MyMainScript

If we test our system on image of a person who is not in the dataset then the max probabilities will be very less when compared to when we test on a image of a person in the dataset. Therefore if we apply the threshold on the probability and if max probability is less than the threshold then we can say that this image does not match will any one in the dataset. But there may also be a case in which even if the image of a person who is in the dataset may have their max probabilities less than this threshold. This may lead to some of the false negetives. So, there is a trade of between false negatives adn false positives. The thresold also depend on the value of K. here i fixed K= 50 and th=0.02,i got false_neg = 27, false_pos = 25; When the th = 0.03,false_neg = 47, false_pos = 2;

ORL dataset

part a

```
tic;
X_train = zeros(112*92,32*6);
X_test = zeros(112*92,32*4);
X_test_unseen = zeros(112*92,8*10);
Y_train = zeros(1,32*6);
Y_test = zeros(1,32*6);
Y_test_unseen = zeros(1,8*10);
tr_i=1;
te_i=1;
tn_i=1;
for i = 1:32
    d = dir(fullfile('..','data','ORL","s"+int2str(i),'*.pgm'));
    for j = 1:6
        temp =
 imread(fullfile('..','data','ORL","s"+int2str(i),d(j).name));
        temp = reshape(temp,[],1);
        X_train(:,tr_i) = temp;
        Y_train(:,tr_i) = i;
        tr_i = tr_i+1;
    end
    for j = 7:10
        temp =
 imread(fullfile('..','data','ORL","s"+int2str(i),d(j).name));
        temp = reshape(temp,[],1);
        X_test(:,te_i) = temp;
        Y_test(:,te_i) = i;
        te_i = te_i+1;
    end
end

for i = 33:40
     d = dir(fullfile('..','data','ORL","s"+int2str(i),'*.pgm'));
    for j = 1:10
        temp =
 imread(fullfile('..','data','ORL","s"+int2str(i),d(j).name));
        temp = reshape(temp,[],1);
        X_test_unseen(:,tn_i) = temp;
        Y_test_unseen(:,tn_i) = i;
```

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        tn_i = tn_i+1;
    end
end

X_mean = mean(X_train,2);
X = X_train - X_mean;
Y = X_test - X_mean;
X_unseen = X_test_unseen - X_mean;
L = (X.')*X;
[V,D] = eigs(L,32*6);
eig_f = X*V;
eig_f = normc(eig_f);

false_pos = 0;
false_neg = 0;
K = 50;
th = 0.02;
max_list = [];
max_list_n = [];
temp = eig_f(:,1:K);
alpha_train = (temp.')*X;
alpha_test = (temp.')*Y;
alpha_test_unseen = (temp.')*X_unseen;

    for j = 1:32*4
        test = alpha_test(:,j);
        dif = alpha_train - test;
        dif = dif.^2;
        dif = sum(dif,1);
        prob = 1./dif;
        prob = prob/sum(prob);
        [M,Ind] = max(prob);
        max_list =[max_list,M];
        if Y_test(:,j) == Y_train(:,Ind)
                if M < th
                    false_neg = false_neg + 1;
                end
        end
    end
    for j = 1:8*10
        test_n = alpha_test_unseen(:,j);
        dif1 = alpha_train - test_n;
        dif1 = dif1.^2;
        dif1 = sum(dif1,1);
        prob = 1./dif1;
        prob = prob/sum(prob);
        [M1,Ind1] = max(prob);
        max_list_n =[max_list_n,M1];
        if M1 > th
            false_pos = false_pos + 1;
        end
    end
% false_neg
disp(false_neg);
```

```
% false_pos
disp(false_pos);
toc;
```

```
    27

    25

Elapsed time is 53.326534 seconds.
```

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