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## Table of Contents

Project Granny Smith .....	1
ECE 2409 .....	1
Begin program. ....	1
PART 1 (QUESTIONS 1, 2, 3): TRAIN DATA, CREATE HISTOGRAMS, WRITE COLOR RULES. ....	1
Read training data .....	1
Create data .....	1
Concatenate the 4 training images .....	2
Import previously determined dimensions of colors to be trained, then apply rules to them. ....	2
PART II (QUESTION 4): RANDOMLY SHUFFLE APPLES AND IDENTIFY TYPE OF APPLE IN LINEUP. ....	7
PART III (QUESTION 5): TEST DATA WITH REAL APPLES. ....	13
End program. ....	17

## Project Granny Smith

## ECE 2409

## Begin program.

```
clear all;clc;close all;
```

## PART 1 (QUESTIONS 1, 2, 3): TRAIN DATA, CREATE HISTOGRAMS, WRITE COLOR RULES.

### Read training data

```
scale=50;  
fj1=imread('training\fuji.jpg'); fj1_sz=size(fj1);  
fj1_2=imresize(fj1, floor(fj1_sz(1)/scale)/100); fj1_resz=size(fj1_2);  
gs1=imread('training\granny_smith.jpg'); gs1_sz=size(gs1);  
hc1=imread('training\honeycrisp.jpg'); hc1_sz=size(hc1);  
gl1=imread('training\gala.jpg'); gl1_sz=size(gl1);
```

### Create data

```
%right-click and select "Export Data to Workspace", save figur eas
```

```
%figure;
imshow(fj1,[]); title('Fuji');
imshow(gs1,[]); title('Granny Smith');
imshow(hc1,[]); title('Honeycrisp');
imshow(gl1,[]); title('Gala');
%figure;
%im=[fj1,gs1,hc1,gl1];
imshow(im);
```

## Concatenate the 4 training images

```
apples=fj1_2; sz=size(apples);

sz(1,end+gs1_sz(2),1) = 0;
dim1=fj1_resz(2)+gs1_sz(2)-1;
apples(1:gs1_sz(1), fj1_resz(2):dim1, :) = gs1;

sz(1,end+hc1_sz(2),1) = 0;
dim2=dim1+hc1_sz(2)-1;
apples(1:hc1_sz(1), dim1:dim2, :) = hc1;

sz(1,end+gl1_sz(2),1) = 0;
dim3=dim2+gl1_sz(2)-1;
apples(1:gl1_sz(1), dim2:dim3, :) = gl1;
%imshow(apples);
```

## Import previously determined dimensions of colors to be trained, then apply rules to them.

Show selected training data.

```
h1=openfig('cursor_fig2.fig');
load('cursor_info.mat');
[gl_p1,gl_p2,hc_p1,hc_p2,gs_p1,gs_p2,fj_p1,fj_p2]=cursor_info.Position;

% Fuji - Katie
r=sort([fj_p1(1),fj_p2(1)]); r=r(1):r(2);
c=sort([fj_p1(2),fj_p2(2)]); c=c(1):c(2);
rc=fj1(r,c,:); low=5000;high=30000;
fj_loc = mx_lk_weibull(rc,'Fuji',apples,low,high);

% Gala - Matt
r=sort([gl_p1(1),gl_p2(1)]); r=r(1):r(2);
c=sort([gl_p1(2),gl_p2(2)]); c=c(1):c(2);
rc=gl1(r(:,c(:,1)), low=5000;high=30000;
gl_loc = mx_lk_weibull(rc,'Gala',apples,low,high);

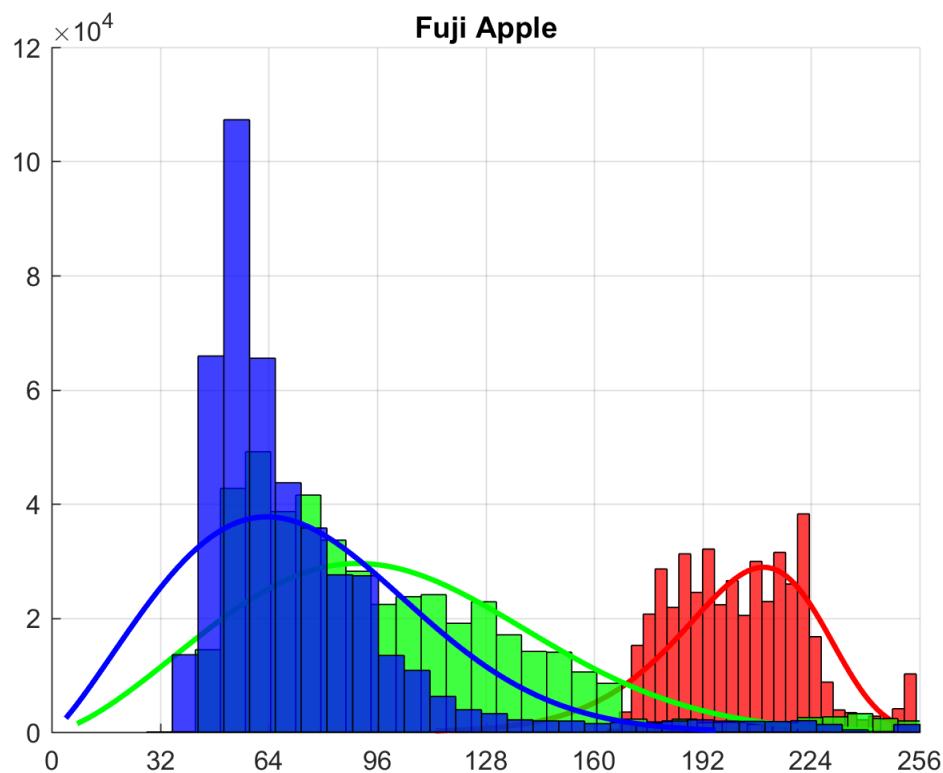
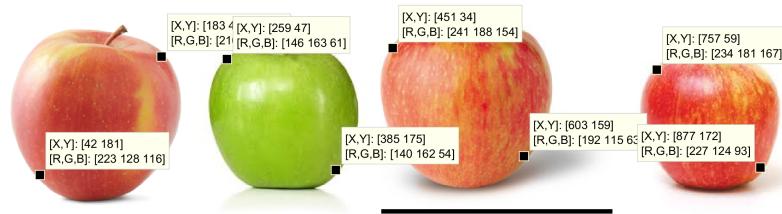
% Honeycrisp - Katie
r=sort([hc_p1(1),hc_p2(1)]); r=r(1):r(2);
c=sort([hc_p1(2),hc_p2(2)]); c=c(1):c(2);
rc=hc1(r,c,:); low=10000;high=10^10;
```

