

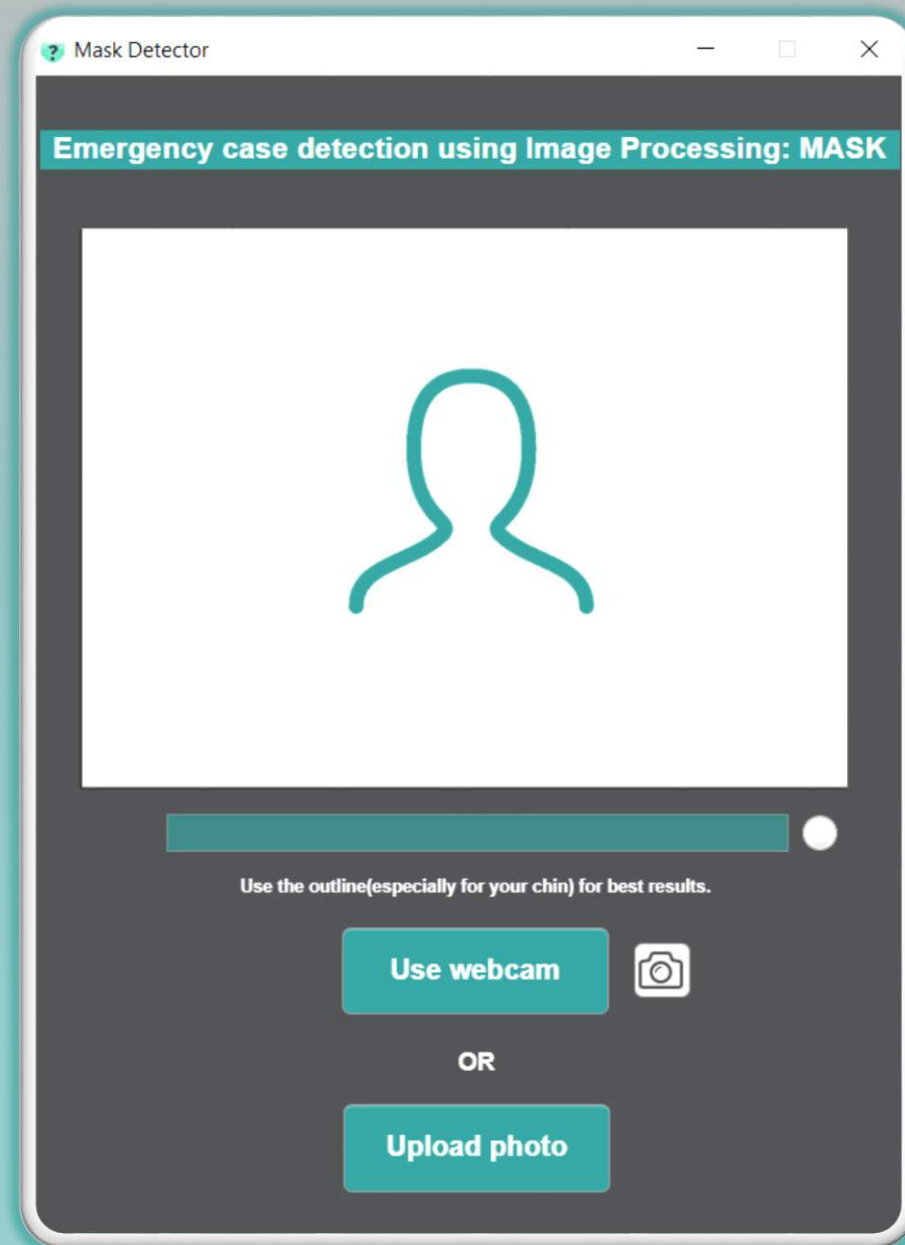
# Emergency Case Detection:

