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Eigenresistance Matlab Code

```
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clear
```

Load images

```
all_weights = [0.2,0,1;
               0.25,0,1;
               0.3,0,1;
               0.25,0.05,1;
               0.25,0,0.95];

for m=1:size(all_weights,2)

    weights = all_weights(m,:);
    train = zeros(250,600,3,78);
    train_set = zeros(250*600*3,79);
    for k=0:78
        image_train = imread(strcat('./initialized_train/',
 int2str(k), '.png'));
        train(:,:,:,k+1) = image_train;
        for a=1:3
            rgb_reshaped = reshape(train(:,:,a,k+1),[250*600, 1]);
            train_set((a-1)*(250*600)+1:a*(250*600),k+1) = weights(a)
 * rgb_reshaped;
        end
    end

    test = zeros(250,600,3,100);
    test_set = zeros(250*600*3,100);
    for k=0:99
        image_test = imread(strcat('./initialized_test/',
 int2str(k), '.png'));
        test(:,:,:,k+1) = image_test;
        for a=1:3
            rgb_reshaped = reshape(test(:,:,a,k+1),[250*600, 1]);
            test_set((a-1)*(250*600)+1:a*(250*600),k+1) =
 rgb_reshaped;
        end
    end
```

Initialize system

Reshape train images to form "vectors"

```
   %train_reshape = reshape(train_set, size(train_set,1) *
size(train_set,2), size(train_set,3));

   % Find SVD of the vector representations of the images
   [U,S,V] = svd(train_set, 'econ');

   % Project faces into eigenspace and find a matrix of weights
   train_weights = U' * train_set;
```

Test New Image

Reshape the test images for matrix calculations

```
   %test_reshape = reshape(test_set, size(test_set,1) *
size(test_set,2), size(test_set,3));
   % Find the weights of the eigenvectors for each face as a
representation in
   % the eigenspace
   test_weights = U' * test_set;
```

Load Labels

```
   labels = xlsread('values.xlsx');
   train_labels = labels(1:79,2);
   test_labels = labels(:,3);
```

For loop to run through images

Initialize a vector of zeros to represent averages By preallocating space, we are saving in runtime

```
   accuracy = zeros(100,1);
   % For loop to compare the distance of each column of weights to
the
   % training image weights
   for num = 1:100
       % Find the index of the minimum distance between two vectors
       [Y,I] = min(vecnorm(test_weights(:,num) - train_weights));

       if train_labels(I) == test_labels(num)
           accuracy(num) = 1;
       else
           accuracy(num) = 0;
       end
       %figure()
       %subplot(2,1,1)
       %imagesc(bw_test(:,:,num))
       %colormap 'gray'
```

```
        %subplot(2,1,2)
        %imagesc(bw_train(:,:,I))
        %colormap 'gray'
    end
    percent_correct = mean(accuracy)
```

```
percent_correct =

    0.6300


percent_correct =

    0.6400


percent_correct =

    0.5900
```

```
end
```

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