```
% Load the image
img = imread('https://images.pexels.com/photos/1308881/pexels-
photo-1308881.jpeg?cs=srgb&dl=pexels-soldiervip-1308881.jpg&fm=jpg'); %
Replace with your image file
img = rgb2gray(img); % Convert to grayscale
img = im2double(img); % Convert to double precision (0 to 1)

% Display the original image
figure;
imshow(img);
title('Original Grayscale Image');
```


```
function dithered_img = floyd_steinberg_dither(img)
    [rows, cols] = size(img);
    dithered_img = zeros(rows, cols);

    for i = 1:rows
        for j = 1:cols
            old_pixel_1 = img(i, j);
            new_pixel = round(old_pixel_1); % Threshold to 0 or 1
            dithered_img(i, j) = new_pixel; % Store new pixel

            % Calculate the error
            error = old_pixel_1 - new_pixel;
```

```
            % Spread the error to neighboring pixels
            if j + 1 <= cols
                img(i, j + 1) = img(i, j + 1) + error * (7 / 16);
            end
            if i + 1 <= rows
                img(i + 1, j) = img(i + 1, j) + error * (5 / 16);
                if j - 1 >= 1
                    img(i + 1, j - 1) = img(i + 1, j - 1) + error * (3 / 16);
                end
                if j + 1 <= cols
                    img(i + 1, j + 1) = img(i + 1, j + 1) + error * (1 / 16);
                end
            end
        end
    end
end
function dithered_img = jarvis_judice_ninke_dither(img)
    [rows, cols] = size(img);
    dithered_img = zeros(rows, cols);

    for i = 1:rows
        for j = 1:cols
            old_pixel_1 = img(i, j);
            new_pixel = round(old_pixel_1); % Threshold to 0 or 1
            dithered_img(i, j) = new_pixel; % Store new pixel

            % Calculate the error
            error = old_pixel_1 - new_pixel;

            % Spread the error to neighboring pixels
            if j + 1 <= cols
                img(i, j + 1) = img(i, j + 1) + error * (7 / 48);
            end
            if j + 2 <= cols
                img(i, j + 2) = img(i, j + 2) + error * (5 / 48);
            end
            if i + 1 <= rows
                img(i + 1, j) = img(i + 1, j) + error * (5 / 48);
                if j - 1 >= 1
                    img(i + 1, j - 1) = img(i + 1, j - 1) + error * (3 / 48);
                end
                if j <= cols
                    img(i + 1, j) = img(i + 1, j) + error * (5 / 48);
                end
                if j + 1 <= cols
                    img(i + 1, j + 1) = img(i + 1, j + 1) + error * (3 / 48);
                end
                if j + 2 <= cols
                    img(i + 1, j + 2) = img(i + 1, j + 2) + error * (1 / 48);
                end
```

```
            end
            if i + 2 <= rows
                img(i + 2, j) = img(i + 2, j) + error * (1 / 48);
            end
        end
    end
end
% Apply Floyd-Steinberg dithering
img_floyd = floyd_steinberg_dither(img);

% Apply Jarvis-Judice-Ninke dithering
img_jj = jarvis_judice_ninke_dither(img);
% Display the results
figure;
subplot(1, 3, 1), imshow(img), title('Original Grayscale Image');
subplot(1, 3, 2), imshow(img_floyd), title('Floyd-Steinberg Dithering');
subplot(1, 3, 3), imshow(img_jj), title('Jarvis-Judice-Ninke Dithering');
```