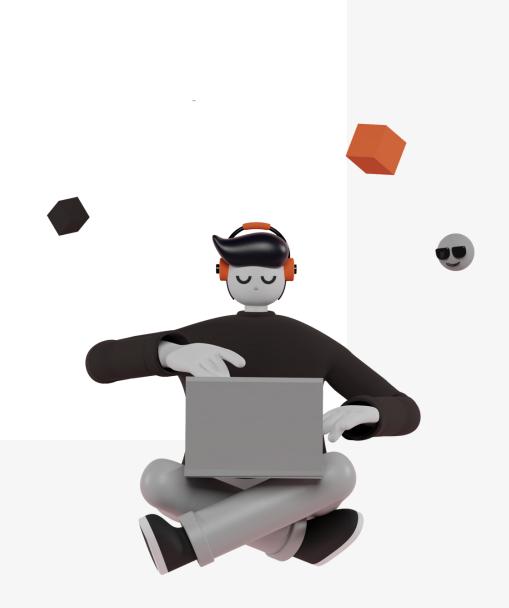# Getting Started with
MATLAB

By Garmit Pant

Hi I'm Garmit Pant

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EDG Intern at MathWorks, 2022
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in @garmitpant

Why MATLAB? 🔍

Designed for Engineering Tasks

MATLAB is a computing platform that is specifically made for engineering and scientific applications.
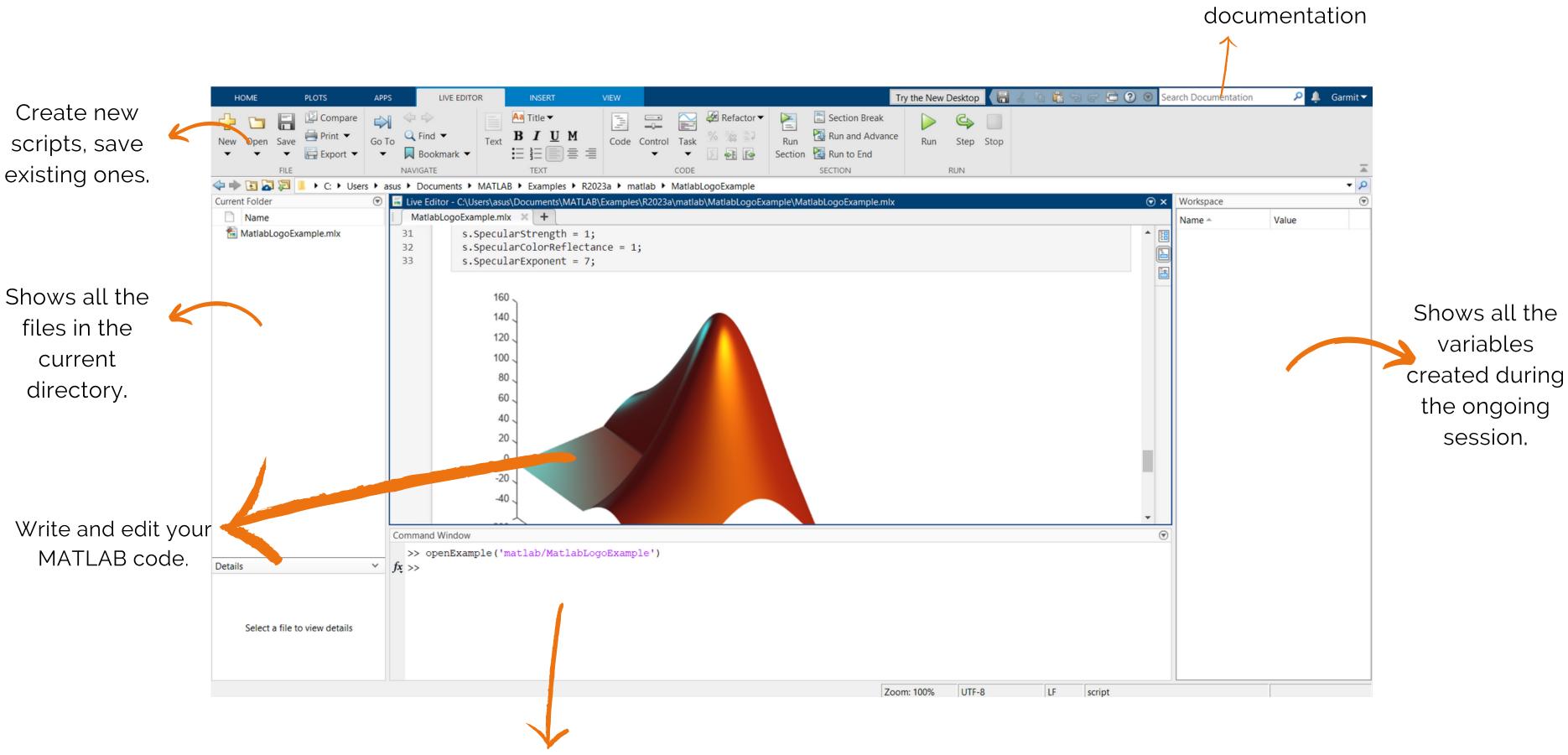
Toolboxes have you covered

