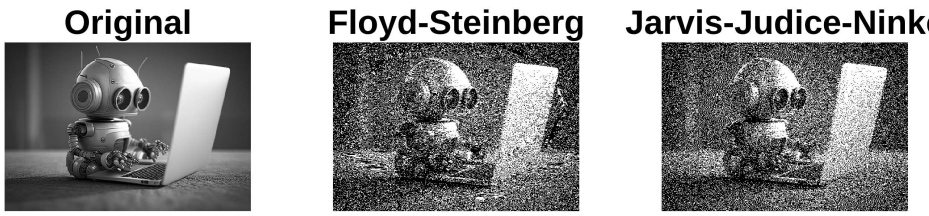
```
% Floyd-Steinberg Dithering
function output = floyd_steinberg_dithering(input)
    [h, w] = size(input);
    output = input;

    for y = 1:h
        for x = 1:w
            oldpixel = output(y, x);
            newpixel = round(oldpixel);
            output(y, x) = newpixel;
            error = oldpixel - newpixel;

            if x < w
                output(y, x+1) = output(y, x+1) + error * 7/16;
            end
            if x > 1 && y < h
                output(y+1, x-1) = output(y+1, x-1) + error * 3/16;
            end
            if y < h
                output(y+1, x) = output(y+1, x) + error * 5/16;
            end
            if x < w && y < h
                output(y+1, x+1) = output(y+1, x+1) + error * 1/16;
            end
        end
    end
end

% Jarvis-Judice-Ninke Dithering
function output = jarvis_judice_ninke_dithering(input)
    [h, w] = size(input);
    output = input;

    for y = 1:h
        for x = 1:w
            oldpixel = output(y, x);
            newpixel = round(oldpixel);
            output(y, x) = newpixel;
            error = oldpixel - newpixel;

            kernel = [0 0 0 7 5;
                      3 5 7 5 3;
                      1 3 5 3 1] / 48;

            for i = 1:3
                for j = 1:5
                    if y+i-1 <= h && x+j-3 >= 1 && x+j-3 <= w
                        output(y+i-1, x+j-3) = output(y+i-1, x+j-3) + error
* kernel(i, j);
                    end
```

```
                end
            end
        end
    end
end

% Main script to compare dithering methods
img
= imread('https://static.vecteezy.com/system/resources/previews/022/254/572/
large_2x/robot-working-on-laptop-computer-artificial-intelligence-concept-3d-
rendering-generative-ai-free-photo.jpg');
if size(img, 3) == 3
    img = rgb2gray(img);
end
img = im2double(img);

% Apply dithering
fs_dithered = floyd_steinberg_dithering(img);
jjn_dithered = jarvis_judice_ninke_dithering(img);


figure;
subplot(1,3,1); imshow(img); title('Original');
subplot(1,3,2); imshow(fs_dithered); title('Floyd-Steinberg');
subplot(1,3,3); imshow(jjn_dithered); title('Jarvis-Judice-Ninke');
```



```
imwrite(img, 'original.png');
imwrite(fs_dithered, 'floyd_steinberg_dithered.png');
imwrite(jjn_dithered, 'jarvis_judice_ninke_dithered.png');

% Compute and display PSNR
psnr_fs = psnr(fs_dithered, img);
psnr_jjn = psnr(jjn_dithered, img);
fprintf('PSNR for Floyd-Steinberg: %.2f dB\n', psnr_fs);
```

```
PSNR for Floyd-Steinberg: 7.24 dB
```

```
fprintf('PSNR for Jarvis-Judice-Ninke: %.2f dB\n', psnr_jjn);
```

```
PSNR for Jarvis-Judice-Ninke: 7.24 dB
```