In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [2]:
```
# The Iris Setosa
from IPython.display import Image
url = 'http://upload.wikimedia.org/wikipedia/commons/5/56/Kosaciec_szczecinkowaty_Iris_setosa.jpg'
Image(url,width=300, height=300)
```

Out[2]:

In [3]:
```
# The Iris Versicolor
from IPython.display import Image
url = 'http://upload.wikimedia.org/wikipedia/commons/4/41/Iris_versicolor_3.jpg'
Image(url,width=300, height=300)
```

Out[3]:

In [4]:
```
# The Iris Virginica
from IPython.display import Image
url = 'http://upload.wikimedia.org/wikipedia/commons/9/9f/Iris_virginica.jpg'
Image(url,width=300, height=300)
```

Out[4]:

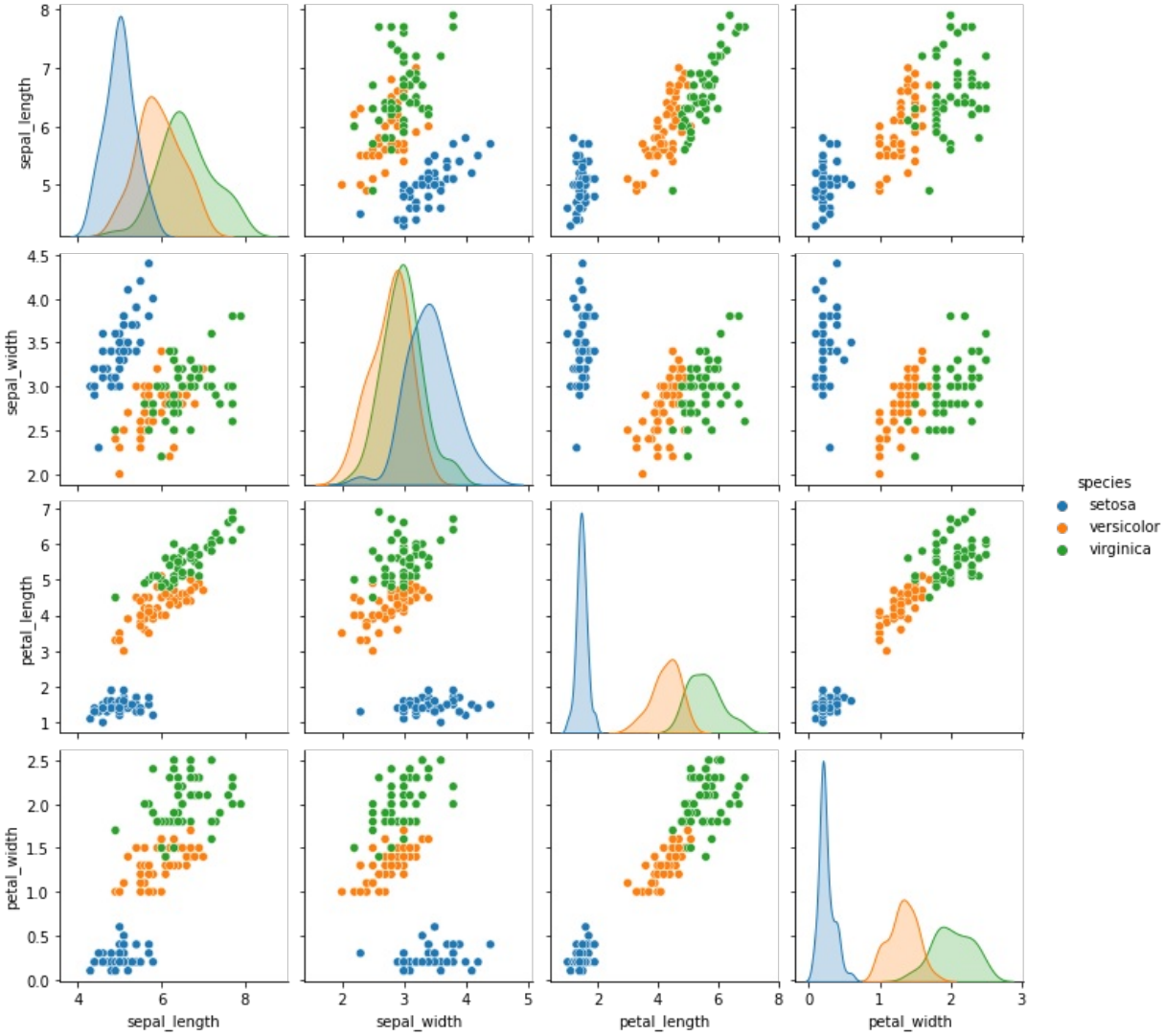
In [5]:
```
iris = sns.load_dataset('iris')
iris.head()
```

