



« An algorithm is a set of rules that precisely defines a sequence of operations » [en.wiki]

Example: computing the volume of a sphere:

1. Get the radius (**Input**)
2. Compute the volume (**Computations**)
3. Show the result (**Output**)

MATLAB and Octave for beginners

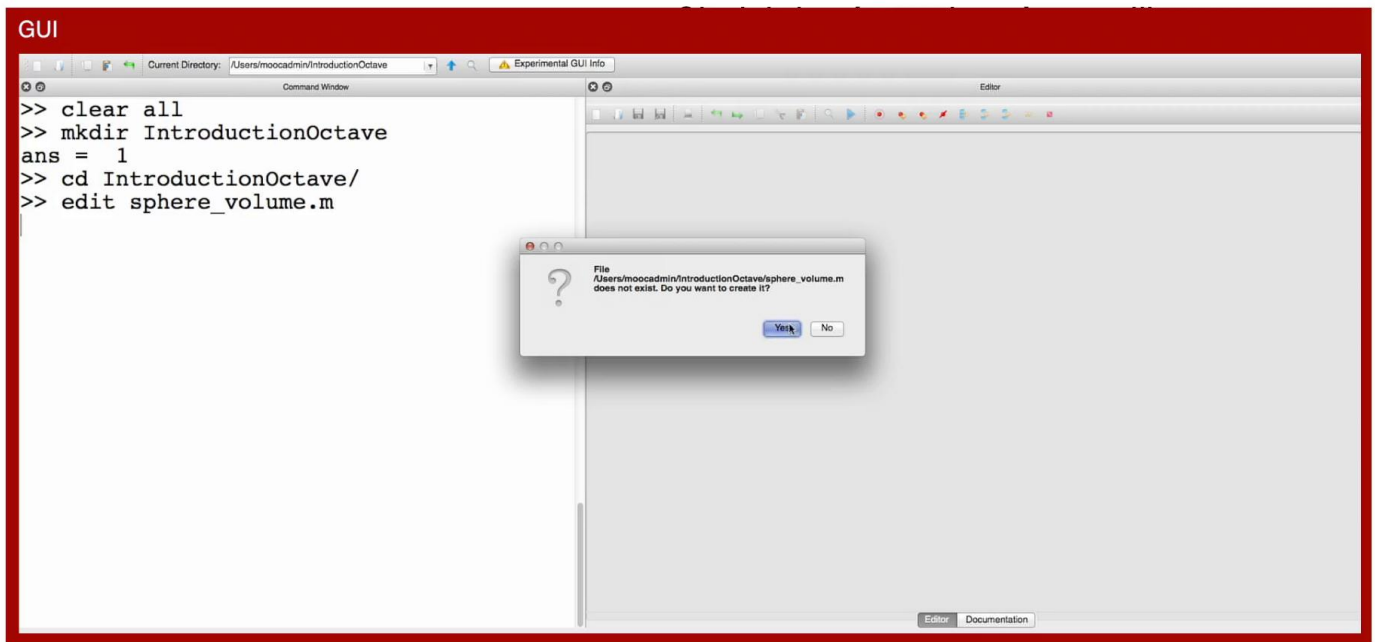
Working on the comment line is not always practical. Often we make typos. We need to change the settings, modify a variable. It is not very convenient, having to retype everything or search all comment as we did using the arrows. It is therefore essential to work with script, that is files which contains the comment to run and that can be edited. This is what allow us to repeat some calculations or redo the work at the later time. Our programs contain algorithms. but what it is an algorithm? which explains that an algorithms a finite sequence of unambiguous operations or instructions which allows to solve a problem and get an output. In particular, we want to give parameters to the algorithm called Input parameter and to receive a response called output. For example: When we want to calculate the volume of a sphere. one must first ask the radius of the sphere. Then use the mathematical formula to compute the volume and the result is delivered to the user. In this example: The input is the radius the algorithm is the calculating of the volume and the output is the volume itself.

Notes

Summary



Creating a script



MATLAB and Octave for beginners

Then how to create your own script? Let's start by cleaning our environment using 'clear all' as usual. and then create a directory where we want to work. so make there introduction Octave, this creates a directory. name: introduction Octave mkdir means create directory, make directory. Done and then it can change into this directory CD introduction Octave enter and then we are inside the new directory. Besides as you can see here, there is a same name introduction Octave. One can also change the directory from this part. Now I want to create the file which contains the steps needed to calculate the volume of the sphere. so first, we need to open this file, it's sphere volume. so edit sphere volume dot M will open a new file M is the extension that's understood by Octave. So the file doesn't exist, so it asks us to create it.

