Introduction to MATLAB

Learning Objectives

- Get to know the MATLAB environment.
- Learn about MATLAB arrays.
- Read tabular data from a file into a program.
- Assign values to variables.
- Select individual values and subsections from data.
- Perform operations on arrays of data.
- Display simple graphs.

Part 1 – The MATLAB Environment

Current Folder

Command Window

Workspace => Temporary memory

Search Documentation

Part 2 – Assigning Variables

Assigning a variable, explain semi-colon

```
x=1
y=1

z= x+y
```

Explain semicolon

Variable names must begin with a letter, and can contain numbers or underscores

Variable arithmetic (plus, negative, divide, multiply)

Vectors (row, column, transpose, size) - use [ ]

```
x= [1,2,3];
```

Matrices

```
X = [1 2 3; 4 5 6];
```

Characters and strings – use ' '

```
X = 'hello Matlab';
```

Challenge

Part 3 – Data Structures

Let us look at the data set.

```
load ('meteorite_landing.mat');
```

We have cell array; structural array and vectors. Our data is a combination numerical and textual data.

Indexing Data – "Taking Slices"

Let us look at the name of the first meteorite

```
name_1= name(1,1);
```

Look at second patient, all days

```
name_2= name(2,1);
```

Display the names of the first 5 meteorites

```
names_1_5= name(1:5, :);
```

More vector making

```
AllNumbers = 1:10;   %start:step:end
EverySecondNumber = 1:2:10;
```

Look at the name of the every second meteorite.

```
meteorite_name_2= name(1:2:end);
```

Let's move on to the mass of the meteorite.

```
mass_meteorite= massg(1);
```

Let us look at a matrix. Show continent_1. The latitude, longitude and mass of the first meteor to hit continent_1

```
lat= continent_1(1,1)
long= continent_1(1,2)
mas= continent_1(1,3)
```

Recap

Define vectors and matrices with [ ]

Define strings and characters with ' ', and squish them together with [ ]

Index a matrix or vector with ( )

Part 4 – Analysing Data

Finding the mean mass of the first 20 meteors to hit continent_1.

```
mean_mass= mean(continent_1(1:20, 3))
```

Find the minimum, maximum and standard deviation

```
min_mass=min(massg)
max_mass= max(massg)
standard_deviation= std(massg)
```

Part 5: Writing Scripts

Why we use scripts

.m extension

Comments first

Make separate data folder (discuss good data conventions, read only)

Reading data, analyse data

Save a script and try to run it from the wrong directory (error). Explain how to change the path

Go over the challenge files.

Part 6: Displaying the data

The plot function

```
plot(massg);
```

Scatter plot

```
scatter(continent_1(:,1), continent_1(:,2));
```

Saving to file: Use the save file

```
print('name', '-dpng');
savefig();
saveas();
```