306 non-null int64
nodes     306 non-null int64
status    306 non-null int64
dtypes: int64(4)
memory usage: 9.7 KB
```

In [9]:
```
data.columns
```

Out[9]:
```
Index(['age', 'year', 'nodes', 'status'], dtype='object')
```

In [10]:
```
data.values
```

Out[10]:
```
array([[30, 64,  1,  1],
       [30, 62,  3,  1],
       [30, 65,  0,  1],
       ...,
       [77, 65,  3,  1],
       [78, 65,  1,  2],
       [83, 58,  2,  2]], dtype=int64)
```

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In [11]:
```
data.describe()                                              # basic stats
```

Out[11]:

	age	year	nodes	status
count	306.000000	306.000000	306.000000	306.000000
mean	52.457516	62.852941	4.026144	1.264706
std	10.803452	3.249405	7.189654	0.441899
min	30.000000	58.000000	0.000000	1.000000
25%	44.000000	60.000000	0.000000	1.000000
50%	52.000000	63.000000	1.000000	1.000000
75%	60.750000	65.750000	4.000000	2.000000
max	83.000000	69.000000	52.000000	2.000000

Observations
median age of patients is 52 years
75% of the patients have nodes <=4.

peeking into number of years survived

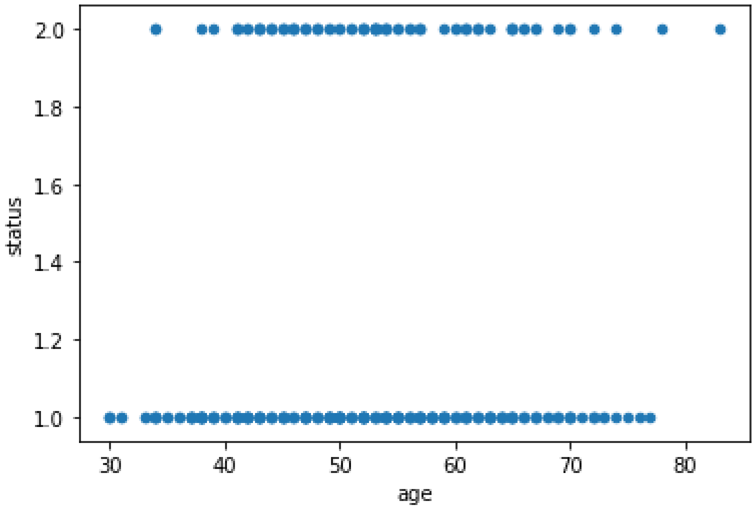
In [12]:
```
x = data["status"]                                    # total number of survivors
y = data[data["status"]==2]["status"]                 # total number of survivors wh

print("total number of survivors are {}".format(len(x)))
print("total number of surviors died within 5 years of operation are {}".format(l
print("the percentage of people who live for more than 5 years is {}".format((30
```

```
total number of survivors are 306
total number of surviors died within 5 years of operation are 81
the percentage of people who live for more than 5 years is 0.7352941176470589
```

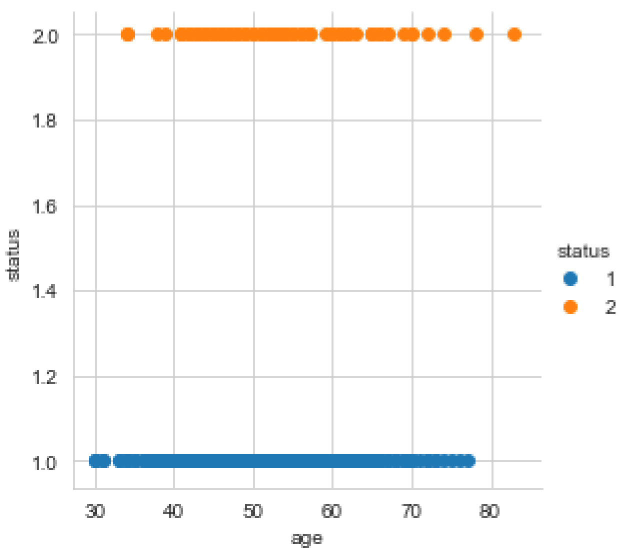
2D plots

Typesetting math: 0%

In [13]:
```
data.plot(kind='scatter', x='age', y='status') ;
plt.show()
```



In [14]:
```
