In [22]:

```python
%matplotlib inline
import warnings
from keras.models import Sequential
from keras.layers import Dense, Activation, Convolution2D, Flatten, Dropout, Max
Pooling2D
from keras.optimizers import SGD
import utils
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from keras.utils.np_utils import to_categorical
from keras import backend as K
```

In [23]:

```python
num_classes = 10
train = np.genfromtxt('/Users/krishna/MIRI/MVA/ZIP data/zip_train.dat')
test = np.genfromtxt('/Users/krishna/MIRI/MVA/ZIP data/zip_test.dat')
```
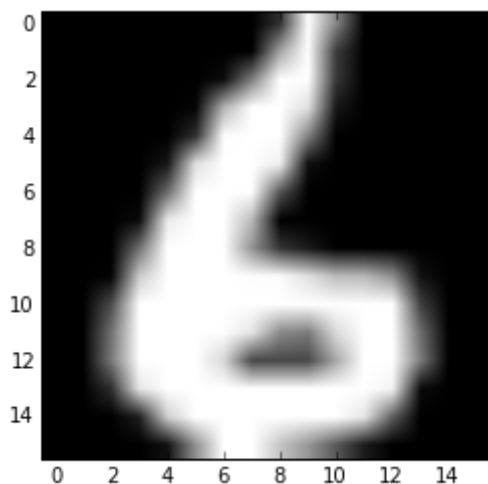
In [24]:

```python
X = train[:,1:]
Y = train[:,0]
Y = to_categorical(Y)
```

In [25]:

```python
IMG_INDEX = 19
X_test = test[:,1:]
img_plt = X_test[IMG_INDEX,:].reshape((16,16))
plt.imshow(img_plt, cmap='gray')
print "True Value",test[IMG_INDEX,0]
```

True Value 6.0

In [26]:

```python
sgd = SGD(momentum=0.9, decay=1e-4)
model = Sequential()
model.add(Dense(output_dim=400, input_dim=256))
model.add(Activation('sigmoid'))
model.add(Dense(output_dim=10))
model.add(Activation('softmax'))
model.compile(loss='categorical_crossentropy',optimizer=sgd, metrics=
['accuracy'])
```

In [27]:

```python
model.fit(X,Y, nb_epoch=5, batch_size=120)
```

```
Epoch 1/5
7291/7291 [==============================] - 0s - loss: 1.4295 - ac
c: 0.6121
Epoch 2/5
7291/7291 [==============================] - 0s - loss: 0.6277 - ac
c: 0.8759
Epoch 3/5
7291/7291 [==============================] - 0s - loss: 0.4395 - ac
c: 0.8985
Epoch 4/5
7291/7291 [==============================] - 0s - loss: 0.3600 - ac
c: 0.9132
Epoch 5/5
7291/7291 [==============================] - 0s - loss: 0.3158 - ac
c: 0.9236
```

Out[27]:

```
<keras.callbacks.History at 0x116c2c2d0>
```

In [28]:

```python
X_test = test[:,1:]
Y_test = test[:,0]
Y_test = to_categorical(Y_test)
```

In [29]:

```python
y_pred = model.predict_classes(X_test)
loss_metrics = model.evaluate(X_test, Y_test, batch_size=32)
print "Loss", loss_metrics[0], "Accuracy", loss_metrics[1]
```

```
2007/2007 [==============================] - 0s
2007/2007 [==============================] - 0s
Loss 0.417616549837 Accuracy 0.884902840179
```