Out[5]:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

In [6]:
```
sns.pairplot(data=iris,hue="species")
```

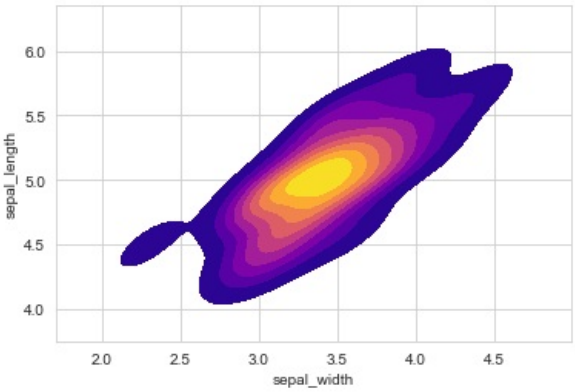
Out[6]:
```
<seaborn.axisgrid.PairGrid at 0x1ae240c4c10>
```



In [7]:
```
sns.set_style("whitegrid")
setosa=iris[iris["species"]=="setosa"]

sns.kdeplot(x=setosa["sepal_width"],y=setosa["sepal_length"],cmap="plasma",shade=True)
```

Out[7]:
```
<AxesSubplot:xlabel='sepal_width', ylabel='sepal_length'>
```



In [8]:
```
from sklearn.model_selection import train_test_split
```

In [9]:
```
X= iris.drop("species",axis=1)
```

```
y= iris["species"]

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.33, random_state=42)
```

In [10]:
```
from sklearn.svm import SVC
```

In [11]:
```
svm= SVC()
```

In [12]:
```
svm.fit(X_train,y_train)
```

Out[12]:
```
SVC()
```

In [13]:
```
from sklearn.metrics import classification_report, confusion_matrix
```

In [14]:
```
predictions=svm.predict(X_test)
```

In [15]:
```
print(classification_report(y_test,predictions))
```

```
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        15
   virginica       1.00      1.00      1.00        16

    accuracy                           1.00        50
   macro avg       1.00      1.00      1.00        50
weighted avg       1.00      1.00      1.00        50
```

In [16]:
```
print(confusion_matrix(y_test,predictions))
```

```
[[19  0  0]
 [ 0 15  0]
 [ 0  0 16]]
```

In [17]:
```
from sklearn.model_selection import GridSearchCV
```

In [18]:
```
pram_grid={'C':[0.1,1,10,100,1000],"gamma":[0.1,1,0.01,0.001,0.0001]}
```

In [19]:
```
grid=GridSearchCV(SVC(),pram_grid,verbose=2)
grid.fit(X_train,y_train)
```

```
Fitting 5 folds for each of 25 candidates, totalling 125 fits
[CV] END ..................................C=0.1, gamma=0.1; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.1; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.1; total time=   0.0s
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[CV] END .................................C=0.1, gamma=0.01; total time=   0.0s
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[CV] END ...................................C=1, gamma=0.01; total time=   0.0s
[CV] END ...................................C=1, gamma=0.01; total time=   0.0s
[CV] END ..................................C=1, gamma=0.001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.001; total time=   0.0s
```

```
[CV] END ................................C=1, gamma=0.001; total time=   0.0s
[CV] END ................................C=1, gamma=0.001; total time=   0.0s
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[CV] END ...................................C=10, gamma=1; total time=   0.0s
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[CV] END ...................................C=10, gamma=1; total time=   0.0s
[CV] END ................................C=10, gamma=0.01; total time=   0.0s
[CV] END ................................C=10, gamma=0.01; total time=   0.0s
[CV] END ................................C=10, gamma=0.01; total time=   0.0s
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[CV] END ................................C=10, gamma=0.01; total time=   0.0s
[CV] END ...............................C=10, gamma=0.001; total time=   0.0s
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[CV] END ................................C=100, gamma=0.1; total time=   0.0s
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[CV] END ..............................C=1000, gamma=0.01; total time=   0.0s
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[CV] END .............................C=1000, gamma=0.001; total time=   0.0s
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[CV] END ............................C=1000, gamma=0.0001; total time=   0.0s
[CV] END ............................C=1000, gamma=0.0001; total time=   0.0s
[CV] END ............................C=1000, gamma=0.0001; total time=   0.0s
```

Out[19]:

```
GridSearchCV(estimator=SVC(),
             param_grid={'C': [0.1, 1, 10, 100, 1000],
                         'gamma': [0.1, 1, 0.01, 0.001, 0.0001]},
             verbose=2)
```

In [20]:

```
grid_predictions=grid.predict(X_test)
```

In [21]:
```
print(classification_report(y_test,grid_predictions))
```

```
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        15
   virginica       1.00      1.00      1.00        16

    accuracy                           1.00        50
   macro avg       1.00      1.00      1.00        50
weighted avg       1.00      1.00      1.00        50
```

In [22]:
```
print(confusion_matrix(y_test,grid_predictions))
```

```
[[19  0  0]
 [ 0 15  0]
 [ 0  0 16]]
```

In [23]:
```
grid.best_params_
```

Out[23]:
```
{'C': 100, 'gamma': 0.01}
```

In [24]:
```
grid.best_estimator_
```

Out[24]:
```
SVC(C=100, gamma=0.01)
```