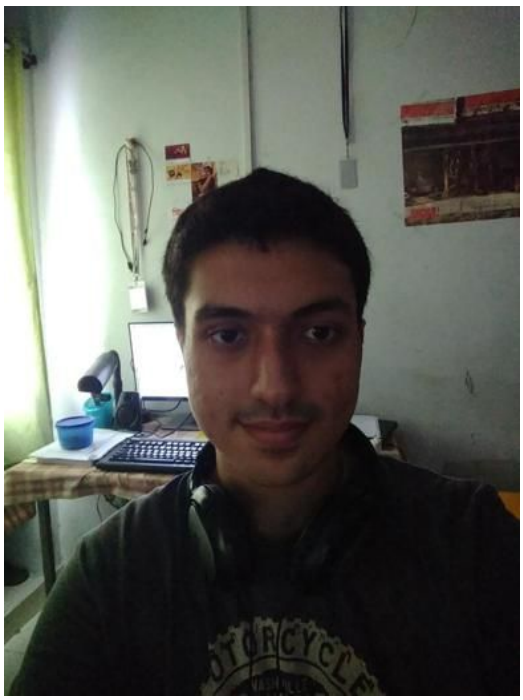
DIP Assignment 2

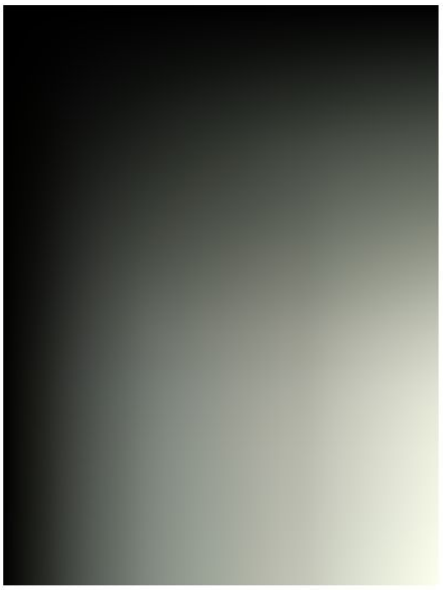
a)

```
% im = imread('myface.jpg');
% out = p3a(im);

function dp = p3a(im)
        dp = double(im);
        for i=2:size(im,1)
        dp(i,1,:) = dp(i,1,:)+dp(i-1,1,:);
        end
        for j=2:size(im,2)
        dp(1,j,:) = dp(1,j,:)+dp(1,j-1,:);
        end
        for i=2:size(im,1)
        for j=2:size(im,2)
        dp(i,j,:) = dp(i,j,:)+dp(i-1,j,:)+dp(i,j-1,:)-dp(i-1,j-1,:);
        end
        end
        figure,imshow(uint8(dp*255/max(dp(:))),[]);
End
```



Original

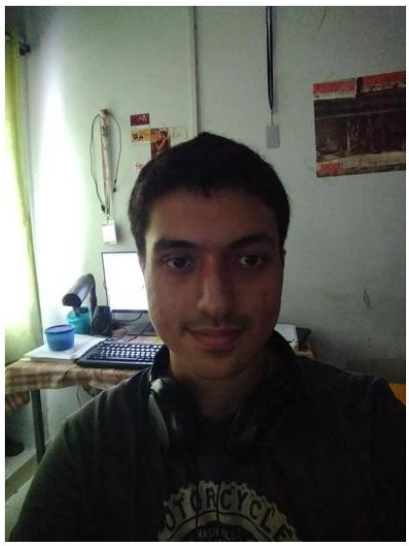


integral image 8 bit

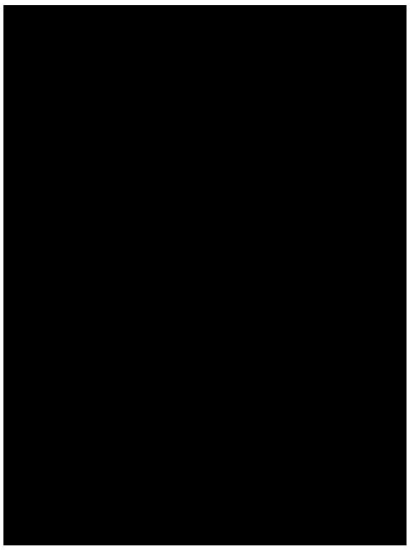
b)

```
function im = p3b(out)
        out1 = [zeros(1,size(out,2),size(out,3));out(1:end-1,:,:)];
        out2 = [zeros(size(out,1),1,size(out,3)),out(:,1:end-1,:)];
        out3 = [zeros(1,size(out2,2),size(out,3));out2(1:end-1,:,:)];
        im = out-out1-out2+out3;
        im = uint8(im);
end

% im = imread('myface.jpg');
% out = p3a(im);
% im1(:,:,1) = p3b(out(:,:,1));
% im1(:,:,2) = p3b(out(:,:,2));
% im1(:,:,3) = p3b(out(:,:,3));
% im1 = uint8(im1);
% imshow(im1);
```



generated image



Difference bw original and generated.

c)

There is no difference between the original image and the reconstructed image.

Use of integral image is to know about the gradient of the image.

If at some portion of the image, there is a very sharp contrast in the lighting, then it reflects out in the integral image.

SURF detector makes use of the gradient between regions.

Therefore, integral image helps in faster calculation of
subregion sums and speeds up the feature detection process. Which can help in feature detection in real time scenarios.

d)

```
function im = p3d(out)
        out1 = [zeros(1,size(out,2),size(out,3));out(1:end-1,:,:)];
        out = out-out1;
        out2 = [zeros(size(out,1),1,size(out,3)),out(:,1:end-1,:)];
        out = out - out2;
        im = uint8(out);
End
```

Number of addition operations in our original implementation are 3*M*N

dp(i,j,:) = dp(i,j,:)+dp(i-1,j,:)+dp(i,j-1,:)-dp(i-1,j-1,:);

Although the new implementation uses 2*M*N operations, the space required is O(2*M*N)
Therefore the storage space requirement is double the original.