MATLAB offers professionally developed Toolboxes for various engineering and scientific domains that offer great usability.

Great Documentation. Greater Support.

MATLAB has a very meticulously documented code base. MATLAB also offers dedicated professional support and has an active, supportive community.

```
s.FaceLighting = 'gouraud';
s.AmbientStrength = 0.3;
s.DiffuseStrength = 0.6;
s.BackFaceLighting = 'lit';

s.SpecularStrength = 1;
s.SpecularColorReflectance = 1;
s.SpecularExponent = 7;
```

Search through the documentation

Create new scripts, save existing ones.

Shows all the files in the current directory.

Write and edit your MATLAB code.

Shows all the variables created during the ongoing session.

Write and execute MATLAB commands. It also shows command line output.

HOME   PLOTS   APPS   LIVE EDITOR   INSERT   VIEW

Try the New Desktop   Search Documentation   Garmit

New Open Save   Compare Print   Go To Find Bookmark   Text Title B I U   Code Control Task Refactor   Run Section Section Break Run and Advance Run to End   Run Step Stop

FILE   NAVIGATE   TEXT   CODE   SECTION   RUN

C: ▸ Users ▸ asus ▸ Documents ▸ MATLAB ▸ Examples ▸ R2023a ▸ matlab ▸ MatlabLogoExample

Current Folder

Name
MatlabLogoExample.mlx

Live Editor - C:\Users\asus\Documents\MATLAB\Examples\R2023a\matlab\MatlabLogoExample\MatlabLogoExample.mlx

MatlabLogoExample.mlx

31   s.SpecularStrength = 1;
32   s.SpecularColorReflectance = 1;
33   s.SpecularExponent = 7;

160
140
120
100
80
60
40
20
0
-20
-40

Workspace

Name   Value

Details

Select a file to view details

Command Window

>> openExample('matlab/MatlabLogoExample')
fx >>

Zoom: 100%   UTF-8   LF   script

Documentation

doc function_name

Opens the documentation for the given function.

help function_name

Displays abbreviated version of documentation in Command Window.

Command Window

```
>> help sum
 sum Sum of elements.
    S = sum(X) is the sum of the elements of the vector X. If X is a matrix,
    S is a row vector with the sum over each column. For N-D arrays,
    sum(X) operates along the first non-singleton dimension.

    S = sum(X,"all") sums all elements of X.

    S = sum(X,DIM) sums along the dimension DIM.

    S = sum(X,VECDIM) operates on the dimensions specified in the vector
    VECDIM. For example, sum(X,[1 2]) operates on the elements contained in
    the first and second dimensions of X.
```

