Comparing the accuracy of pca for different values of k

The weights for a person is the average of the weights for all photos of that person

Creating the train and test file

```
accuracy = zeros([15, 1]);
for k = 10:10:150
    load YaleB_32x32.mat
    %accuracy = 0;
    num_of_passes = 0;
    for iter=0:10
        [data_size,image_size] = size(fea);
        image_size = sqrt(image_size);
        test_index = randi(data_size,1,100);
        train_index = 1:data_size;
        train_index(test_index) = [];

        train_face = fea(train_index,:)';
        train_label = gnd(train_index,:);
        test_face = fea(test_index,:)';
        test_label = gnd(test_index,:);
        train_size = size(train_index,2);
        test_size = size(test_index,2);
```

Mean

```
        train_mean = mean(train_face,2);
        train_face = train_face - train_mean;
```

Eigen-faces

```
        [eigen_faces,eigen_value,~] = svd(train_face'*train_face);
        eigen_faces = normc(train_face*eigen_faces);
        eigen_faces = eigen_faces(:,4:k+3);
        eigen_value = diag(eigen_value);
        eigen_value = eigen_value(4:k+3)';
```

Projection

```
        weights = eigen_faces' * train_face;
        train_weights = zeros([k,train_size]);
        num_faces = zeros([1,train_size]);
        for i = 1:train_size
            num_faces(1,train_label(i)) =  num_faces(1,train_label(i)) +1;
            train_weights(:,train_label(i)) = train_weights(:,train_label(i)) + (weight
        end
```

Check

```
        reduce = eigen_faces * train_weights;
        %imagesc(reshape(train_mean+train_face(:,1),[64 64]))
        %imagesc(reshape(train_face(:,1),[64 64]))
```

```
        %imagesc(reshape(train_mean+reduce(:,1),[32 32]))
        %imagesc(reshape(reduce(:,1),[64 64]))
```

Test

```
        test_weights = eigen_faces'*(test_face - train_mean);
        test_reduce = eigen_faces*test_weights;
        acc = test_size;
        for i = 1:test_size
            test = test_weights(:,i);
            no = vecnorm(train_weights - test);
            [M, I] = min(no);
            if I ~= test_label(i)
                acc=acc-1;
                %disp([test_label(i), I])
                %figure
                %imagesc(reshape(reduce(:,I), [32 ,32]))
                %figure
                %imagesc(reshape(test_reduce(:,i), [32 ,32]))
            end
        end
        acc = acc*100/test_size;
        num_of_passes = num_of_passes+1;
        accuracy(k/10) = accuracy(k/10)+(acc-accuracy(k/10))/num_of_passes;
        %disp([acc , accuracy(k/10)])
    end
    disp([k , accuracy(k/10)]);
end
```

```
   10.0000   35.8182

   20.0000   54.3636

   30.0000   57.3636

   40.0000   61.6364

   50.0000   65.2727

   60.0000   59.6364

   70.0000   63.0909

   80.0000   69.1818

   90.0000   67.4545

  100.0000   66.3636

  110.0000   68.7273

  120.0000   65.5455

  130.0000   68.0000

  140.0000   65.6364

  150.0000   66.9091
```

Plotting the accuracy

```
plot(10:10:150, accuracy)
```