Notes

Summary



1m 23s

Creating a script

GUI

```
>> clear all
>> mkdir IntroductionOctave
ans = 1
>> cd IntroductionOctave/
>> edit sphere_volume.m
>> |
```

```
1 ## Copyright (C) 2015 moocadmin
2 ##
3 ## This program is free software; you can redistribute it and/or modify
4 ## under the terms of the GNU General Public License as published by
5 ## the Free Software Foundation; either version 3 of the License, or
6 ## (at your option) any later version.
7 ##
8 ## This program is distributed in the hope that it will be useful,
9 ## but WITHOUT ANY WARRANTY; without even the implied warranty of
10 ## MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
11 ## GNU General Public License for more details.
12 ##
13 ## You should have received a copy of the GNU General Public License
14 ## along with this program. If not, see <http://www.gnu.org/licenses/>.
15
16 ## -*- texinfo -*-
17 ## @deftypefn {Function File} {@var{retval} =} sphere_volume (@var{input
18 ##
19 ## @seealso{}
20 ## @end deftypefn
21
22 ## Author: moocadmin <moocadmin@cedegemac16.epfl.ch>
23 ## Created: 2015-10-28
24
25 function [retval] = sphere_volume (input1, input2)
```

MATLAB and Octave for beginners

Here is the small feature by Octave. The sharp symbol means the comment so everything that is after a sharp symbol is a comment. Usually, we use a the percentage sign okay, so it is only Octave which uses the sharps and everything it comes after that is a comment. However, we are not interested in this part right now.

Notes

Summary



2m 42s

Creating a script

GUI

```
>> clear all
>> mkdir IntroductionOctave
ans = 1
>> cd IntroductionOctave/
>> edit sphere_volume.m
>> |
```

```
1
2 ## -*- texinfo -*-
3 ## @deftypefn {Function File} {@var{retval} =} sphere_volume (@var{input1}, @var{input2})
4 ##
5 ## @seealso{}
6 ## @end deftypefn
7
8 ## Author: moocadmin <moocadmin@cedegemac16.epfl.ch>
9 ## Created: 2015-10-28
10
11 function [retval] = sphere_volume (input1, input2)
12
13 endfunction
14
```

MATLAB and Octave for beginners

It's an automatic copyright notice introduced by Octave and we are not, also not interested in the second part of the comments.