Pro Tip:
Click on the 'fx' symbol to search for the function you need.

```
fx >>

sum                                                          ×
Functions                                                    ^
fx sum                    Sum of array elements
fx sum                    Sum of timeseries data
```
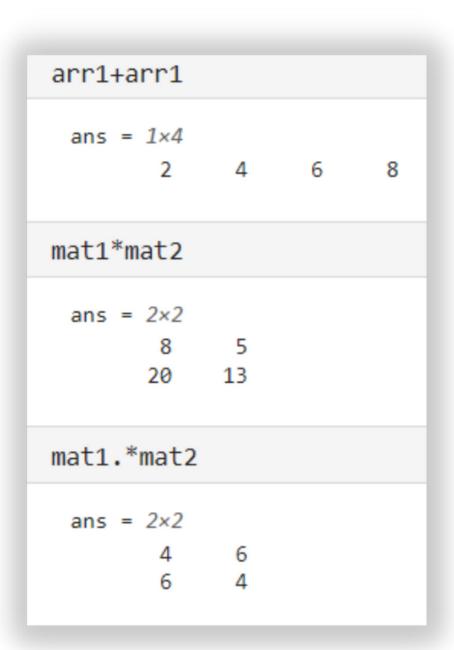
Variables

Dynamically Typed Language

Data type is associated with value, not the variable name

```
var1 = 1;                %double
var2 = 2.45;             %double
var3 = 'Hello World!';   %char array
whos                     %displays the contents of the workspace

  Name      Size          Bytes  Class     Attributes

  var1      1x1               8  double
  var2      1x1               8  double
  var3      1x12             24  char
```

Array and Matrices

```matlab
arr1 = [1 2 3 4];        %row vector
mat1 = [1 2; 3 4];       %2x2 matrix
mat2 = [4 3; 2 1];

arr1+arr1;        %array addition
mat1*mat2;        %matrix multiplication
mat1.*mat2        %element-wise mutiplication
```

Output

```
arr1+arr1

ans = 1×4
      2      4      6      8


mat1*mat2

ans = 2×2
      8      5
     20     13


mat1.*mat2

ans = 2×2
      4      6
      6      4
```

NOTE:
In MATLAB, arrays are indexed from **1**!

Loops and Conditionals

Just the way you know them

Loops and Conditional statements are similar to other languages. Close the loops and if-elses with "end".

While loops also exist in MATLAB and work similarly to while loops in other languages.
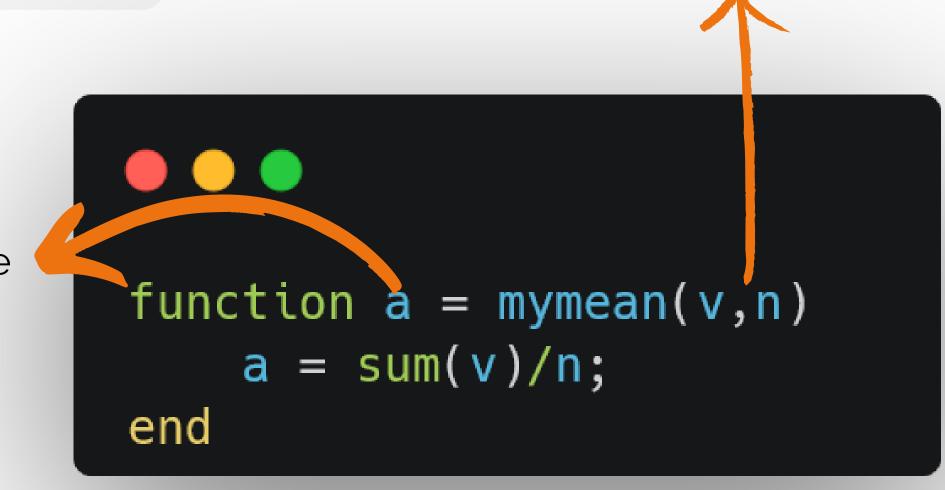
```matlab
A = randi(10,1,20);

%for loop
for i = 1:length(A)
    %if statement
    if A(i)==3
        disp('For');
    end
end
```

Functions

- Defined as separate .m scripts or at the end of live scripts.
- You can define multiple local functions within a function file, but only the primary function can be used by other scripts.