sns.set_style("whitegrid");
sns.FacetGrid(data, hue="status", size=4) \
   .map(plt.scatter, "age", "status") \
   .add_legend();
plt.show();
```




```
<p style = "background : pink">
Obersvations : <br>
1. On a positive note, we can say, survivors whose age is below 40 are likely
to survive for more than 5 years <br>
<br>
let us calulate the percentage of patients who can survive for more than 5
years having age<40
```

Typesetting math: 0%

In [27]:
```
a=data[(data["status"]==1) & (data["age"]<=40)]["status"].sum()         # finding
b=data[(data["status"]==2) & (data["age"]<=40)]["status"].sum()         # finding
print(a)
print(b)
print(a/(a+b))                                                          # calcul
```

```
39
8
0.8297872340425532
```

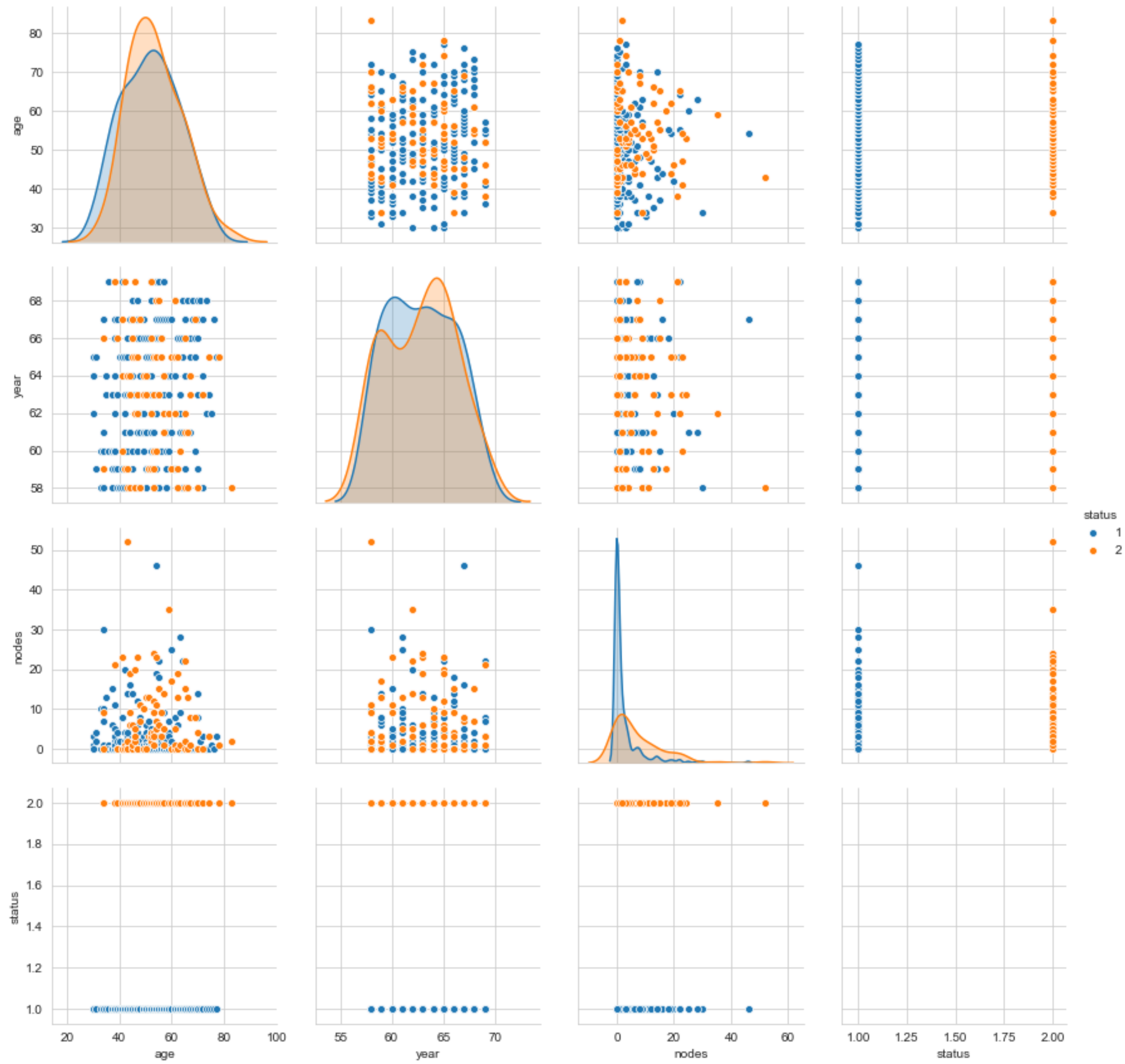
Pair Plots

Typesetting math: 0%

In [28]:
```
sns.set_style("whitegrid");                                    # alltogether without 'hue
sns.pairplot(data, size=3);
