Khwopa Engineering College

Course Code :BEG 475 IP
Image Processing and Pattern Recogntiion

Lab Report on Introduction to MATLAB

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1 Theory:

1.1 MATLAB

Matlab
The Language of Technical Computing
Millions of engineers and scientists worldwide use MATLAB® to analyze and design the systems and products transforming our world. The matrix-based MATLAB language is the world's most natural way to express computational mathematics. Built-in graphics make it easy to visualize and gain insights from data. The desktop environment invites experimentation, exploration, and discovery. These MATLAB tools and capabilities are all rigorously tested and designed to work together.

MATLAB helps us to run our analyses on larger data sets, and scale up to clusters and clouds. MATLAB code can be integrated with other languages, enabling us to deploy algorithms and applications within web, enterprise, and production systems.

1.2 Few Command and Statements

1.clc
clc clears all input and output from the Command Window display, giving you a "clean screen." After using clc, we cannot use the scroll bar to see the history of functions, but we still can use the up arrow key, ↑, to recall statements from the command history.

2.disp()
disp(X) displays the value of variable X without printing the variable name. Another way to display a variable is to type its name, which displays a leading "X =" before the value. If a variable contains an empty array, disp returns without displaying anything.

3.if elseif else
if expression, statements, end evaluates an expression, and executes a group of statements when the expression is true. An expression is true when its result is nonempty and contains only nonzero elements (logical or real numeric). Otherwise, the expression is false.
The elseif and else blocks are optional. The statements execute only if previous expressions in the if...end block are false. An if block can include multiple elseif blocks.

4.end
end terminates for, while, switch, try, if, and parfor statements. Without an end
statement, for, while, switch, try, if, and parfor wait for further input. Each end is
paired with the closest previous unpaired for, while, switch, try, if, or parfor and
serves to delimit its scope.
end also marks the termination of a function, although in many cases it is optional.
If your function contains one or more nested functions, then you must terminate
every function in the file, whether nested or not, with end. This includes primary,
nested, private, and local functions.

5.input()
x = input(prompt) displays the text in prompt and waits for the user to input a
value and press the Return key. The user can enter expressions, like pi/4 or rand(3),
and can use variables in the workspace.
If the user presses the Return key without entering anything, then input returns an
empty matrix.
If the user enters an invalid expression at the prompt, then MATLAB® displays
the relevant error message, and then redisplays the prompt.
str = input(prompt,'s') returns the entered text as a string, without evaluating the
input as an expression.

6.fprintf()
fprintf(fileID,formatSpec,A1,...,An) applies the formatSpec to all elements of arrays
A1,...An in column order, and writes the data to a text file. fprintf uses the encoding
scheme specified in the call to fopen.

7.plot()
plot(X,Y) creates a 2-D line plot of the data in Y versus the corresponding values
in X.

8.while
while expression, statements, end evaluates an expression, and repeats the execution
of a group of statements in a loop while the expression is true. An expression is
true when its result is nonempty and contains only nonzero elements (logical or real
numeric). Otherwise, the expression is false.

2   Code Description

Basic Mathematical operations using MATLAB

```
fprintf('Choose Options\n');
fprintf('1. Basic Mathematical operation on Numbers\n');
fprintf('2. Matrix Operations\n');
fprintf ('3. Plot Graph\n');
logv = true;
while logv == true
    choice = input('Enter your Choice');
    if(choice == 1)
        a = input('Enter Number One');
        b = input ('Enter Number Two');
        disp('a+b:'); disp(a+b);
        disp('a-b:'); disp(a-b);
        disp('a/b:'); disp(a/b);
        disp('a*b:'); disp(a*b);
    elseif(choice == 2)
        matrixA = [12,15,18;12,18,15;14,19,13];
        matrixB = [1,25,14;18,13,1;12,15,15];
        disp('matrix A:\n');
        disp(matrixA);
        disp('matrix B:\n');
        disp(matrixB);
        disp('Addition of Two Matrix\n');
        disp(matrixA+matrixB);
        disp('Subtraction of Two Matrix\n');
        disp(matrixA-matrixB);
        disp('Multiplication of Two Matrix\n');
        disp(matrixA*matrixB);
        disp('submatrix A:\n');
        disp(matrixA(1:2,2:3));
    elseif(choice == 3)
        x = 0:pi/100:2*pi;
        y = sin(x);
        plot(x,y);
    elseif (choice == 9)
        logv = false;
    end
end
```