Function arguments

Return variable

```matlab
function a = mymean(v,n)
    a = sum(v)/n;
end
```
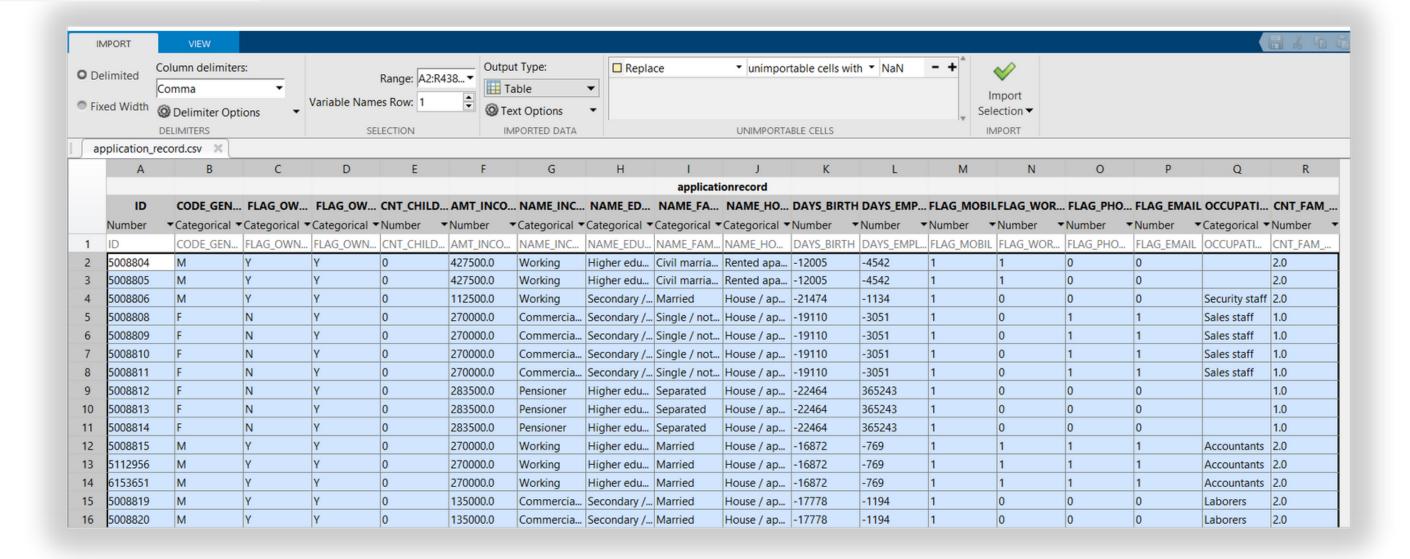
Importing Data

- Using Import Tool. Handles many steps.
- Using readtable function

Changing Tables 🔍

Adding a column based on entries in another column

```
data.Is_Employed = double(data.DAYS_EMPLOYED < 0);
```

```
data = sortrows(data,'AMT_INCOME_TOTAL','descend');
data = movevars(data,'AMT_INCOME_TOTAL','After','CODE_GENDER');
```
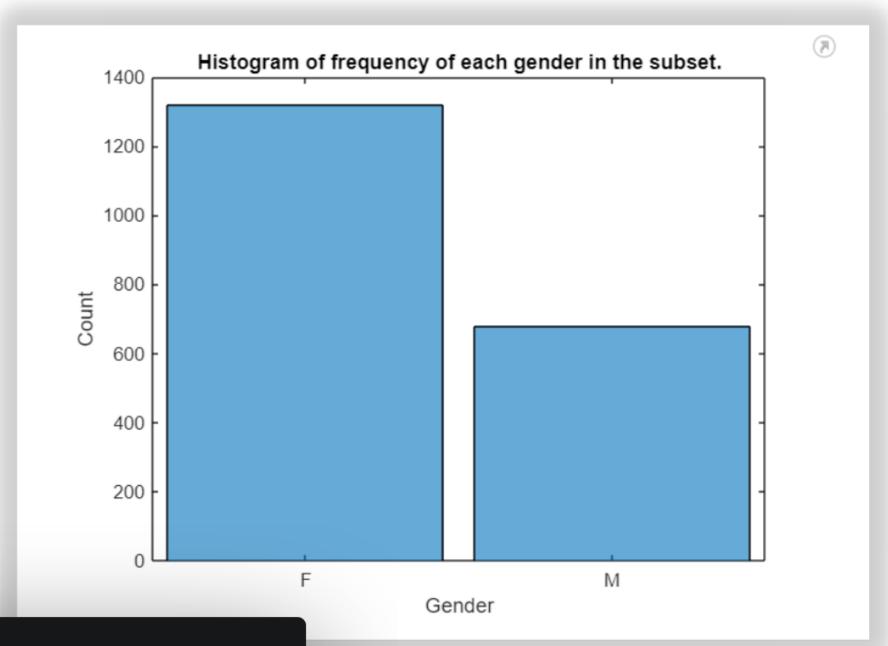
Rearranging rows and columns.