plt.show()
```

Typesetting math: 0%

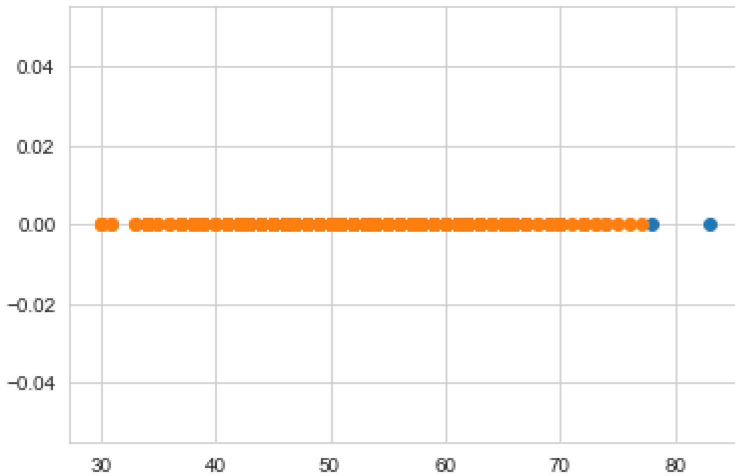
In [29]:
```
sns.set_style("whitegrid");                                    # with 'hue on sta
sns.pairplot(data, hue = "status", size=3);
plt.show()
```



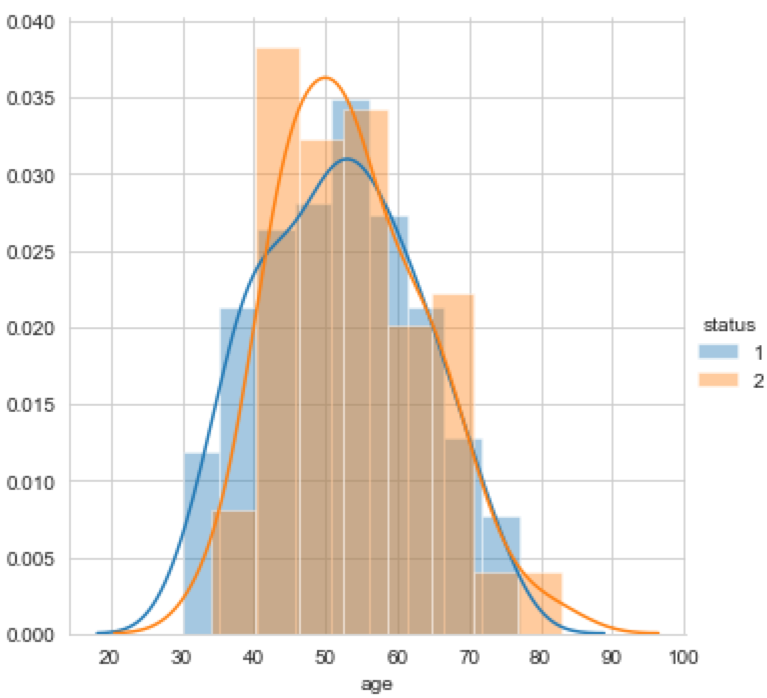
Typesetting math: 0%

Histogram

In [30]:
```
data_below5years = data.loc[data["status"] == 2];
data_above5years = data.loc[data["status"] == 1];
#print(iris_setosa["petal_length"])
plt.plot(data_below5years["age"], np.zeros_like(data_below5years["age"]), 'o')
plt.plot(data_above5years["age"], np.zeros_like(data_above5years["age"]), 'o')
plt.show()
```

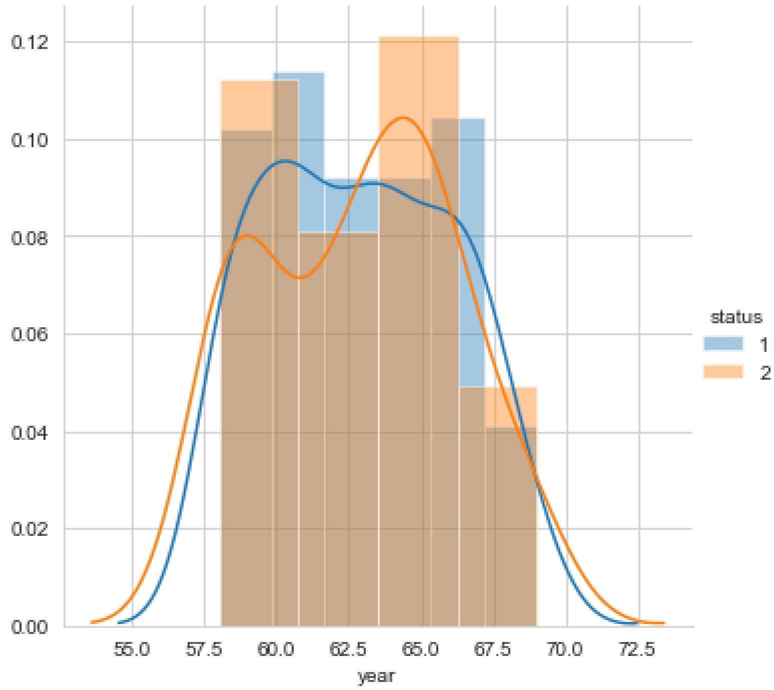


In [31]:
```
sns.FacetGrid(data, hue="status", size=5) \
   .map(sns.distplot, "age") \
   .add_legend();
plt.show();
```



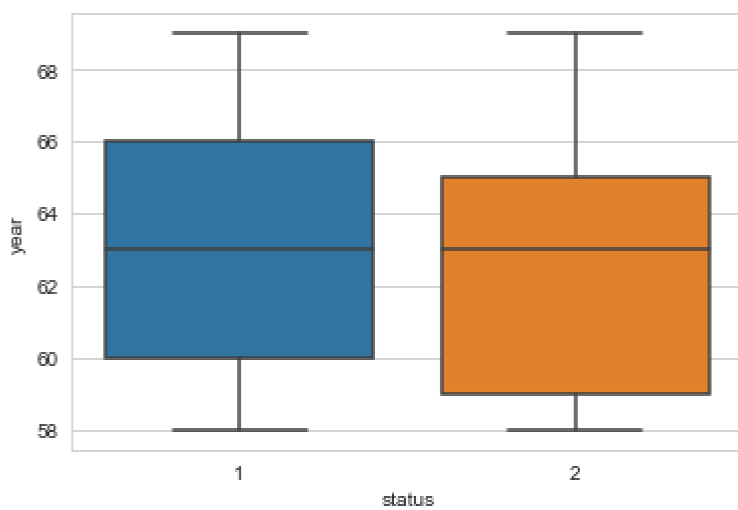
Typesetting math: 0%

In [32]:
```
sns.FacetGrid(data, hue="status", size=5) \
   .map(sns.distplot, "year") \