## MASK

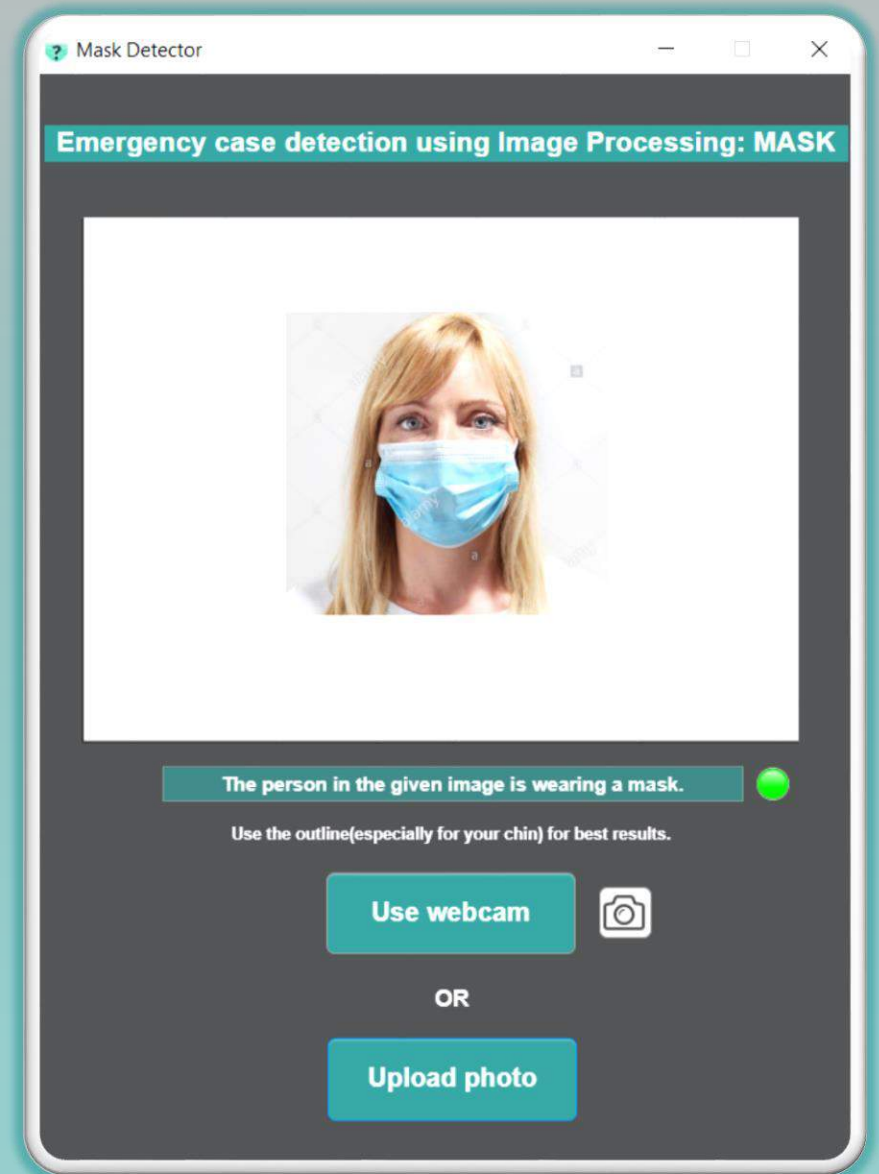
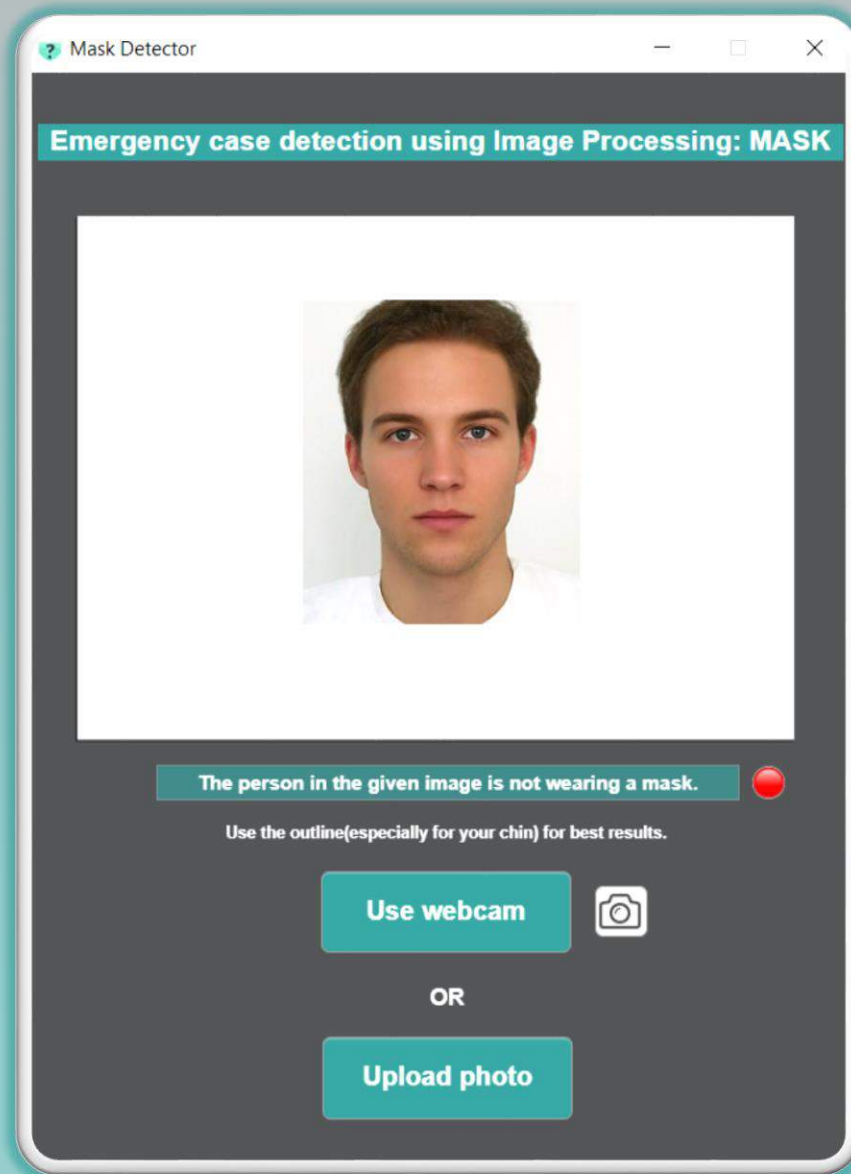


