

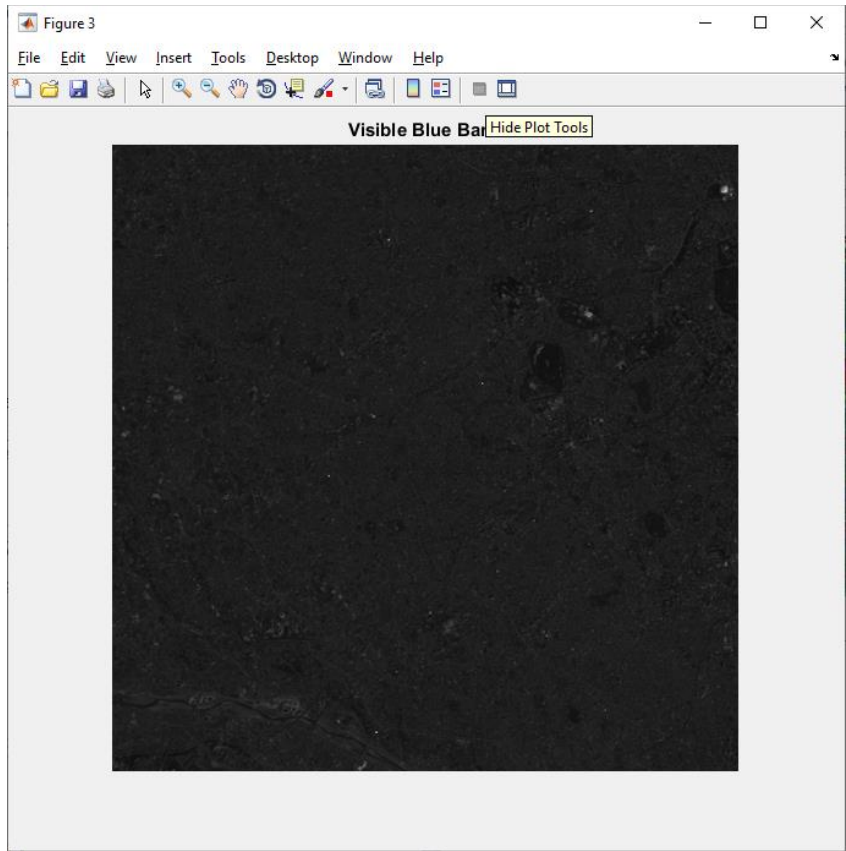
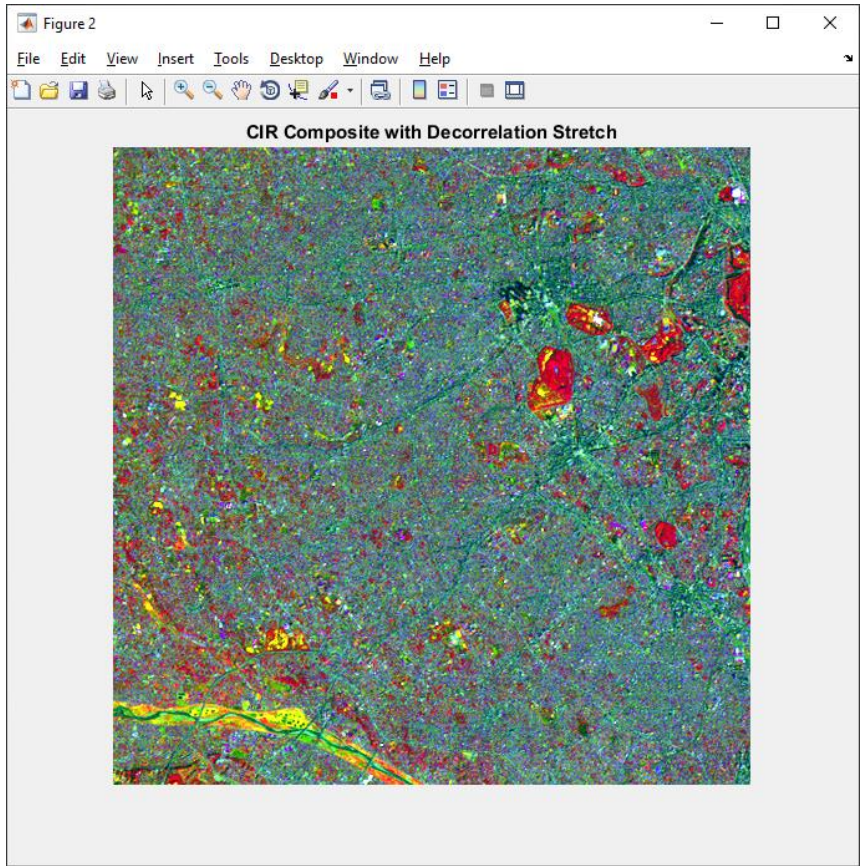
Computer Image Processing

