ASSIGNMENT 7 ¶

Kernel Ridge Regression and Regular Ridge Regression

In [74]:

```
#importing the libraries

%matplotlib inline
import numpy as np
import pandas as pd
from pandas import Series, DataFrame
import matplotlib.pyplot as plt


# import test and train file

train = pd.read_csv('data.csv')
train.head()
```

Out[74]:

	Blue	Green	Red	Class
0	74	85	123	1
1	73	84	122	1
2	72	83	121	1
3	70	81	119	1
4	70	81	119	1

In [75]:

```
# importing ridge regression from sklearn

from sklearn.linear_model import Ridge

# splitting into training and cv for cross validation

from sklearn.model_selection import train_test_split
x = train.iloc[:,0:2]
y=train.iloc[:,3].values
x_train, x_cv, y_train, y_cv = train_test_split(x,train.Class)
```

In [76]:

```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
x_train=sc.fit_transform(x_train)
x_cv=sc.fit_transform(x_cv)
```

In [77]:

```
# training the model

ridgeReg = Ridge(alpha=0.5, normalize=True)
ridgeReg.fit(x_train,y_train)
pred = ridgeReg.predict(x_cv)
```

In [78]:

```
mse = np.mean((pred - y_cv)**2)
mse
```

Out[78]:

```
0.22913613068521518
```

In [79]:

```
from sklearn.metrics import r2_score
r2_score(y_cv, pred)
```

Out[79]:

```
0.083196718701027184
```

In [80]:

```
# importing kernel_ridge regression from sklearn

from sklearn.kernel_ridge import KernelRidge

# training the model

kridgeReg = KernelRidge(alpha=0.5)
kridgeReg.fit(x_train,y_train)
pred1 = kridgeReg.predict(x_cv)
```

In [81]:

```
mse1 = np.mean((pred1 - y_cv)**2)
mse1
```

Out[81]:

```
2.394971480384792
```

From the mean square errors of Regular Ridge and Kernel Ridge Regression, we observe that Regular Ridge Regression is more suited for our dataset.

Comparison between linear, polynomial, and RBF kernels in SVM

In [82]:

```
# Support Vector Machine (SVM)

# Importing the libraries
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

In [83]:

```
# Importing the dataset
dataset = pd.read_csv('data.csv')
X = dataset.iloc[:,0:2].values
y = dataset.iloc[:,3].values
```

In [84]:

```
dataset.head()
```

Out[84]:

	Blue	Green	Red	Class
0	74	85	123	1
1	73	84	122	1
2	72	83	121	1
3	70	81	119	1
4	70	81	119	1

In [85]:

```
# Splitting the dataset into the Training set and Test set
from sklearn.cross_validation import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.20, random_stat
e = 0)
```

In [86]:

```
# Feature Scaling
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)
```

```
C:\Users\ddalv\Anaconda3\lib\site-packages\sklearn\utils\validation.py:47
5: DataConversionWarning: Data with input dtype int64 was converted to flo
at64 by StandardScaler.
  warnings.warn(msg, DataConversionWarning)
```

In [87]:

```
# Fitting SVM to the Training set
from sklearn.svm import SVC
classifier = SVC(kernel = 'linear', random_state = 0)
classifier.fit(X_train, y_train)
```

Out[87]:

```
SVC(C=1.0, cache_size=200, class_weight=None, coef0=0.0,
  decision_function_shape='ovr', degree=3, gamma='auto', kernel='linear',
  max_iter=-1, probability=False, random_state=0, shrinking=True,
  tol=0.001, verbose=False)
```

In [88]:

```
# Predicting the Test set results
y_pred = classifier.predict(X_test)
```

In [89]:

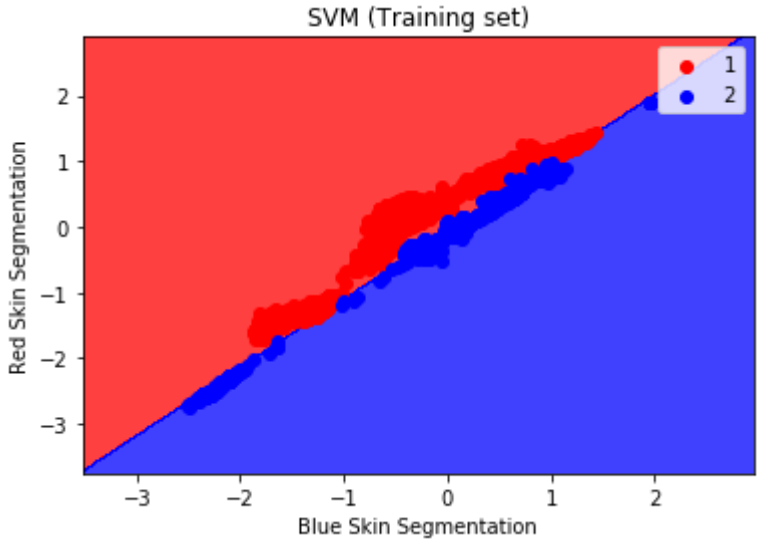
```
# Making the Confusion Matrix
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
cm
```

Out[89]:

```
array([[ 984,    3],
       [  11, 1002]], dtype=int64)
```

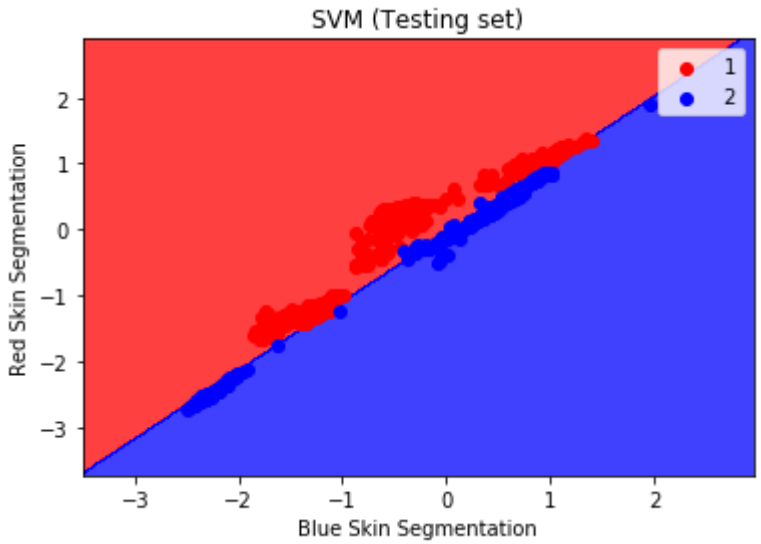
In [90]:

```
# Visualising the Training set results
from matplotlib.colors import ListedColormap
X_set, y_set = X_train, y_train
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0].max()
+ 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1].max()
+ 1, step = 0.01))
plt.contourf(X1, X2, classifier.predict(np.array([X1.ravel(), X2.ravel()]).T).reshape(X
1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'blue')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'blue'))(i), label = j)
plt.title('SVM (Training set)')
plt.xlabel('Blue Skin Segmentation')
plt.ylabel('Red Skin Segmentation')
plt.legend()
plt.show()
```



In [91]:

```
# Visualising the Testing set results
from matplotlib.colors import ListedColormap
X_set, y_set = X_test, y_test
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0].max()
+ 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1].max()
+ 1, step = 0.01))
plt.contourf(X1, X2, classifier.predict(np.array([X1.ravel(), X2.ravel()]).T).reshape(X
1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'blue')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'blue'))(i), label = j)
plt.title('SVM (Testing set)')
plt.xlabel('Blue Skin Segmentation')
plt.ylabel('Red Skin Segmentation')
plt.legend()
plt.show()
```



In [92]:

```
# Fitting SVM to the Training set
from sklearn.svm import SVC
classifier1 = SVC(kernel = 'rbf', random_state = 0)
classifier1.fit(X_train, y_train)
```

Out[92]:

```
SVC(C=1.0, cache_size=200, class_weight=None, coef0=0.0,
  decision_function_shape='ovr', degree=3, gamma='auto', kernel='rbf',
  max_iter=-1, probability=False, random_state=0, shrinking=True,
  tol=0.001, verbose=False)
```

In [93]:

```
# Predicting the Test set results
y_pred1 = classifier1.predict(X_test)
```

In [94]:

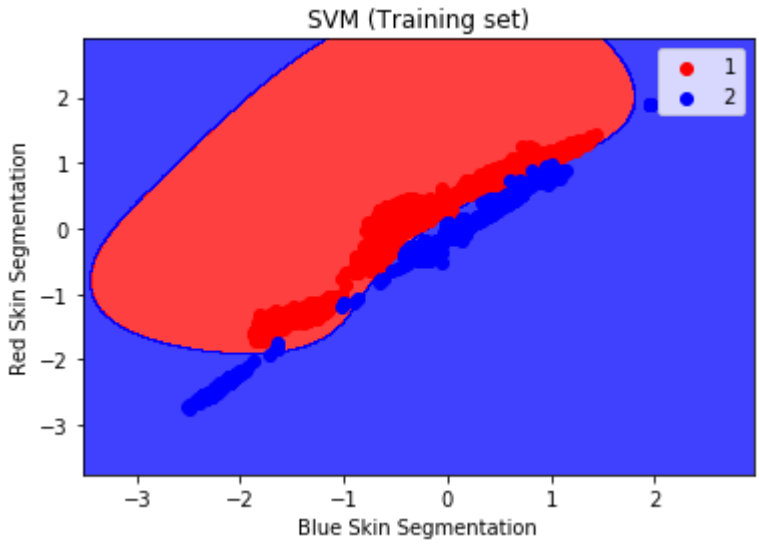
```
# Making the Confusion Matrix
from sklearn.metrics import confusion_matrix
cm1 = confusion_matrix(y_test, y_pred1)
cm1
```

Out[94]:

```
array([[ 986,    1],
       [   2, 1011]], dtype=int64)
```

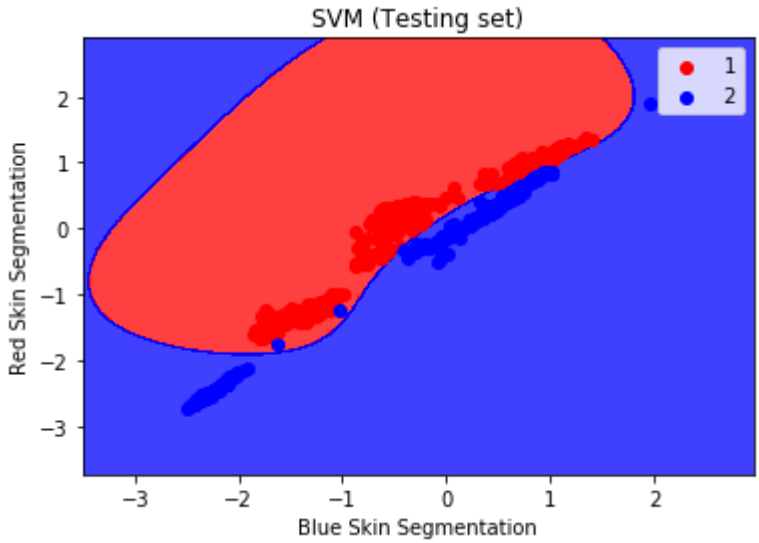
In [95]:

```
# Visualising the Training set results
from matplotlib.colors import ListedColormap
X_set, y_set = X_train, y_train
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0].max()
+ 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1].max()
+ 1, step = 0.01))
plt.contourf(X1, X2, classifier1.predict(np.array([X1.ravel(), X2.ravel()]).T).reshape(
X1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'blue')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'blue'))(i), label = j)
plt.title('SVM (Training set)')
plt.xlabel('Blue Skin Segmentation')
plt.ylabel('Red Skin Segmentation')
plt.legend()
plt.show()
```



In [96]:

```
# Visualising the Testing set results
from matplotlib.colors import ListedColormap
X_set, y_set = X_test, y_test
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0].max()
+ 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1].max()
+ 1, step = 0.01))
plt.contourf(X1, X2, classifier1.predict(np.array([X1.ravel(), X2.ravel()]).T).reshape(
X1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'blue')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'blue'))(i), label = j)
plt.title('SVM (Testing set)')
plt.xlabel('Blue Skin Segmentation')
plt.ylabel('Red Skin Segmentation')
plt.legend()
plt.show()
```



In [97]:

```
# Fitting SVM to the Training set
from sklearn.svm import SVC
classifier2 = SVC(kernel = 'poly', degree = 3, random_state = 0, coef0=0.1)
classifier2.fit(X_train, y_train)
```

Out[97]:

```
SVC(C=1.0, cache_size=200, class_weight=None, coef0=0.1,
  decision_function_shape='ovr', degree=3, gamma='auto', kernel='poly',
  max_iter=-1, probability=False, random_state=0, shrinking=True,
  tol=0.001, verbose=False)
```

In [98]:

```
# Predicting the Test set results
y_pred2 = classifier2.predict(X_test)
```

In [99]:

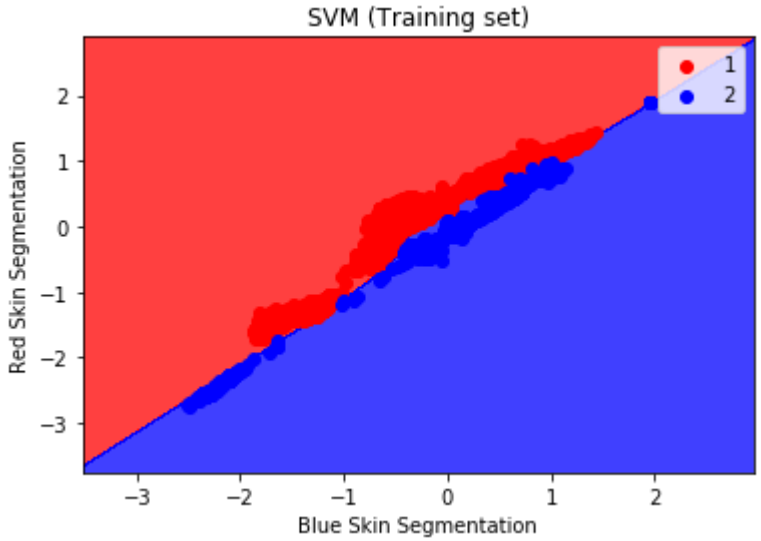
```
# Making the Confusion Matrix
from sklearn.metrics import confusion_matrix
cm2 = confusion_matrix(y_test, y_pred)
cm2
```

Out[99]:

```
array([[ 984,    3],
       [  11, 1002]], dtype=int64)
```

In [100]:

```
# Visualising the Training set results
from matplotlib.colors import ListedColormap
X_set, y_set = X_train, y_train
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0].max()
+ 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1].max()
+ 1, step = 0.01))
plt.contourf(X1, X2, classifier2.predict(np.array([X1.ravel(), X2.ravel()]).T).reshape(
X1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'blue')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'blue'))(i), label = j)
plt.title('SVM (Training set)')
plt.xlabel('Blue Skin Segmentation')
plt.ylabel('Red Skin Segmentation')
plt.legend()
plt.show()
```



In [101]:

```
# Visualising the Testing set results
from matplotlib.colors import ListedColormap
X_set, y_set = X_test, y_test
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0].max
() + 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1].max
() + 1, step = 0.01))
plt.contourf(X1, X2, classifier2.predict(np.array([X1.ravel(), X2.ravel()]).T).reshap
e(X1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'blue')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'blue'))(i), label = j)
plt.title('SVM (Testing set)')
plt.xlabel('Blue Skin Segmentation')
plt.ylabel('Red Skin Segmentation')
plt.legend()
plt.show()
```