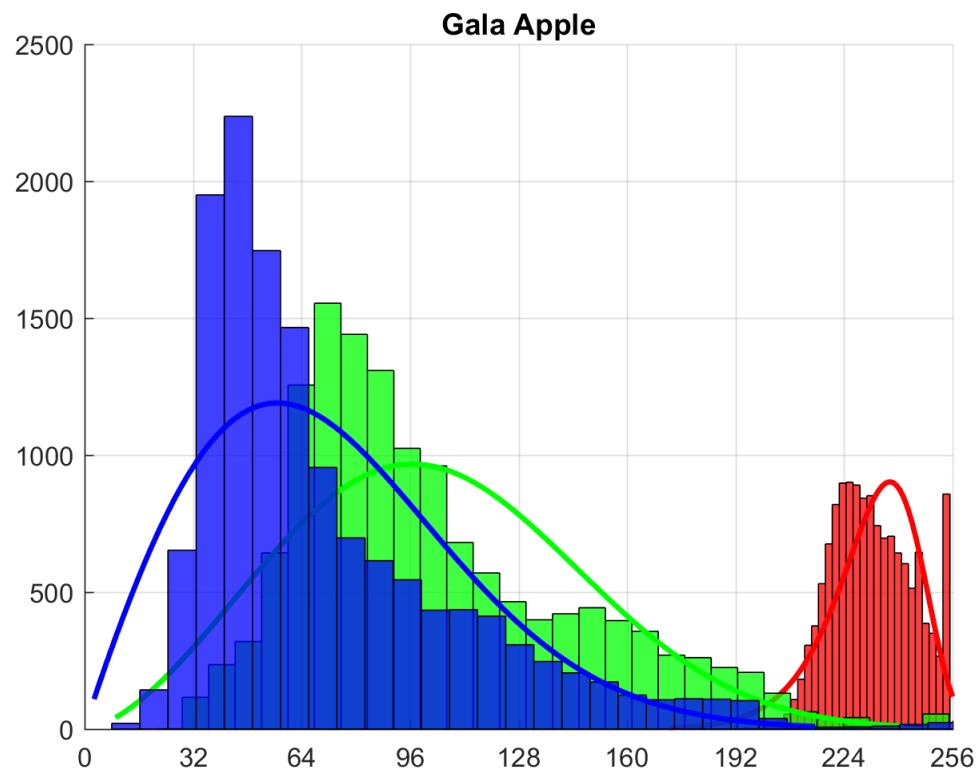
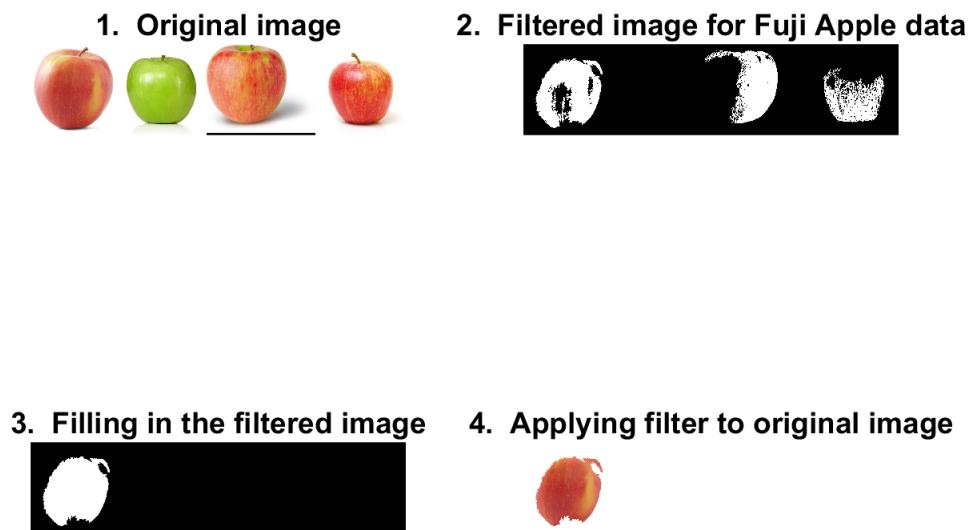
```

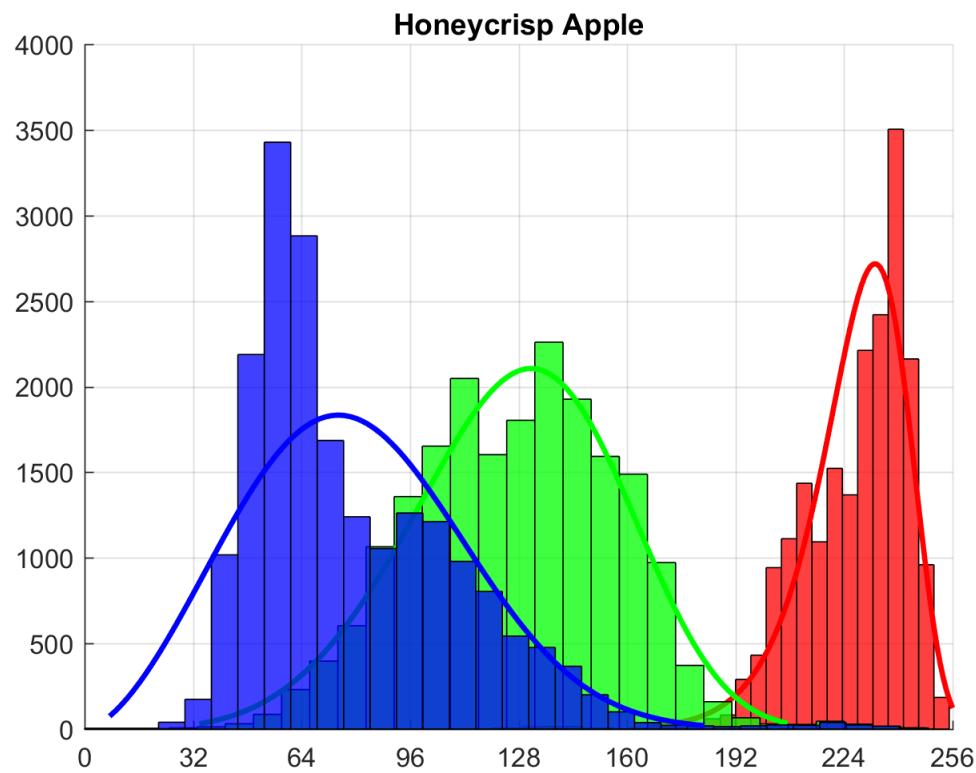
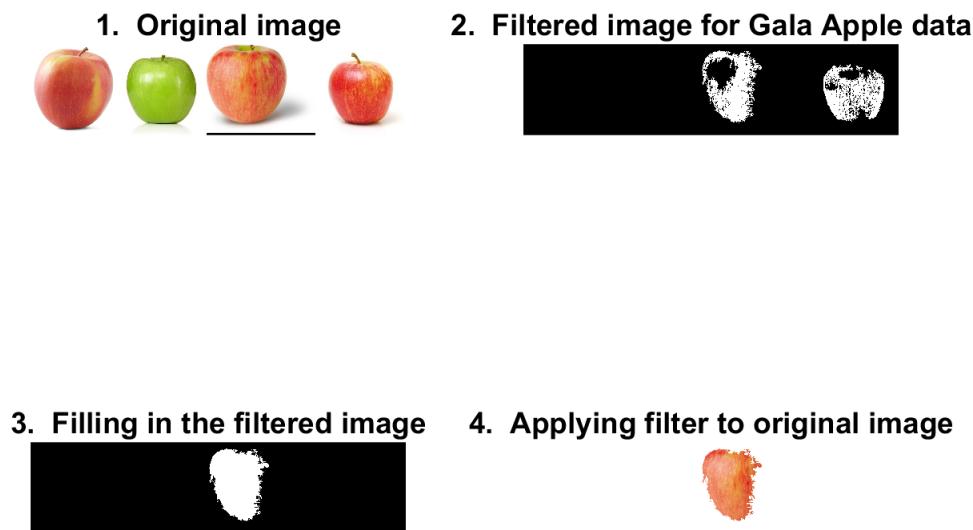
hc_loc = mx_lk_weibull(rc, 'Honeycrisp', apples,low,high);

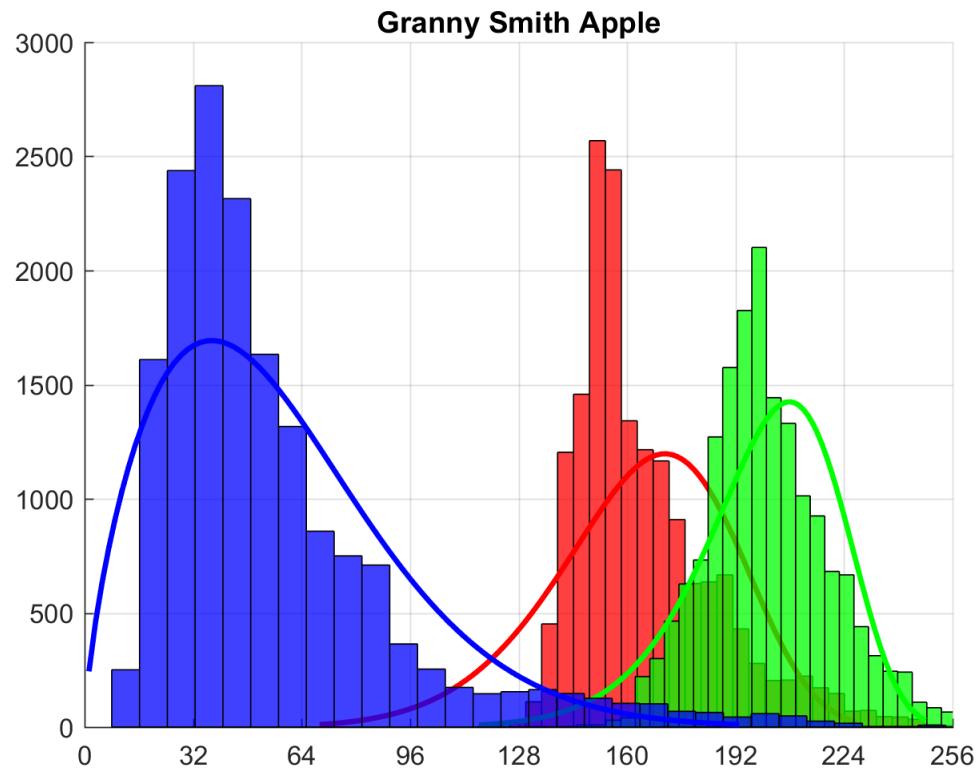