**Creating a Mask Detector app using image processing technique.**

# Preview: the start screen

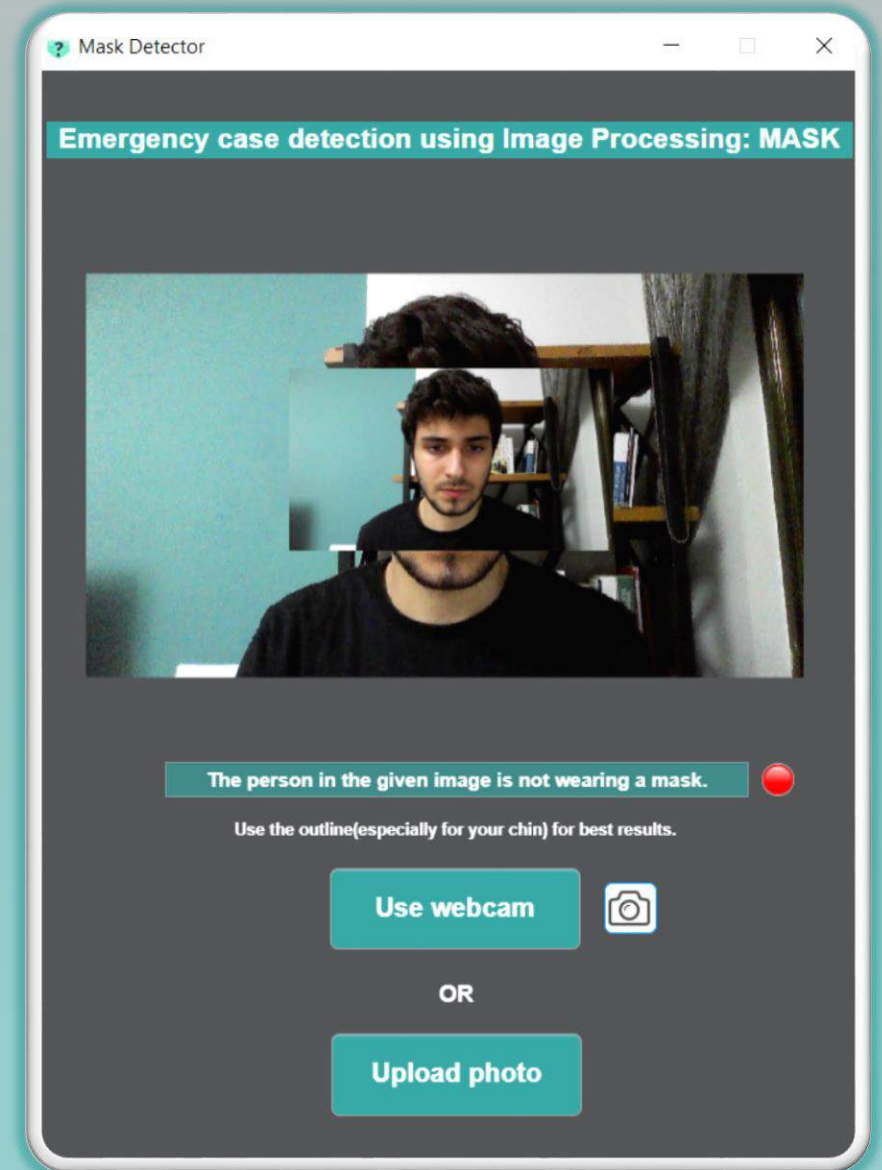
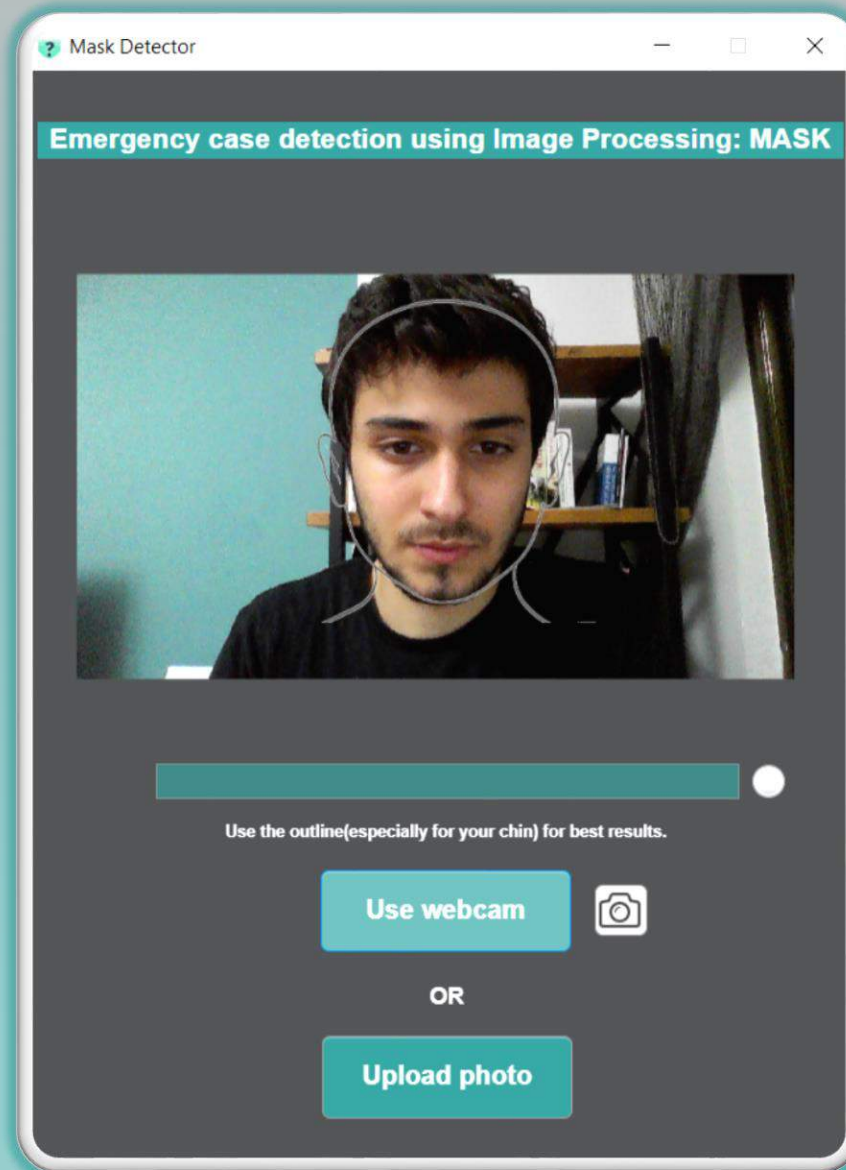