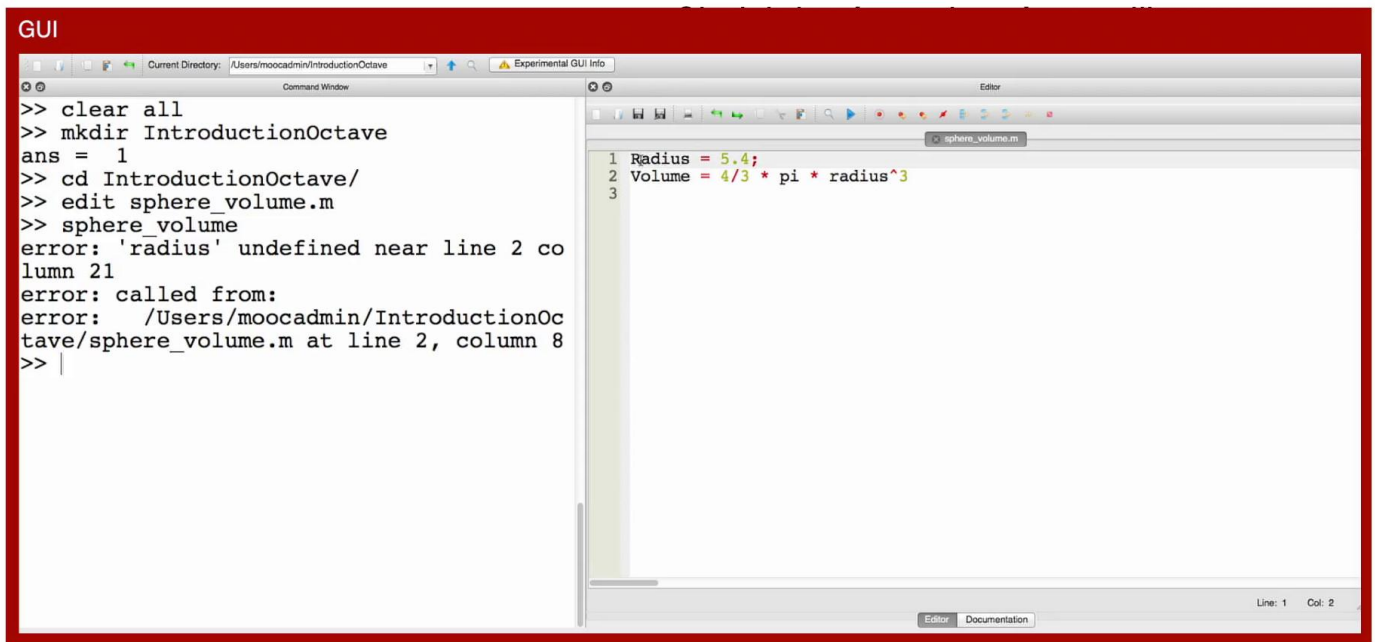
Notes

Summary



3m 13s

Creating a script



MATLAB and Octave for beginners

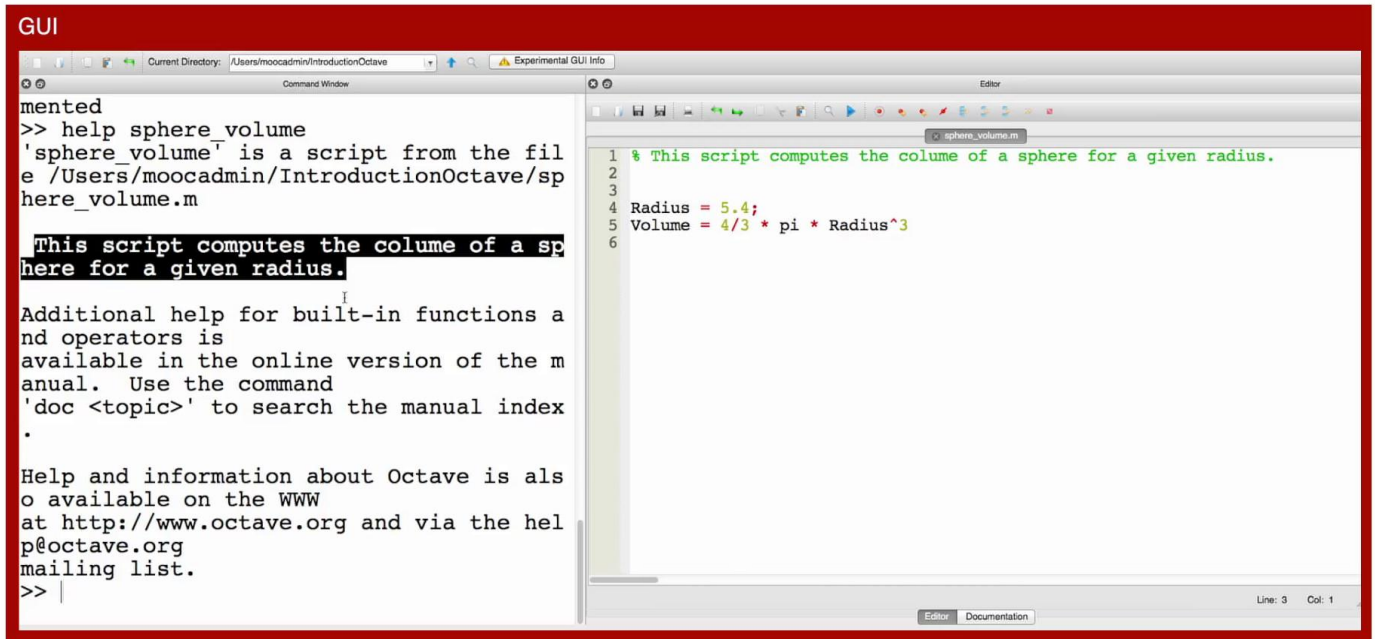
so remove that now I'm left with function and done some other comments and again this is for later use, when we will define functions. Right now we start with an empty script, so let's remove that too. So if you are using Octave you first have to erase all these parts, when you have a file. This MATLAB, the files will be empty directly. so I save and I start writing my program. so I set the radius. so radius, this is the variable name equal to 5.4 for example and then semicolons so that once this script is run this the output of this comment is not shown although it is executed and then I can compute the volume so up little typo volume equal to so what's the formula for a volume. It's a $\frac{4}{3}$ times radius the cube times pi so 4 times pi times radius to the cube oops I have to put the variable exactly in the same way that is said in the first line but here I will probably have a mistake an error. so let's see like I call sphere underscore volume I'd to remove the extension. The extension is automatically added by Octave. Then I run it enter, oh and the radius is undefined but indeed remember variables are upper or lower case and they are different in this case between, because they are is once uppercase and the other time is lowercase.