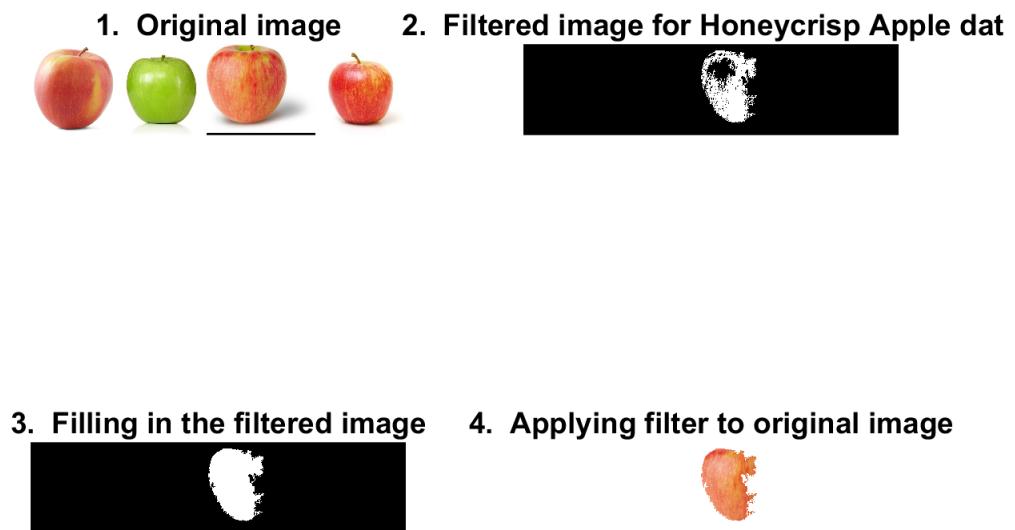
% Granny Smith - Matt
r=sort([gs_p1(1),gs_p2(1)]); r=r(1):r(2);
c=sort([gs_p1(2),gs_p2(2)]); c=c(1):c(2);
rc=gs1(r,c,:); low=5000;high=30000;
gs_num = mx_lk_weibull(rc, 'Granny Smith', apples,low,high);

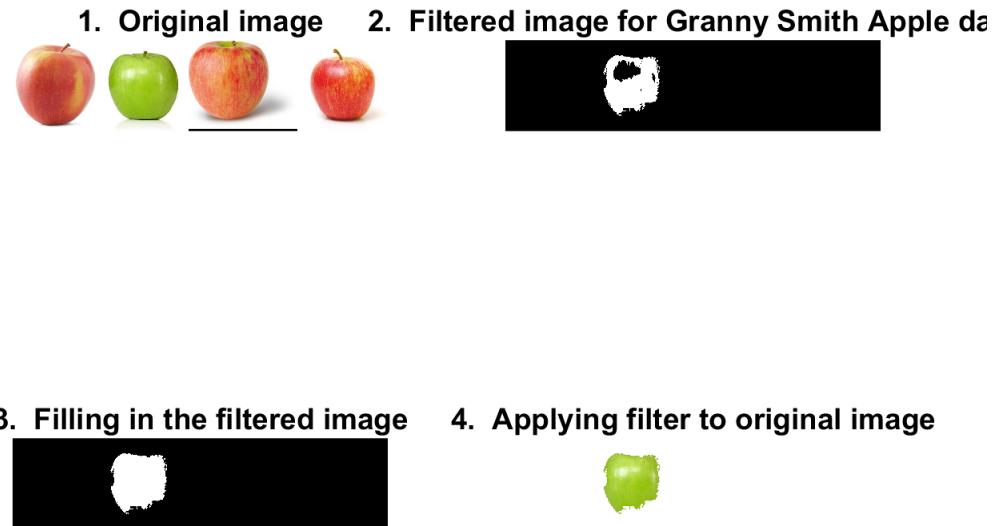
```