Plotting

Plot away!

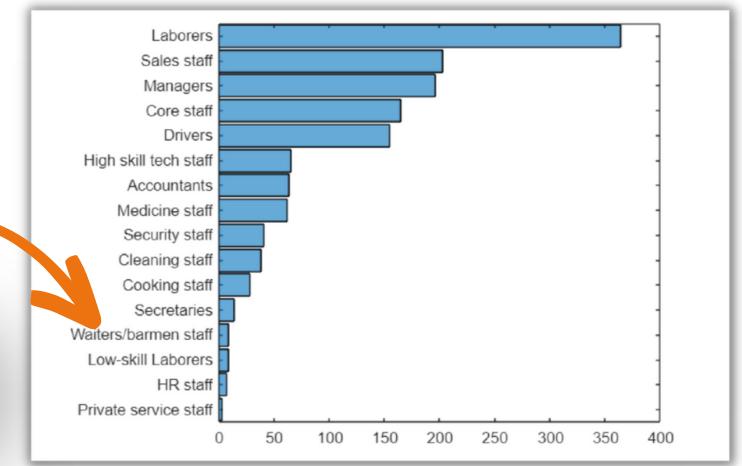MATLAB offers various plotting options like line plots, scatterplots, histograms, bar graphs, heatmaps etc.

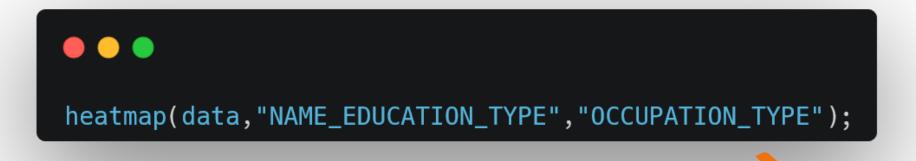Histogram of frequency of each gender in the subset.

```
h = histogram(data.CODE_GENDER)
xlabel('Gender');
ylabel('Count');
title('Histogram of frequency of each gender in the subset.');
counts = h.Values;
fprintf('Number of females = %4.2f and number of men = %4.2f', counts(1), counts(2));
```
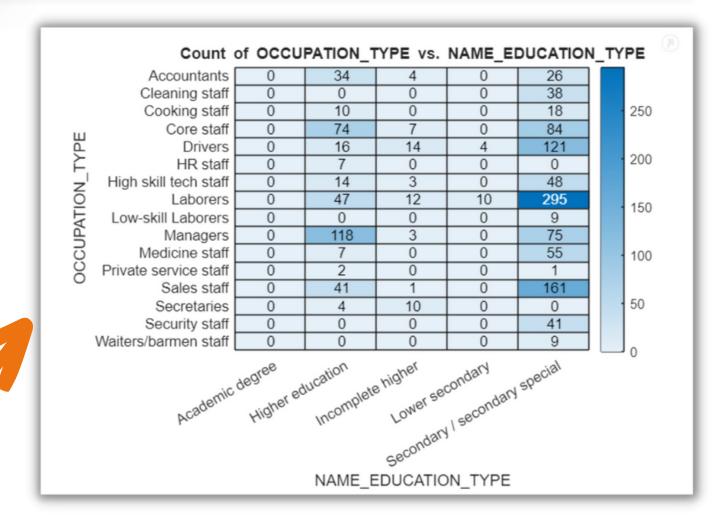
Plotting

```
h3 = histogram(data.OCCUPATION_TYPE,"Orientation","horizontal","DisplayOrder","ascend")
```



```
heatmap(data,"NAME_EDUCATION_TYPE","OCCUPATION_TYPE");
```

Access the codes used in the slides here:

OR   https://github.com/GarmitPant/MATLAB-Session