# Preview: upload option



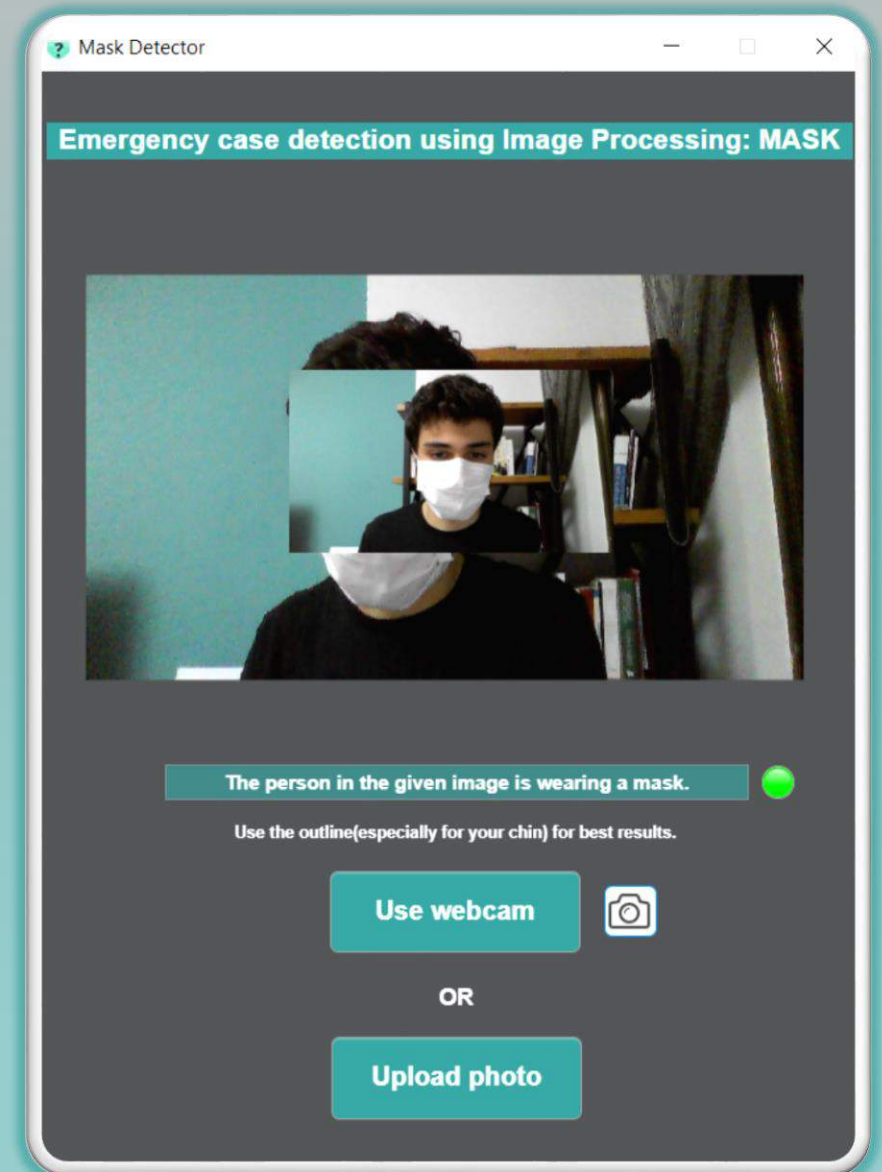
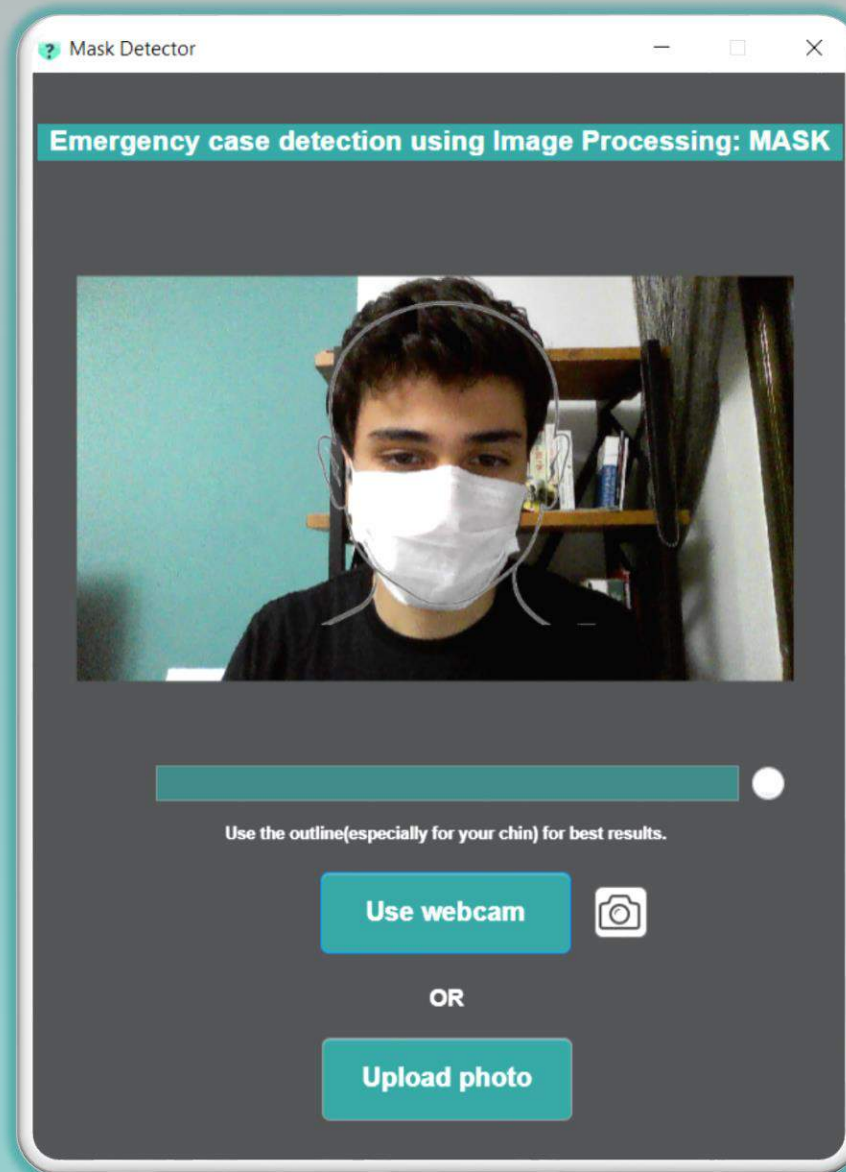
the upload option lets the user upload desired image from any folder.

# Preview: webcam option



using the outline properly will result in better accuracy.

# Preview: webcam option



using the outline properly will result in better accuracy.