## PART II (QUESTION 4): RANDOMLY SHUFFLE APPLES AND IDENTIFY TYPE OF APPLE IN LINEUP.

Katie wrote shuffle function & Matt did shuffling.

```
mattShuffled=apple_shuffle(fj1,gs1,hc1,g11);
mTitle = "Matt's Shuffled Image";
figure;
imshow(mattShuffled);
title(mTitle);

katieShuffled=apple_shuffle(fj1,gs1,hc1,g11);
kTitle = "Katie's Shuffled Image";
figure;
imshow(katieShuffled);
title(kTitle);

% Gala - Matt
r=sort([gl_p1(1),gl_p2(1)]); r=r(1):r(2);
c=sort([gl_p1(2),gl_p2(2)]); c=c(1):c(2);
rc=g11(r,:),c(:,,:); low=5000;high=30000;
gl_loc = mx_1k_weibull(rc,'Gala',mattShuffled,low,high);

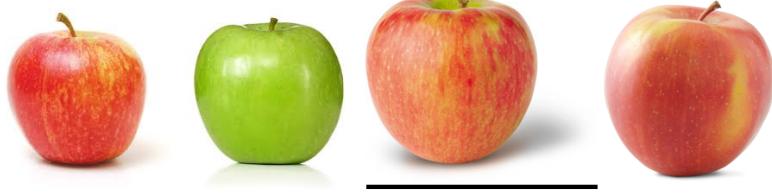
% Granny Smith - Matt
```

```
r=sort([gs_p1(1),gs_p2(1)]); r=r(1):r(2);
c=sort([gs_p1(2),gs_p2(2)]); c=c(1):c(2);
rc=gsl(r,c,:); low=5000;high=30000;
fj_num = mx_lk_weibull(rc, 'Granny Smith', mattShuffled,low,high);

% Fuji - Katie
r=sort([fj_p1(1),fj_p2(1)]); r=r(1):r(2);
c=sort([fj_p1(2),fj_p2(2)]); c=c(1):c(2);
rc=fjl(r,c,:); low=5000;high=30000;
fj_loc = mx_lk_weibull(rc, 'Fuji', katieShuffled,low,high);

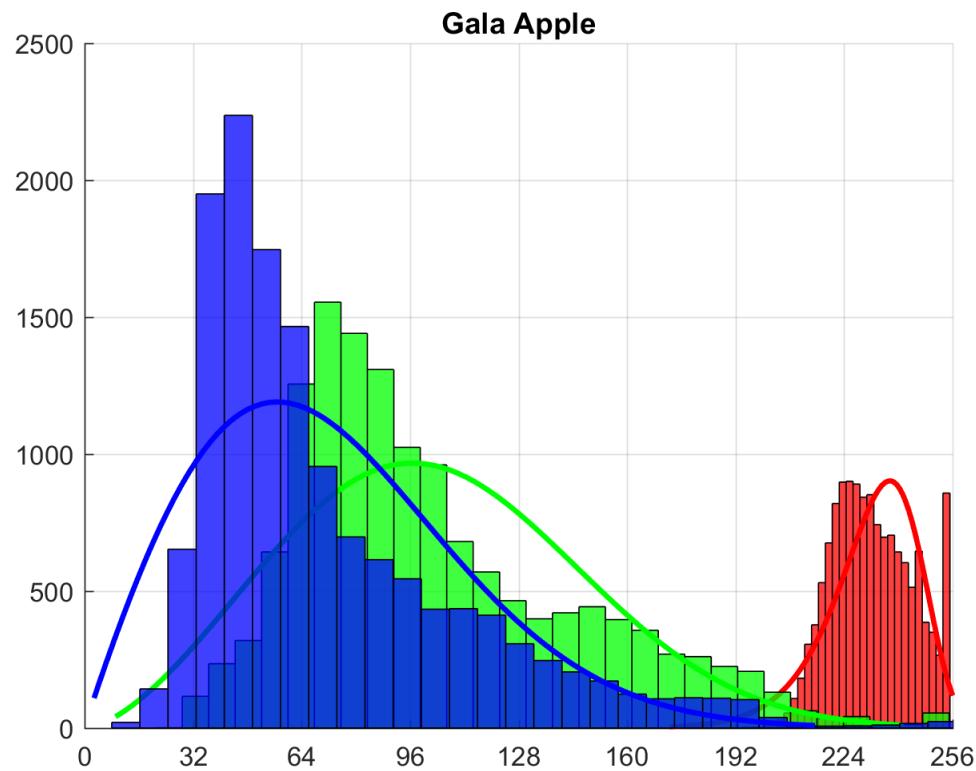
% Honeycrisp - Katie
r=sort([hc_p1(1),hc_p2(1)]); r=r(1):r(2);
c=sort([hc_p1(2),hc_p2(2)]); c=c(1):c(2);
rc=hcl(r,c,:); low=10000;high=10^10;
hc_num = mx_lk_weibull(rc, 'Honeycrisp', apples,low,high);
```

