

# Computer Image Processing

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*Classes 2 - Introduction to image processing, geometric transformations*

## Example 1

Numbering of rows and columns of the image matrix

```
imshow (eye(4)*0.5+0.5, 'InitialMagnification', 'fit')
axis on
grid on
xlabel('kolumny')
ylabel('wiersze')
hold on
plot(1:4,1:4, 'r', 'LineWidth', 5)
pause
axis xy
```

## Example 2

Information about the image

```
info = imfinfo('portrait.jpg')
```

*imfinfo returns a value of a struct type, you can refer to individual fields by name, for example, info.FileSize*

## Example 3

Displaying the loaded image and information about figure

```
L1=imread('portrait.jpg');
figure(1);
imshow(L1);
get(1);
```

*imshow - displays the grayscale image in a figure*

*figure(h) - creates a new figure window with the h handle*

*get(h) - returns all properties and property values for the graphics object identified by the h handle*

*set(h,Name,Value) - specifies a value for the property Name on the object identified by the h handle*

*gcf - (get current figure) returns current figure handle*

## Exercise 1

**Display picture *portrait.jpg* in a new figure. In the figure name display the color type of the image got with the use of *imfinfo*. Set the figure background color to white.**

```
info = imfinfo('portrait.jpg');
L1=imread(info.FileName);
figure(1);
imshow(L1);
set(1,'Name',info.ColorType,'Color',[1 1 1]);
```

## Geometric transformations

### Example 4

Image shift with enlarged image area. The shift vector is given in the Cartesian system.

```
m0=100;
n0=160;
L1=imread('portrait.jpg');
figure(1);
imshow(L1)
[m1,n1]=size(L1);
L2=[zeros(m1,n0),L1;zeros(m0,(n0+n1))];
figure(2);
imshow(L2)
```

### Exercise 2

**Basing on example 4, shift the image by the same vector, but retaining its original surface.**

```
m0=100;
n0=160;
L1=imread('portrait.jpg');
figure(1);
imshow(L1)
[m1,n1]=size(L1);
L2=[zeros((m1-m0),n0),L1((m0+m1):m1,1:(n1-n0)); zeros(m0,n1)];
figure(2);
imshow(L2)
```

### Example 5

Rotation the image by a given angle while retaining its original surface.

```
L1=imread('portrait.jpg');
figure(1);
imshow(L1);
L2a=imrotate(L1,-60,'crop');
figure(2);
imshow(L2a);
```

**Rotate the image by a different angle, respectively increasing the area of the image.**

### Exercise 3

The "fliplr" (flip left-right) function flips the image (an array) about a vertical axis, "flipud" (flip up-down) - about a horizontal axis of the source image.

Use the given functions to get the following image:



```
L1=imread('portrait.jpg');  
L2 = fliplr(L1);  
L3 = flipud(L1);  
L4 = fliplr(L3);  
L_out = [L2,L1;L3,L4];  
imshow(L_out)
```