3   Result and Discussion

Input Numbers are taken from user and different mathematical operations like addition, subtraction, multiplication,division are performed and result are shown. For the Matrix Operation two 3 x 3 matrices A and B are made and Multiplication, Addition, Subtraction on those matrices is done and Submatrix of Matrix A is also shown to the user.
On User choice to plot the graph, the system generates the figure for sine curve with range 0 to 2*Pi

Output:

```
>> labone
Choose Options
1.Basic Mathematical operation on Numbers
2.Matrix Operations
3.Plot Graph
Enter your Choice1
Enter Number One15
Enter Number Two18
a+b:
    33

a-b:
    -3

a/b:
    0.8333

a*b:
   270

Enter your Choice2
matrix A:\n
    12    15    18
    12    18    15
    14    19    13
```

```
matrix B:\n
     1    25    14
    18    13     1
    12    15    15

Addition of Two Matrix\n
    13    40    32
    30    31    16
    26    34    28

Subtraction of Two Matrix\n
    11   -10     4
    -6     5    14
     2     4    -2

Multiplication of Two Matrix\n
   498   765   453
   516   759   411
   512   792   410

submatrix A:\n
    15    18
    18    15

Enter your Choice3
```
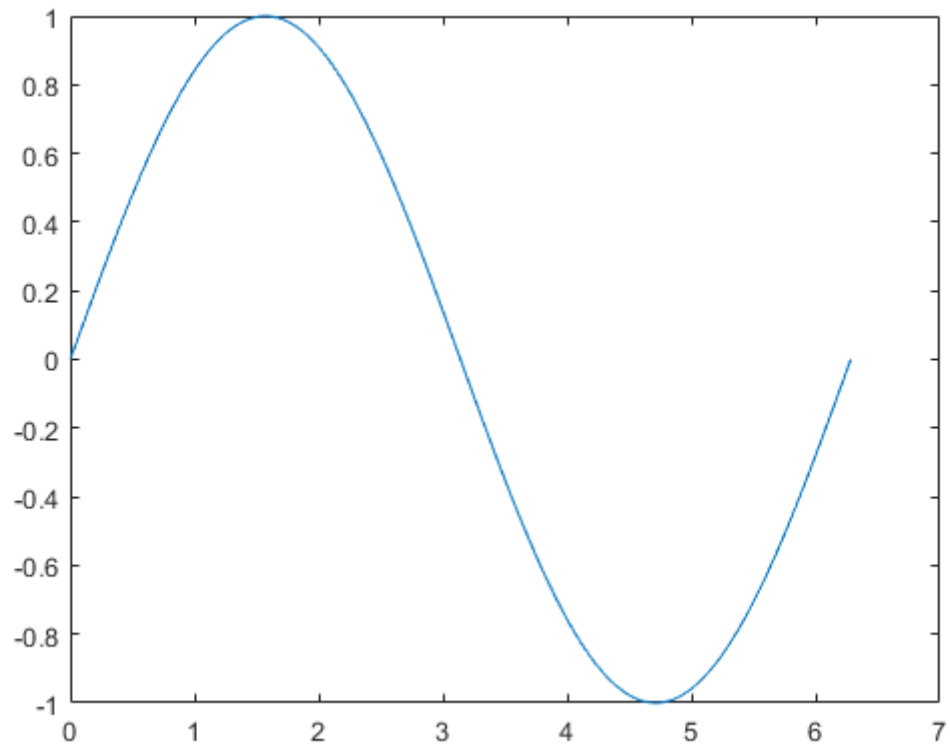
4   Conclusion

Hence,
We are familiarized with the MATLAB to perform basic programming and mathematical operation.