**Matt's Shuffled Image**



**Katie's Shuffled Image**





1. Original image



2. Filtered image for Gala Apple data

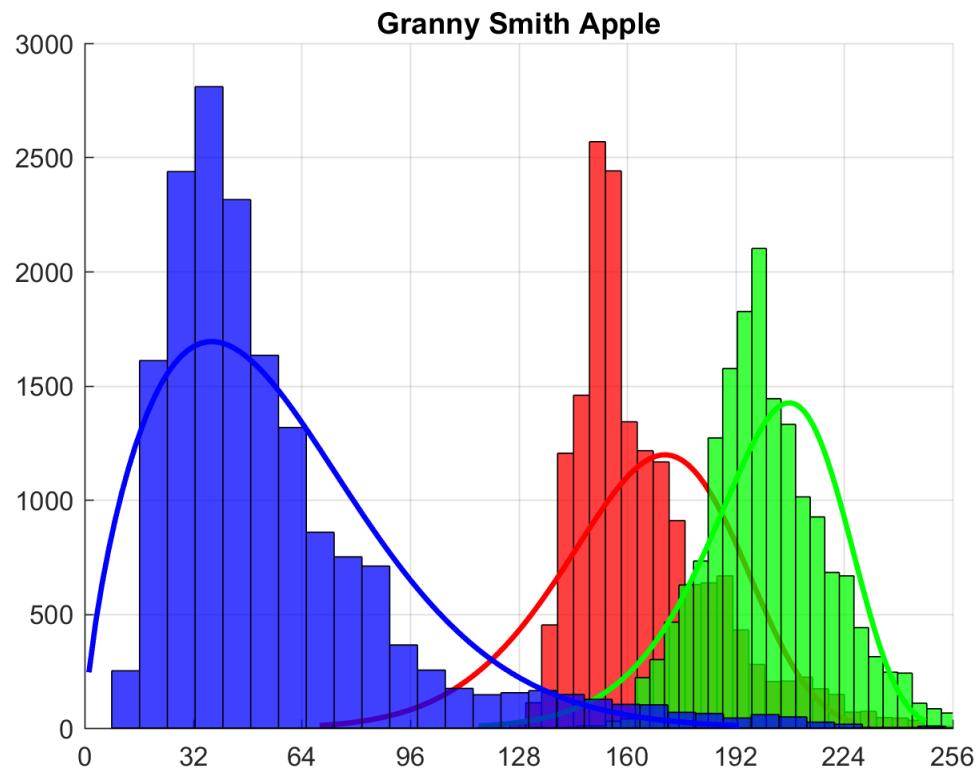


3. Filling in the filtered image



4. Applying filter to original image



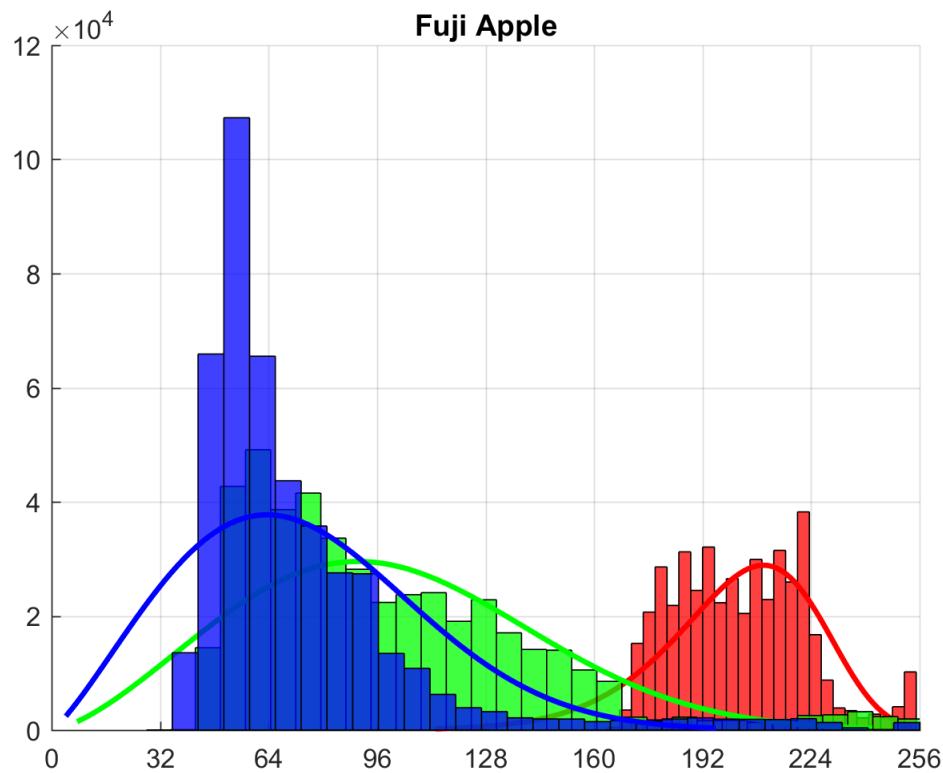


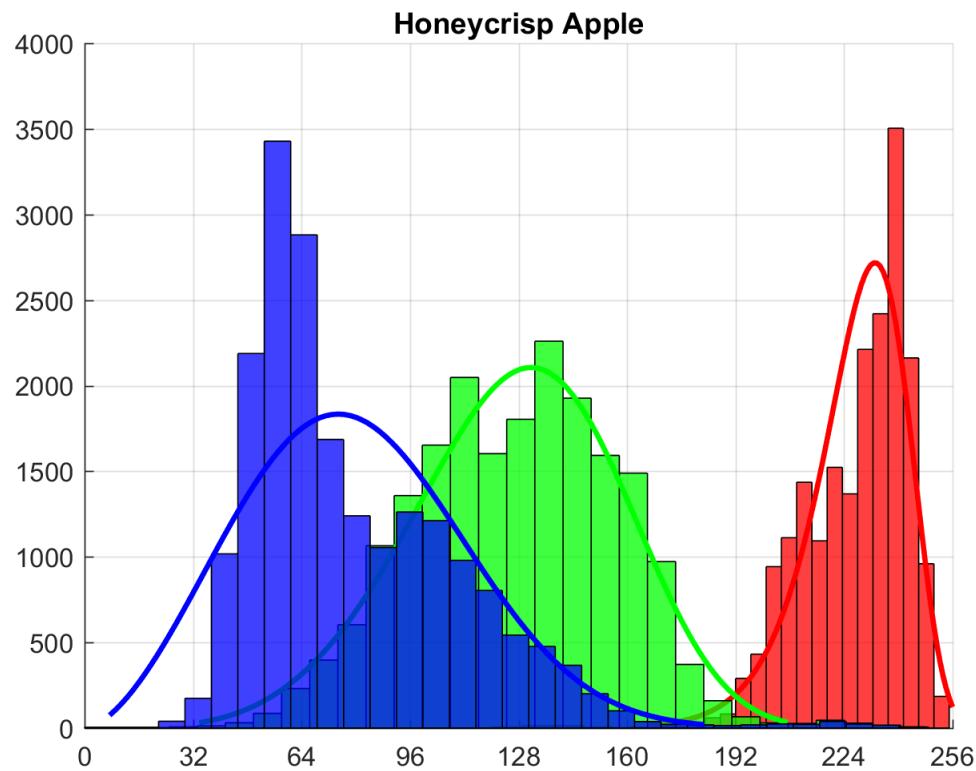
1. Original image    2. Filtered image for Granny Smith Apple data



