

```
img = imread('https://cdn.britannica.com/86/34386-050-25B31B35/Great-horned-owl.jpg?w=300');
img = rgb2gray(img);
img = im2double(img);
```

#### % Floyd-Steinberg Dithering

```
function dithered = floyd_steinberg_dither(img)
    [h, w] = size(img);
    dithered = zeros(h, w);
    for y = 1:h
        for x = 1:w
            oldpixel = img(y, x);
            newpixel = round(oldpixel);
            dithered(y, x) = newpixel;
            quant_error = oldpixel - newpixel;
            if x < w
                img(y, x+1) = img(y, x+1) + quant_error * 7/16;
            end
            if y < h
                if x > 1
                    img(y+1, x-1) = img(y+1, x-1) + quant_error * 3/16;
                end
                img(y+1, x) = img(y+1, x) + quant_error * 5/16;
                if x < w
                    img(y+1, x+1) = img(y+1, x+1) + quant_error * 1/16;
                end
            end
        end
    end
end
```

#### % Jarvis-Judice-Ninke Dithering

```
function dithered = jarvis_judice_ninke_dither(img)
    [h, w] = size(img);
    dithered = zeros(h, w);
    for y = 1:h
        for x = 1:w
            oldpixel = img(y, x);
            newpixel = round(oldpixel);
            dithered(y, x) = newpixel;
            quant_error = oldpixel - newpixel;
            if x < w
                img(y, x+1) = img(y, x+1) + quant_error * 7/48;
                if x < w-1
                    img(y, x+2) = img(y, x+2) + quant_error * 5/48;
                end
            end
            if y < h
                if x > 1
                    img(y+1, x-1) = img(y+1, x-1) + quant_error * 5/48;
                end
            end
        end
    end
end
```

```

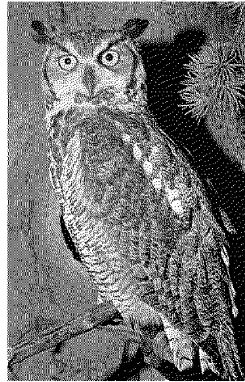
        if x > 2
            img(y+1, x-2) = img(y+1, x-2) + quant_error * 3/48;
        end
    end
    img(y+1, x) = img(y+1, x) + quant_error * 7/48;
    if x < w
        img(y+1, x+1) = img(y+1, x+1) + quant_error * 5/48;
        if x < w-1
            img(y+1, x+2) = img(y+1, x+2) + quant_error * 3/48;
        end
    end
end
end
if y < h-1
    if x > 1
        img(y+2, x-1) = img(y+2, x-1) + quant_error * 3/48;
        if x > 2
            img(y+2, x-2) = img(y+2, x-2) + quant_error * 1/48;
        end
    end
    img(y+2, x) = img(y+2, x) + quant_error * 5/48;
    if x < w
        img(y+2, x+1) = img(y+2, x+1) + quant_error * 3/48;
        if x < w-1
            img(y+2, x+2) = img(y+2, x+2) + quant_error * 1/48;
        end
    end
end
end
end
end

% Apply dithering algorithms
fs_dithered = floyd_steinberg_dither(img);
jjn_dithered = jarvis_judice_ninke_dither(img);

% Display results
figure;
subplot(1,3,1), imshow(img), title('Original Image');
subplot(1,3,2), imshow(fs_dithered), title('Floyd-Steinberg Dithering');
subplot(1,3,3), imshow(jjn_dithered), title('Jarvis-Judice-Ninke Dithering');

```

Original Image    Floyd-Steinberg Dithering    Jarvis-Judice-Ninke Dithering



```
% Compare results
fs_mse = mean((img(:) - fs_dithered(:)).^2);
jjn_mse = mean((img(:) - jjn_dithered(:)).^2);

fprintf('Floyd-Steinberg MSE: %f\n', fs_mse);
```

Floyd-Steinberg MSE: 0.184806

```
fprintf('Jarvis-Judice-Ninke MSE: %f\n', jjn_mse);
```

Jarvis-Judice-Ninke MSE: 0.171463