

SVM_Analysis

Machine Learning-Spring 2015 (Choong-Wan Woo)

1. Use the scikit implementation of SVMs to train a classifier to distinguish 3's from 8's.

Done. See <https://github.com/wanirepo/ml-hw/blob/master/svm/svm2.py>

2. Try at least five values of the regularization parameter C and at least two kernels.

As you can see below, I ran SVMs with a linear kernel with five different C values (C=1,3,5,10,20) and with a polynomial kernel (degree = 2) with the same C values. Interestingly, with the linear kernel, accuracy decreases as C increases, but with the polynomial kernel, accuracy increases as C increases.

```
In [21]: run svm2.py --C=1 --kernel='linear'
C: 1.0, kernel: linear
accuracy = 96.81% *****
```

```
In [22]: run svm2.py --C=3 --kernel='linear'
C: 3.0, kernel: linear
accuracy = 96.67% *****
```

```
In [25]: run svm2.py --C=5 --kernel='linear'
C: 5.0, kernel: linear
accuracy = 96.47% *****
```

```
In [26]: run svm2.py --C=10 --kernel='linear'
C: 10.0, kernel: linear
accuracy = 96.37% *****
```

```
In [27]: run svm2.py --C=20 --kernel='linear'
C: 20.0, kernel: linear
accuracy = 96.08% *****
```

```
In [28]: run svm2.py --C=1 --kernel='poly' --degree=2
C: 1.0, kernel: poly, degree: 2, gamma: 0.0, coef0: 0.0
accuracy = 95.68% *****
```

```
In [29]: run svm2.py --C=3 --kernel='poly' --degree=2  
C: 3.0, kernel: poly, degree: 2, gamma: 0.0, coef0: 0.0  
accuracy = 97.11% *****
```

```
In [30]: run svm2.py --C=5 --kernel='poly' --degree=2  
C: 5.0, kernel: poly, degree: 2, gamma: 0.0, coef0: 0.0  
accuracy = 97.50% *****
```

```
In [31]: run svm2.py --C=10 --kernel='poly' --degree=2  
C: 10.0, kernel: poly, degree: 2, gamma: 0.0, coef0: 0.0  
accuracy = 97.89% *****
```

```
In [32]: run svm2.py --C=20 --kernel='poly' --degree=2  
C: 20.0, kernel: poly, degree: 2, gamma: 0.0, coef0: 0.0  
accuracy = 98.23% *****
```

3. Give examples of support vectors with a linear kernel.

Here, I'm providing two examples for each class.

```
In [1]: %matplotlib inline
```

```
In [3]: run svm2.py --C=1 --kernel='linear' --sv_examples=True
```

C: 1.0, kernel: linear

accuracy = 96.81% *****