3. Filling in the filtered image    4. Applying filter to original image







1. Original image



2. Filtered image for Honeycrisp Apple dat



3. Filling in the filtered image



4. Applying filter to original image



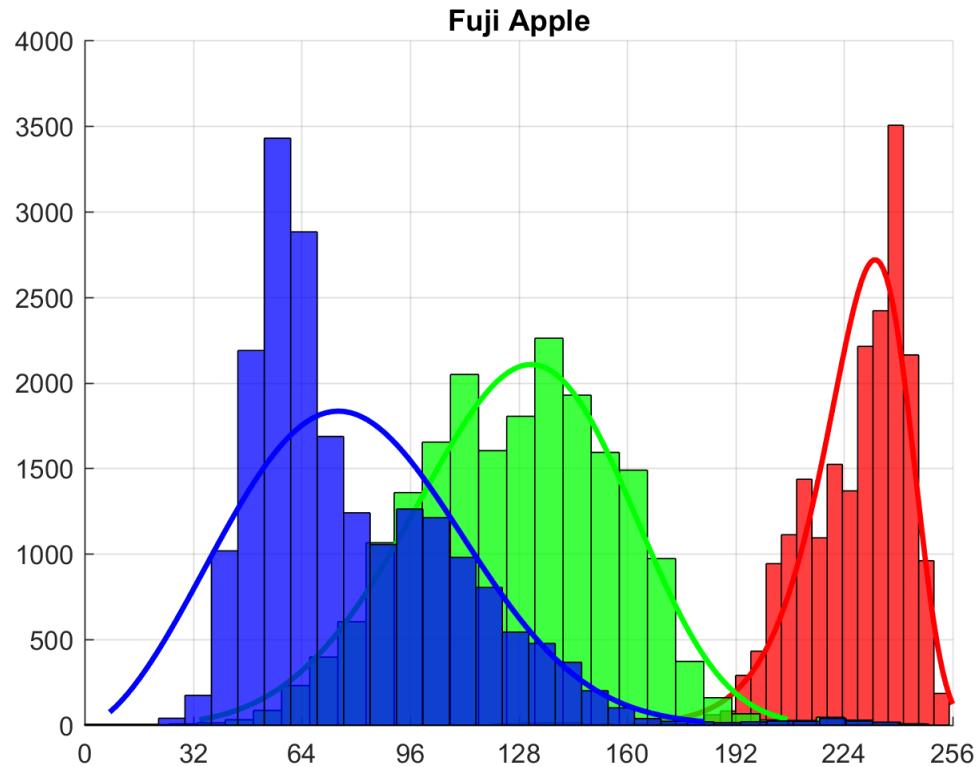
## PART III (QUESTION 5): TEST DATA WITH REAL APPLES.

```
% Fuji - Katie
fj2 imread('test\fuji.jpg');
numfj = mx_lk_weibull(rc,'Fuji',fj2,low,high,false);

% Gala - Matt
gl2 imread('test\gala.jpg');
numgl = mx_lk_weibull(rc,'Gala',gl2,low,high,false);

% Honeycrisp - Katie
hc2 imread('test\honeycrisp.jpg');
numhc = mx_lk_weibull(rc,'Honeycrisp',hc2,low,high,false);

% Granny Smith - Matt
gs2 imread('test\organic_mini_granny_smith.jpg');
numgs = mx_lk_weibull(rc,'Granny Smith',gs2,low,high,false);
```



