Untitled1

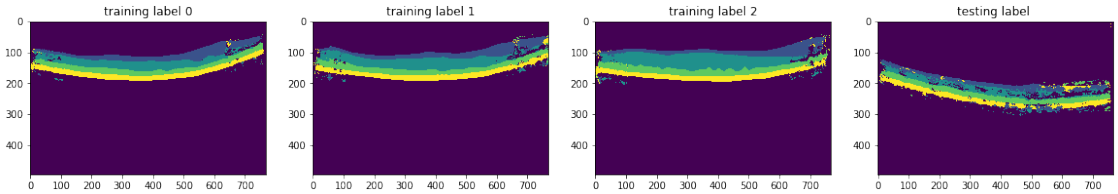
May 15, 2018

In [104]:
```
import numpy as np
import h5py as h5
import matplotlib.pyplot as plt
import scipy.ndimage
import skimage.color
import skimage.feature
import sklearn.ensemble
from matplotlib.colors import LinearSegmentedColormap
import ipywidgets as widgets
from ipywidgets import interact, interactive, fixed
import ipywidgets as widgets
```

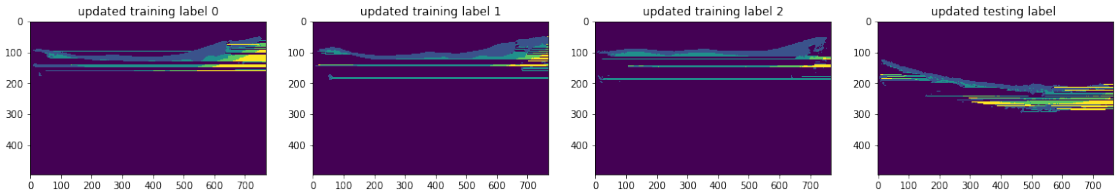
In [110]:
```
# Functions:

def daijkstra(chain, p_prior, u_prior):
    updated_chain = np.zeros((chain.shape[0]))
    paths = np.zeros((p_prior.shape[0], chain.shape[0])).astype(int) # param for sav
    path_costs = np.zeros((p_prior.shape[0])).astype(int)            # param for sav
    temp_costs = np.zeros((p_prior.shape[0])).astype(int)            # param for tem
    for x in range(chain.shape[0]-1):
        for state in range(p_prior.shape[0]):  # current node
            for next_state in range(p_prior.shape[0]):  # all paths that lead to tha
                temp_costs[next_state] =  p_prior[next_state][paths[next_state][x]]
                if(next_state == chain[x]):   # if the possible path equals to the p
                    temp_costs[next_state] += u_prior
            paths[state][x+1] = np.random.choice(np.where(temp_costs == np.amin(temp_
            path_costs[state] += temp_costs[paths[state][x+1]]

    return paths[np.argmin(path_costs)]  # return the labels of the path with the cu

def get_p_prior_r(C1, C2):
    prior = np.ones((5, 5))
    prior[np.where(np.eye(5))] = 0
    for i in range(prior.shape[0]):
        for j in range(prior.shape[1]):
            if(abs(i-j)==1):
                prior[i][j]=C1
            if(abs(i-j)>1):
```

```
                    prior[i][j]=C2
        return prior

    def get_p_prior_c(C1, C2, C3):
        prior = np.ones((5, 5))
        prior[np.where(np.eye(5))] = 0
        for i in range(prior.shape[0]):
            for j in range(prior.shape[1]):
                if((j-i) <= -1 ):
                    prior[i][j]=C3
                if((j-i) == -4):
                    prior[i][j]=C1
                if((j-i) == 1):
                    prior[i][j]=C1
                if((j-i) > 1):
                    prior[i][j]=C2
        return prior
```

In [111]:
```
#EX 3b)

predictions_set = h5.File('predictions.h5','r')
pred_img = []

for key in predictions_set:
    pred_img.append(predictions_set[key][...])

predictions_set.close()
pred_img=np.array(pred_img)

test_label = np.argmax(pred_img[0], axis=2)
train_label = np.array([np.argmax(pred_img[1], axis=2),
                        np.argmax(pred_img[2], axis=2),
                        np.argmax(pred_img[3], axis=2)])

colors = ['w','r','b','g','y']
cmap_name = 'my_list'
cm = LinearSegmentedColormap.from_list(
        cmap_name, colors, N=5)
fig,ax = plt.subplots(1,4)
for i in range(3):
    ax[i].imshow(train_label[i])
    ax[i].set_title("training label "+str(i))
ax[3].imshow(test_label)
ax[3].set_title("testing label ")
fig.set_size_inches(20,40)
```



In [112]:
```
#EX 3c)

C1 = 2
C2 = 3
u_prior_r = -2

p_prior_r = get_p_prior_r(C1, C2)
#print(test_label[200])
#ret = daijkstra(test_label[200], p_prior, u_prior)
#print(ret)
updated_test_label = np.zeros((test_label.shape[0],
                               test_label.shape[1]))
updated_train_label = np.zeros((train_label.shape[0],
                                train_label.shape[1],
                                train_label.shape[2]))

for i in range(test_label.shape[0]):
    updated_test_label[i] = daijkstra(test_label[i], p_prior_r, u_prior_r)
    for j in range(updated_train_label.shape[0]):
        updated_train_label[j][i] = daijkstra(train_label[j][i], p_prior_r, u_prior_r

fig1,ax1 = plt.subplots(1,4)
for i in range(3):
    ax1[i].imshow(updated_train_label[i])
    ax1[i].set_title("updated training label "+str(i))
ax1[3].imshow(updated_test_label)
ax1[3].set_title("updated testing label ")
fig1.set_size_inches(20,40)
```



In [113]:
```
# EX 3e)
C1 = 1
C2 = 2*C1
C3 = 1000 * C1
u_prior_c = -3

p_prior_c = get_p_prior_c(C1, C2, C3)

transposed_train_label = np.zeros((train_label.shape[0],
                                   train_label.shape[2],
                                   train_label.shape[1]))
transposed_test_label = test_label.transpose()
transposed_train_label[0] = train_label[0].transpose()
transposed_train_label[1] = train_label[1].transpose()
transposed_train_label[2] = train_label[2].transpose()

transposed_updated_test_label = np.zeros((transposed_test_label.shape[0],
                                          transposed_test_label.shape[1]))
transposed_updated_train_label = np.zeros((transposed_train_label.shape[0],
                                           transposed_train_label.shape[1],
                                           transposed_train_label.shape[2]))

for i in range(test_label.shape[0]):
    transposed_updated_test_label[i] = daijkstra(transposed_test_label[i], p_prior_c
    for j in range(updated_train_label.shape[0]):
        transposed_updated_train_label[j][i] = daijkstra(transposed_train_label[j][i

updated_test_label = transposed_updated_test_label.transpose()
updated_train_label[0] = transposed_updated_train_label[0].transpose()
updated_train_label[1] = transposed_updated_train_label[1].transpose()
updated_train_label[2] = transposed_updated_train_label[2].transpose()

fig2,ax2 = plt.subplots(1,4)
for i in range(3):
    ax2[i].imshow(updated_train_label[i])
    ax2[i].set_title("updated training label "+str(i))
ax2[3].imshow(updated_test_label)
ax2[3].set_title("updated testing label ")
fig2.set_size_inches(20,40)
```