Czestochowa University of Technology

Faculty of Mechanical Engineering and Computer Science

# Computer vision, pattern recognition and image retrieval

## Laboratory 1

**Topic:** *Basic operations and functions in Matlab*

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Technical support for Matlab is available on the website: http://www.mathworks.com/

### MATLAB Operators and Special Characters

This page contains a comprehensive listing of all MATLAB® operators, symbols, and special characters.

https://uk.mathworks.com/help/matlab/matlab_prog/matlab-operators-and-special-characters.html?searchHighlight=operator&s_tid=srchtitle_operator_2

### Syntax in Matlab - The most commonly used

```
>> a=2                    % a variable with a value of 2

a =
   2
```

```
>> A=[1 2 3 4 5]                    >> A=[1,2,3,4,5]
A =                           =     A =
   1   2   3   4   5                    1   2   3   4   5
```

```
>> B=[1 2 3; 4 5 6]                 >> B=[1,2,3; 4,5,6]
B =                                 B =
   1   2   3                 =        1   2   3
   4   5   6                          4   5   6
```

```
>> C=zeros(3)
C =
   0   0   0
   0   0   0
   0   0   0
```

```
>> C=zeros(3,1)
C =
   0
   0
   0

>> C=zeros(1,3)
C =
   0   0   0

>> D=zeros(2,3)
D =
   0   0   0
   0   0   0

>> E=ones(4)
E =
   1   1   1   1
   1   1   1   1
   1   1   1   1
   1   1   1   1

>> E=ones(4,1)
E =
   1
   1
   1
   1

>> E=ones(1,4)
E =
   1   1   1   1

>> F=ones(3,2)
F =
   1   1
   1   1
   1   1

>> A1=A+2                          % Dla  A =   1   2   3   4   5
A1 =
   3   4   5   6   7
```

```
>> B1=B-2                    % Dla  B =   1   2   3
B1 =                                     4   5   6
  -1   0   1
   2   3   4

>> C1=C+1                    % Dla  C =   0   0   0
C1 =
   1   1   1

>> E1=E*2                    % Dla  E =   1   1   1   1
E1 =
   2   2   2   2

>> F1=F*4/2                  % Dla F =    1   1
F1 =                                     1   1
   2   2                                 1   1
   2   2
   2   2
```

**for**

```
n=3;
for i=1:n
 B(i)=i;
end
```

or

```
n=3;
m=5;
for i=1:n
 for j=1:m
 A(i,j)=i+j;
 end
end
```

***while***

```
a=10;
x=1;
while x<=a
 x=x+1;
end
```

*if*

```
if i==j
 D=2;
end
```

or

```
if i>=j
 E=1;
else
 E=0;
end
```

or

```
if i==j
 E=1;
elseif i<j
 E=-1;
else
 E=0;
end
```

The % sign is used to comment on a line of code,

to comment on multiple lines use the keyboard shortcut Ctrl + r

to uncomment multiple lines use the Ctrl + t keyboard shortcut

**Please do all tasks in one script „*LAB01.m*”.**

**Exercise 1**

You should write a program that will load RGB photos in * .jpg or * .png format. Then, it will convert that photo to grayscale. Next, it will save them to the * Sz.jpg or * Sz.png file. The program should display the original and modified image.

**Required commands:**

imread - reading an image file

imwrite - saving to an image file
imshow - displaying an image on the screen
rgb2gray - convert RGB color image to grayscale

## Exercise 2

You should write a program that will load two RGB photos in * .jpg or * .png format. The program should display in one window both the original photos and the third image as an assembled pair of these images.

**Required commands:**

imread - reading an image file
imshow - displaying an image on the screen
rgb2gray - convert RGB color image to grayscale
imshowpair - mounting two images (e.g. with the 'montage' parameter)
subplot - to display figures in one window

## Exercise 3

Create 2 folders "Pom1" and "Pom2" in the current folder. Copy any two color image files in * .jpg or * .png format to the "Pom1" folder.

Write a program that will load all the .jpg or .png files from the "Pom1" folder. Then each of them will convert to grayscale and save to the previously created folder "Pom2". The program should display all files in grayscale.

**Required commands:**

imread - reading an image file
imshow - displaying an image on the screen
imwrite - saving to an image file
rgb2gray - convert RGB color image to grayscale
length - counts the amount of data
dir - returns a list of folder contents
cd, cd ../ - switching between folders

## Exercise 4

Create a folder called "Pom3" in the current folder.

You should write a program that will load all .jpg or .png files from the "Pom1" folder. Then it will resize them to the range 227 x 227 x 3 and save them to the previously created folder "Pom3". The program should display all resized files..

**Required commands:**

imread - reading an image file
imshow - displaying an image on the screen
imwrite - saving to an image file
imresize3 - changes the size of a three-dimensional object
length - counts the amount of data
dir - returns a list of folder contents
cd, cd ../ - switching between folders

Please send the created „*LAB01.m*" script with completed tasks as a solution via the moodle platform.