   .add_legend();
plt.show();
```



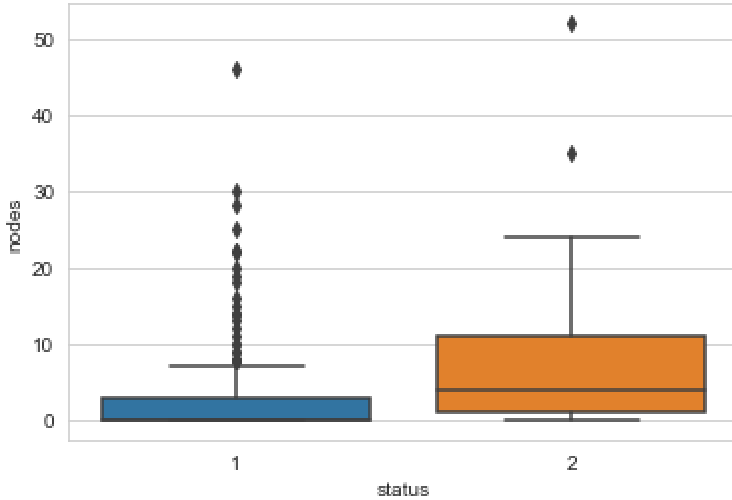
Box plot and Whiskers

In [33]:
```
sns.boxplot(x='status',y='year', data=data)
plt.show()
```

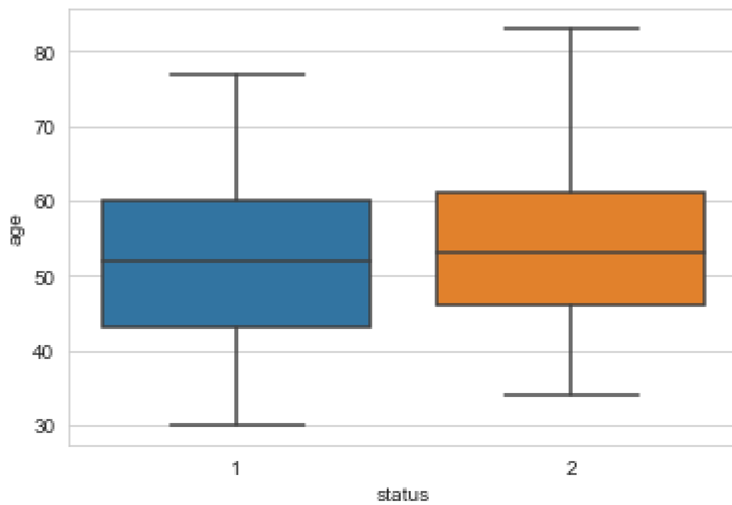


Typesetting math: 0%

In [34]:
```
sns.boxplot(x='status',y='nodes', data=data)
plt.show()
```

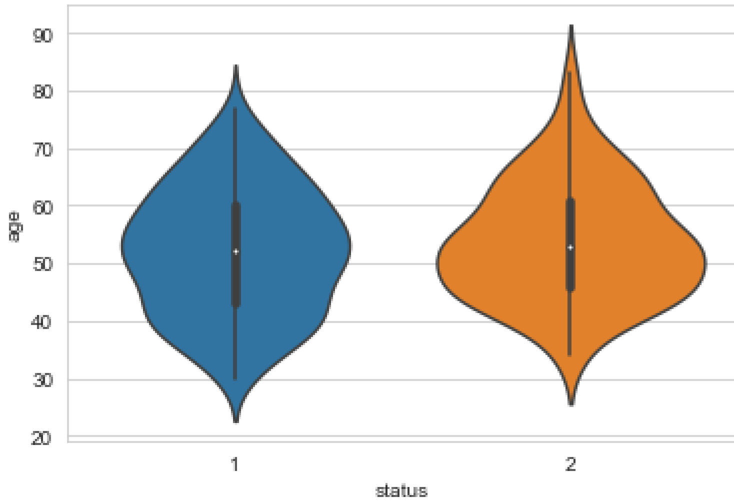


In [35]:
```
sns.boxplot(x='status',y='age', data=data)
plt.show()
```



Typesetting math: 0%

In [36]:
```
sns.violinplot(x="status", y="age", data=data, size=8)
plt.show()
```



Take away points

median age of patients is 52 years
- 75% of the patients have nodes <=4.
- total number of survivors are 306
- total number of surviors died within 5 years of operation are 81
- the percentage of people who live for more than 5 years is 0.7352941176470589
- On a positive note, we can say, survivors whose age is below 40 are likely to survive for more than 5 years

Typesetting math: 0%