**Background Blur on an Image Using a Mask in MATLAB**

**Introduction:**

In image editing, we often want to focus on one part of a picture while softening the background. This project shows how to blur the background of an image in MATLAB while keeping the main subject clear. The user draws a mask around the subject, and a Gaussian filter is used to blur the background.

**Objective:**

* Highlight the main subject of an image by keeping it sharp.
* Blur the background using a Gaussian filter.
* Show how MATLAB tools can be used for image processing.

**Tools Used:**

* **Software:** MATLAB
* **Functions Used:** imread, imfreehand, createMask, fspecial, imfilter, imshow, im2double
* **Filter Used:** Gaussian Blur Filter

**Method:**

**Step 1: Create a Mask for the Subject**

1. Open the image in MATLAB.
2. Draw a freehand mask around the subject using imfreehand.
3. Convert the drawing into a binary mask with createMask.
4. Save the mask as subjectMask.mat.

**Code :**

image = imread('hd.jpg');

imshow(image);

h = imfreehand();

mask = createMask(h);

save('subjectMask.mat', 'mask');

imshow(mask);

**Step 2: Blur the Background**

1. Load the image and the saved mask.
2. Convert the image to double precision.
3. Create a Gaussian blur filter.
4. Apply the filter to the background.
5. Keep the subject sharp while blending it with the blurred background.

**Code :**

image = imread('hd.jpg');

load('subjectMask.mat', 'mask');

imageDouble = im2double(image);

H = fspecial('gaussian', [30 30], 50);

blurredImage = imfilter(imageDouble, H, 'replicate');

blurredBackground = blurredImage;

for i = 1:3

blurredBackground(:,:,i) = blurredImage(:,:,i) .\* ~mask + imageDouble(:,:,i) .\* mask;

end

imshow(blurredBackground);

**Results:**

* The subject remains sharp while the background is blurred.
* The Gaussian filter creates a smooth and natural background blur.

**Output Example:**

* Original Image
* Mask Image
* Final Image

**Challenges and Limitations:**

* Drawing the mask manually can take time.
* The result depends on how accurately the mask is drawn.

**Conclusion:**

This project showed how to blur the background of an image in MATLAB while keeping the main subject sharp. Using a hand-drawn mask and Gaussian filter, we achieved a clear and focused result.

**Image to Sketch Conversion in MATLAB**

## ****Introduction:****

Image processing techniques are widely used for transforming images for different applications. This project demonstrates how to convert a regular image into a binary sketch-like representation using MATLAB. A binary image only have black and white pixels, resembling a hand-drawn sketch.

## ****Objective:****

* To load an image into MATLAB.
* To convert the image into a binary (sketch.
* To display both the original and binary images for comparison.

## ****Tools and Technologies Used:****

* **Software:** MATLAB
* **Functions Used:** imread, im2bw, imshow, subplot, title

## ****Method:****

### ****Step 1: Load the Image****

1. Read the input image using the imread function.
2. Display the original image for reference.

### ****Step 2: Convert the Image to Binary****

1. Use the im2bw function to convert the image to a binary format.
2. The resulting binary image contains only black and white pixels.

### ****Step 3: Display Both Images****

1. Use the subplot function to create a 2x2 layout for displaying images.
2. Show the original image in one panel and the binary (sketch) image in another.

**Code :**

clc; clear all;

a = imread('Sabbir.jpg');

binary\_img = im2bw(a);

subplot(221); imshow(a); title('Sabbir.jpg');

subplot(222); imshow(binary\_img); title('Sketch Image');

## ****Results:****

* **Original Image:** The original image is displayed in the first panel.
* **Sketch Image:** The binary image (sketch) is shown in the second panel.

**Output Example:**

* Original Image: Sabbir.jpg
* Sketch Image: A binary version with black and white pixels only.

## ****Challenges and Limitations:****

* The quality of the binary sketch depends on the original image.
* Some image details may be lost during the conversion.

## ****10. Conclusion:****

This project successfully converted an image into a binary sketch using MATLAB. The process is simple and effective for creating sketch-like effects or simplifying images for further analysis.