1. Original image



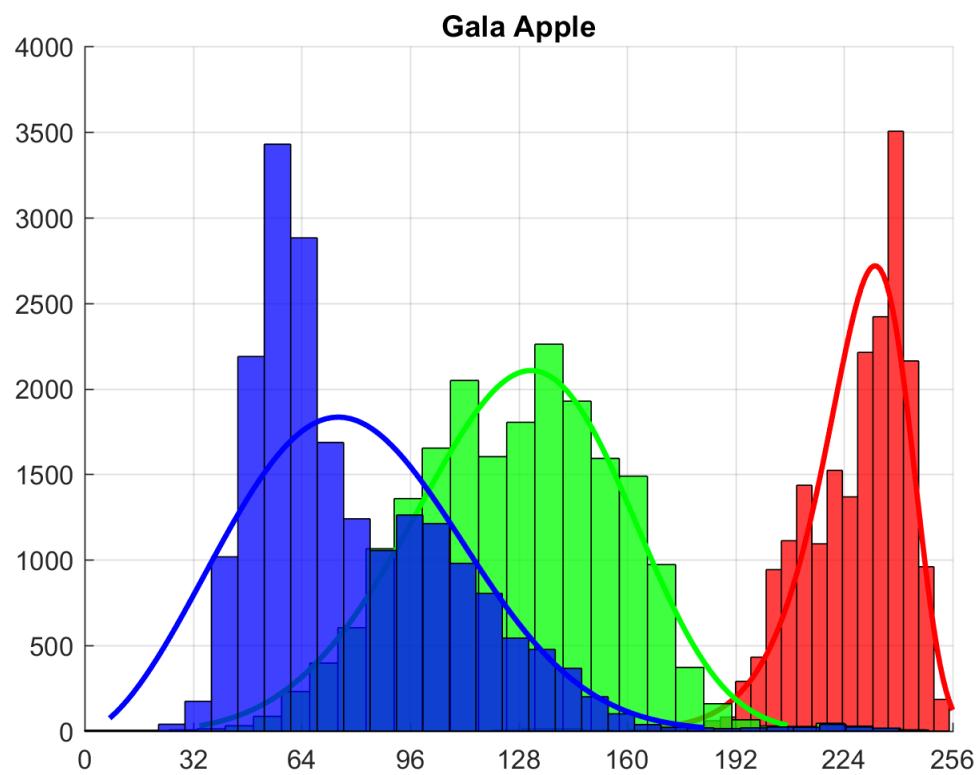
2. Filtered image for Fuji Apple data



3. Filling in the filtered image



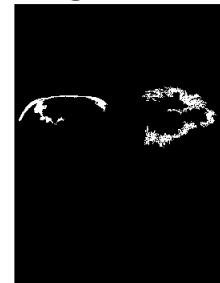
4. Applying filter to original image



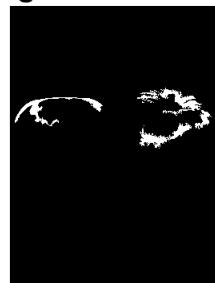
1. Original image



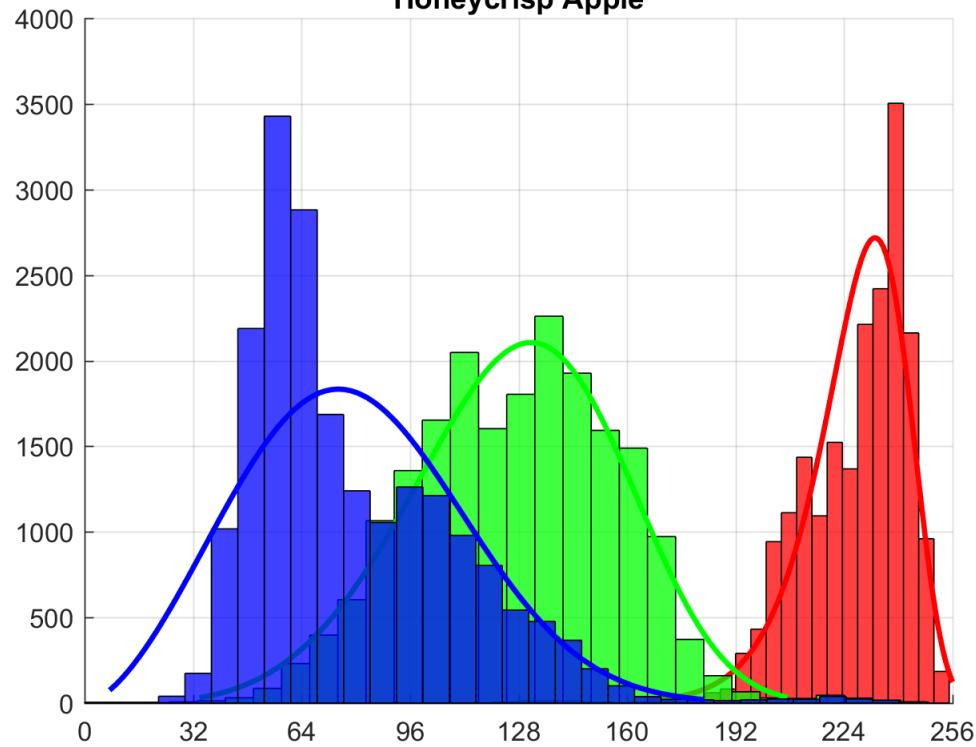
2. Filtered image for Gala Apple data



3. Filling in the filtered image    4. Applying filter to original image



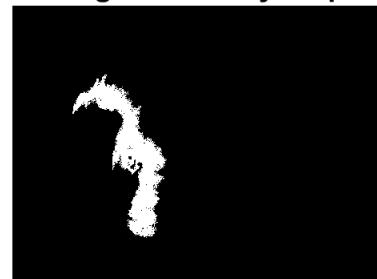
Honeycrisp Apple



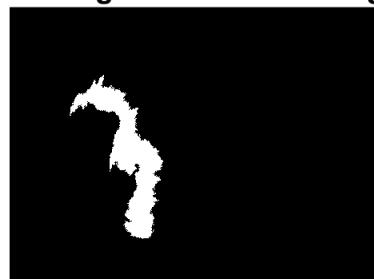
1. Original image



2. Filtered image for Honeycrisp Apple data



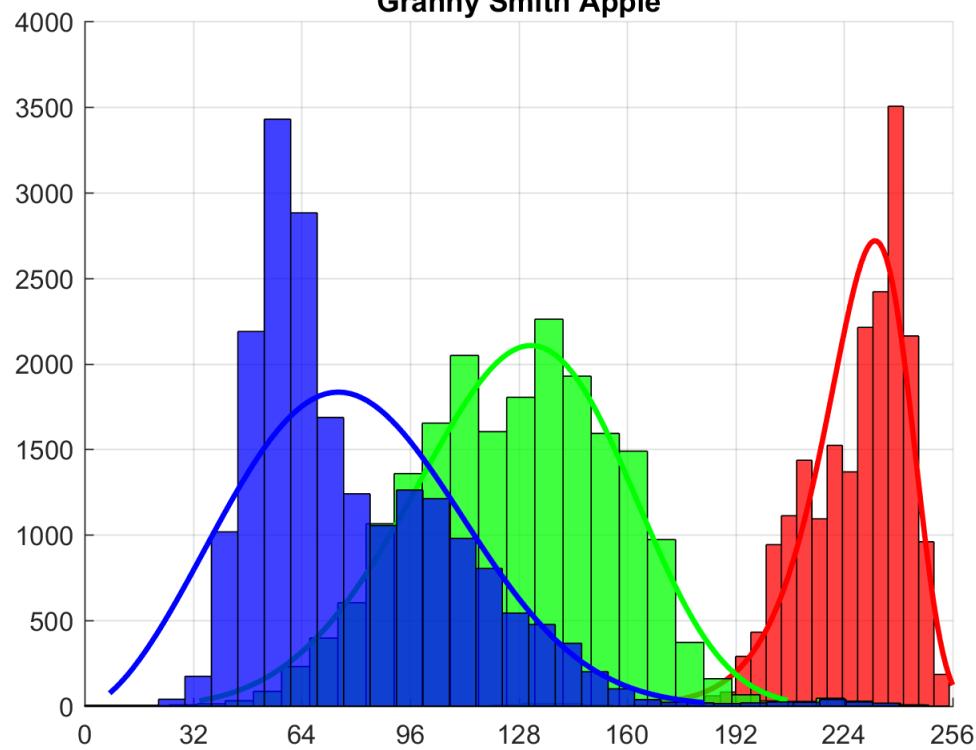
3. Filling in the filtered image



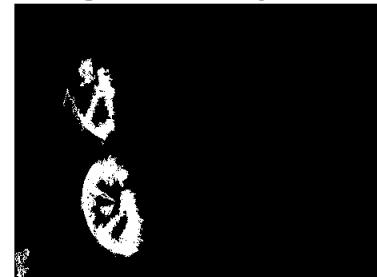
4. Applying filter to original image



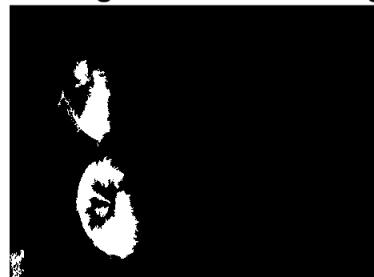
Granny Smith Apple



1. Original image    2. Filtered image for Granny Smith Apple da



3. Filling in the filtered image    4. Applying filter to original image



## End program.

```
%close all  
  
% Pros: Robust implementation.  
% Cons: Need better test images. Mixed results when applied to real  
data.  
% Improve concatenation of apples by making extra space white instead  
% of black, as well as only resizing images when above certain height.  
Better documentation.
```

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