# How?:

## database, re-shaping & computing the average

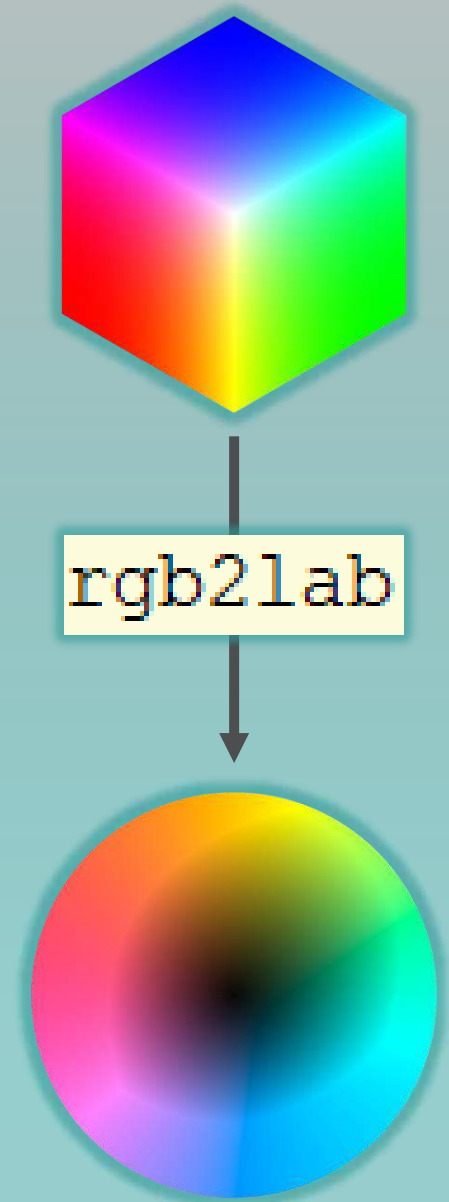
I firstly started to create a photo-database of people wearing masks in various colors and the ones without masks. Following this, I cropped all with a similar shape. Afterwards, I wrote a matlab program that assigns an image variable(uint8) that only includes the person's mouth chin and cheek then computes the variable's R G B values' average so that I can get an exact average color for the given photo. After applying these calculations for each photo of each color of mask, I got myself a colorpalette of people wearing masks in various colors.



# How?:

## comparing two colors on visual similarity

With the color palette I managed to create, I could scan a photo on mask existence by applying the same cropping technique and computing the average to compare it with the colors on the color palette. Well, but comparing colors on visual similarity with RGB color model isn't a good choice since it is not perceptually uniform. So I decided to use **L\*a\*b\*( CIELAB Color Space)** which is intended to be a perceptually uniform colorspace.



## final code & DeltaE

After converting RGB to  $L^*a^*b^*$  I can now tell the similarity between two colors by computing the **DeltaE** (the measure of change in visual perception of two given colors). Following this, I coded the final program that would print that the person is wearing a mask if the given photo's average color is more similar to a color than unmasked's and would print that the person is not wearing a mask if average color is more similar to unmasked's than any other color on the color palette.

```
%% comparison with black
avgblacklab=rgb2lab(avgblack);
wantedavglab=rgb2lab(wantedavg);
DeltaE(1)=sqrt(sum((avgblacklab-wantedavglab).^2));

%% comparison with blue
avgblacklab=rgb2lab(avgbblue);
DeltaE(2)=sqrt(sum((avgblacklab-wantedavglab).^2));

%% comparison with green
avgblacklab=rgb2lab(avggreen);
DeltaE(3)=sqrt(sum((avgblacklab-wantedavglab).^2));

%% comparison with white
avgblacklab=rgb2lab(avgwhite);
DeltaE(4)=sqrt(sum((avgblacklab-wantedavglab).^2));

%% comparison with neutral
avgblacklab=rgb2lab(avgneutral);
DeltaE(5)=sqrt(sum((avgblacklab-wantedavglab).^2));

% result
i=find(DeltaE==min(DeltaE));
fprintf('DeltaE values for given image %s is: \n',q(k).name);
display(DeltaE);
if i==5
    fprintf('The person in the given image %s is not wearing a mask.\n',q(k).name);
else
    fprintf('The person in the given image %s is wearing a mask.\n',q(k).name);
end
end
```



## testing the accuracy & end of the project

I tested the accuracy of my program with almost 80 photos including photos of my family members, my friends and me with mask and without. The program was inaccurate for 3 of the photos which were the ones that poorly shot but was fully accurate for the rest of the data. That means a %96.25 accuracy. To make things easier for the user, I designed an app using MATLAB App designer.



Thank you for listening!