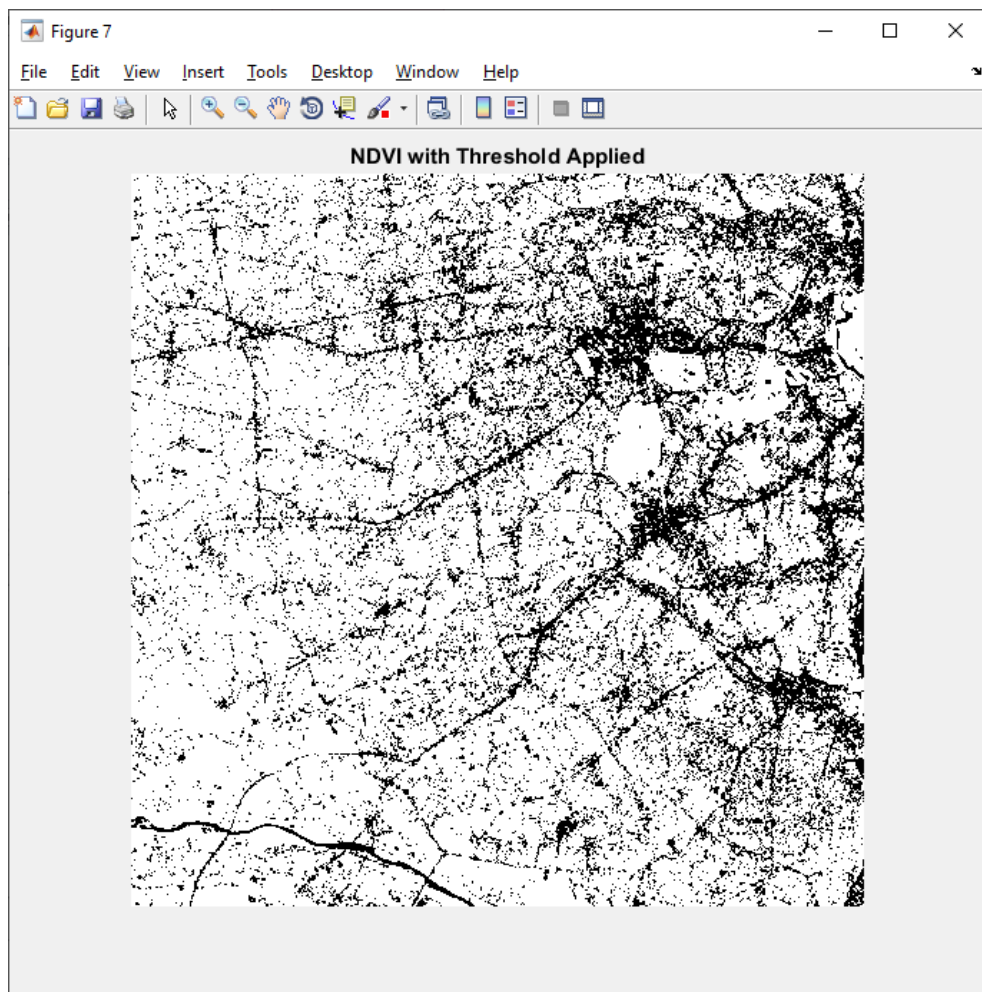
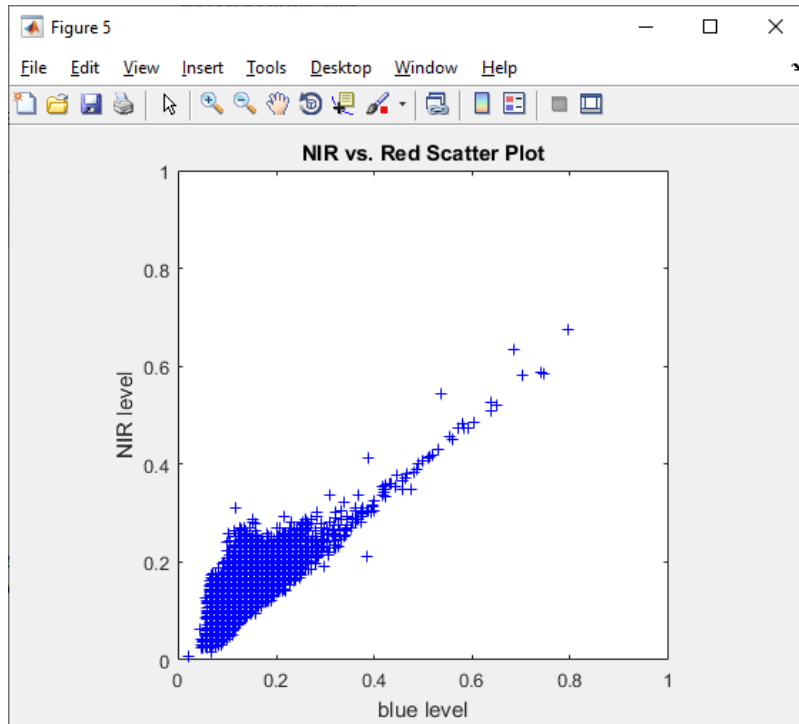
Classes 12 - Multispectral Color Images

