Control Statements

- Download PDF
- To access the updated lecture notes, please click on the following link: https://yasirbhutta.github.io/matlab/docs/flow-control.html

Introduction

Loops

For Loop

- A for loop in MATLAB is a programming statement that repeats a block of code a certain number of times.
- They are used in a wide variety of applications, such as mathematical computations, data processing, and graphical plotting.

Syntax - for loop

```
for variable = expression
    statements
end
```

- **variable** is a loop counter variable that is initialized to the value of expression at the start of the loop.
- **expression** is a mathematical expression that evaluates to a scalar value.
- **statements** are the statements that are executed within the loop body.

The loop counter variable is incremented by 1 after each iteration of the loop. The loop continues to iterate until the loop counter variable is greater than the value of expression.

Example: Printing "Hello, World!" Ten Times Using a for Loop

```
for i = 1:10
    disp('Hello, world!');
end
```

Example: Print Numbers from 1 to 5

```
   for i = 1:5
       disp(i);
end
```

Example: Print the numbers from 1 to 10

```
% Print the numbers from 1 to 10 to the console.
for i = 1:10
  fprintf('The number is %d\n', i);
end
```

Example: Sum of Numbers from 1 to N

```
  N = 10;
  sum = 0;
  for i = 1:N
      sum = sum + i;
  end
  disp(sum);
```

Example: Calculate the sum of the numbers from 1 to 100

```
sum = 0;
for i = 1:100
    sum = sum + i;
end
disp(sum);
```

Example: Print Even Numbers from 1 to 10

```
  for i = 2:2:10
      disp(i);
  end
```

Example: Print Even Numbers from 0 to 20

```
sum = 0;
for k = 0:2:20,
    sum = sum + k;
end;
fprintf('sum %d', sum);
```

MATLAB Example: Calculating the Sum of Elements in an Array

```
sum = 0;
for arr1 = [1 5 7 6],
    sum = sum + arr1;
end;
fprintf('sum = %d',sum)
```

MATLAB Example: Displaying Elements of an Array Using a for Loop

```
   A = [10, 20, 30, 40, 50];
   for i = 1:length(A)
       disp(A(i));
end
```

- A **nested loop** is a loop inside another loop. It is a powerful programming technique that can be used to solve a wide variety of problems.
- We use nested loops when we need to iterate over multiple dimensions of data. For example, we might use a nested loop to print a two-dimensional array, or to search through a list of lists.

Example: Nested Loops - Multiplication Table

```
for i = 1:5
    for j = 1:5
            fprintf('%d x %d = %d\n', i, j, i * j);
    end
end
```

Conditional Statements / Branches

Exercises

1. Write a MATLAB program to get input from the user to display a table of a given number. The program should prompt the user to enter the number and then print a table showing the multiplication table for that number from 1 to 10.

Example output: Enter a number: 5

Multiplication table for 5

1 * 5 = 5 2 * 5 = 10 3 * 5 = 15 4 * 5 = 20 5 * 5 = 25 6 * 5 = 30 7 * 5 = 35 8 * 5 = 40 9 * 5 = 45 10 * 5 = 50