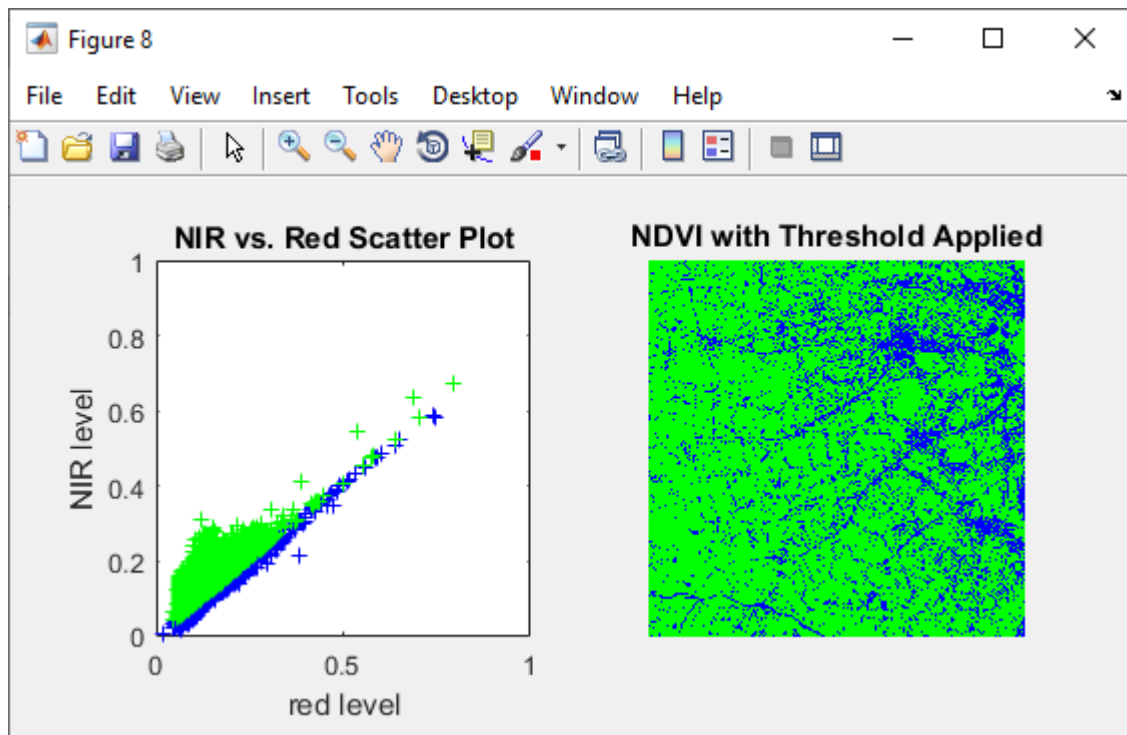
Example 1

Identify paths (roads and rivers) on a multispectral image. Use a multispectral image `tokyo.lan`.

```
CIR = multibandread('tokyo.lan', [512, 512, 7], 'uint8=>uint8', ...
    128, 'bil', 'ieee-le', {'Band', 'Direct', [4 3 1]});
    figure, imshow(CIR)
title('CIR Composite (Un-enhanced)')
text(size(CIR,2), size(CIR,1) + 15, ...
    'Image courtesy of Space Imaging, LLC', ...
    'FontSize', 5, 'HorizontalAlignment', 'right')
decorrCIR = decorrstretch(CIR, 'Tol', 0.01);
figure, imshow(decorrCIR)
title('CIR Composite with Decorrelation Stretch')
NIR = im2single(CIR(:,:,1));
blue= im2single(CIR(:,:,2));
figure, imshow(blue)
title('Visible Blue Band')
figure
imshow(NIR)
title('Near Infrared Band')
figure, plot(blue, NIR, '+b')
set(gca, 'XLim', [0 1], 'XTick', 0:0.2:1, ...
    'YLim', [0 1], 'YTick', 0:0.2:1);
axis square
xlabel('blue level')
ylabel('NIR level')
title('NIR vs. Red Scatter Plot')
ndvi = (NIR - blue) ./ (NIR + blue);
figure, imshow(ndvi, 'DisplayRange', [-1 1])
title('Normalized Difference Vegetation Index')
threshold = -0.1;
q = (ndvi > threshold);
figure, imshow(q)
title('NDVI with Threshold Applied')
% Creating an image with a characteristic ratio 12.
h = figure;
p = get(h, 'Position');
set(h, 'Position', [p(1,1:3), p(3)/2])
subplot(1,2,1)
% Creating a scattering schedule.
plot(blue, NIR, '+b')
hold on
plot(blue(q(:)), NIR(q(:)), 'g+')
set(gca, 'XLim', [0 1], 'YLim', [0 1])
axis square
xlabel('red level')
ylabel('NIR level')
title('NIR vs. Red Scatter Plot')
% NDVI image display.
subplot(1,2,2)
imshow(q)
set(h, 'Colormap', [0 0 1; 0 1 0])
title('NDVI with Threshold Applied')
```







Exercise 1

Determine what radiates heat (greenery and machinery, ships) on a multispectral image.

Use a multispectral image paris.lan

```

CIR = multibandread('paris.lan', [512, 512, 7], 'uint8=>uint8', ...
    128, 'bil', 'ieee-le', {'Band', 'Direct', [4 3 2]});
figure, imshow(CIR)
title('CIR Composite (Un-enhanced)')
text(size(CIR,2), size(CIR,1) + 15, ...
    'Image courtesy of Space Imaging, LLC', ...
    'FontSize', 5, 'HorizontalAlignment', 'right')
decorrCIR = decorrstretch(CIR, 'Tol', 0.01);
figure, imshow(decorrCIR)
title('CIR Composite with Decorrelation Stretch')
NIR = im2single(CIR(:,:,1));
red = im2single(CIR(:,:,2));
figure, imshow(red)
title('Visible Red Band')
figure
imshow(NIR)
title('Near Infrared Band')
figure, plot(red, NIR, '+r')
set(gca, 'XLim', [0 1], 'XTick', 0:0.2:1, ...
    'YLim', [0 1], 'YTick', 0:0.2:1);
axis square
xlabel('red level')
ylabel('NIR level')
title('NIR vs. Red Scatter Plot')
ndvi = (NIR - red) ./ (NIR + red);
figure, imshow(ndvi, 'DisplayRange', [-1 1])
title('Normalized Difference Vegetation Index')
threshold = 0.1;
q = (ndvi > threshold);
figure, imshow(q)
title('NDVI with Threshold Applied')
% Создание изображения с характеристическим отношением 12.
h = figure;
p = get(h, 'Position');

```

```

set(h, 'Position', [p(1,1:3), p(3)/2])
subplot(1,2,1)
% Создание графика рассеяния.
plot(red, NIR, '+r')
hold on
plot(red(q(:)), NIR(q(:)), 'g+')
set(gca, 'XLim', [0 1], 'YLim', [0 1])
axis square
xlabel('red level')
ylabel('NIR level')
title('NIR vs. Red Scatter Plot')
% Отображение NDVI-изображения.
subplot(1,2,2)
imshow(q)
set(h, 'Colormap', [0 1 0; 1 0 0])
title('NDVI with Threshold Applied')

```

Notes: Multispectral images are located inside Matlab. Therefore, for the program to work, it is enough to write the name of the image.