Notes

Summary



3m 24s



MATLAB and Octave for beginners

so now I can correct my script. I can save again and I can restart my script. so again I write down sphere underscore volume is the name of the script. and when I type enter it is executed in the volume is equal to six hundred fifty nine dot 58. When you write a program even when it is so simple you have to add comments. so you have to document your work. When I look at my file I have not added any comment okay, there are only nice variables but nothing help us understanding, what's going on and if I type 'helpsphere_volume' nothing happens. So you remember when I had typed help sine, there was a help and here there is none. so to add a comment I can put a percentage in front of the line or the first line and then write down a description of the script so what makes the script? The script, computes the volume of a sphere for a given radius. okay, so this is a comment then I do a new line at least one I save and If I type again 'help sphere' volume then I get the help which says this script computes the column, the volume of a sphere for a given radius. good In theory, there are other help that you could be obtained. If there were wider documentation but in this case there is only the help.

Notes

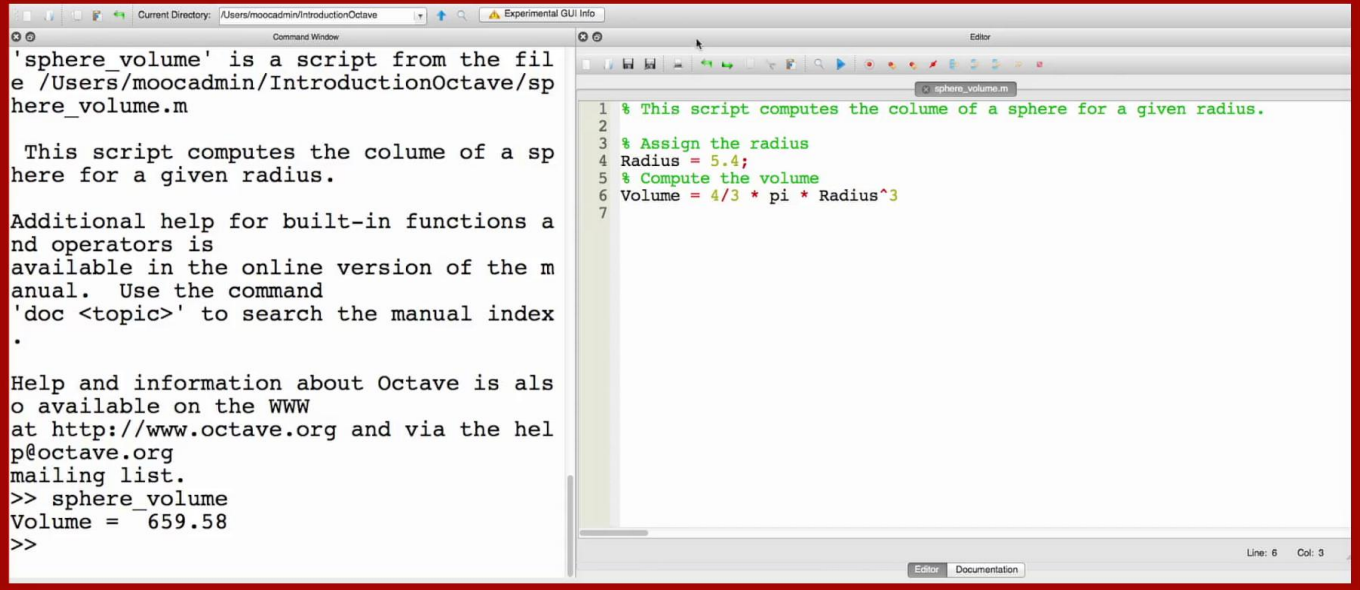
Summary



5m 40s

Input

GUI



The screenshot shows the MATLAB/Octave GUI. On the left is the Command Window, and on the right is the Editor window.

Command Window:

```
'sphere_volume' is a script from the file /Users/moocadmin/IntroductionOctave/sphere_volume.m

This script computes the volume of a sphere for a given radius.

Additional help for built-in functions and operators is available in the online version of the manual. Use the command 'doc <topic>' to search the manual index.

Help and information about Octave is also available on the WWW at http://www.octave.org and via the help@octave.org mailing list.
>> sphere_volume
Volume = 659.58
>>
```

Editor:

```
1 % This script computes the volume of a sphere for a given radius.
2
3 % Assign the radius
4 Radius = 5.4;
5 % Compute the volume
6 Volume = 4/3 * pi * Radius^3
7
```

MATLAB and Octave for beginners

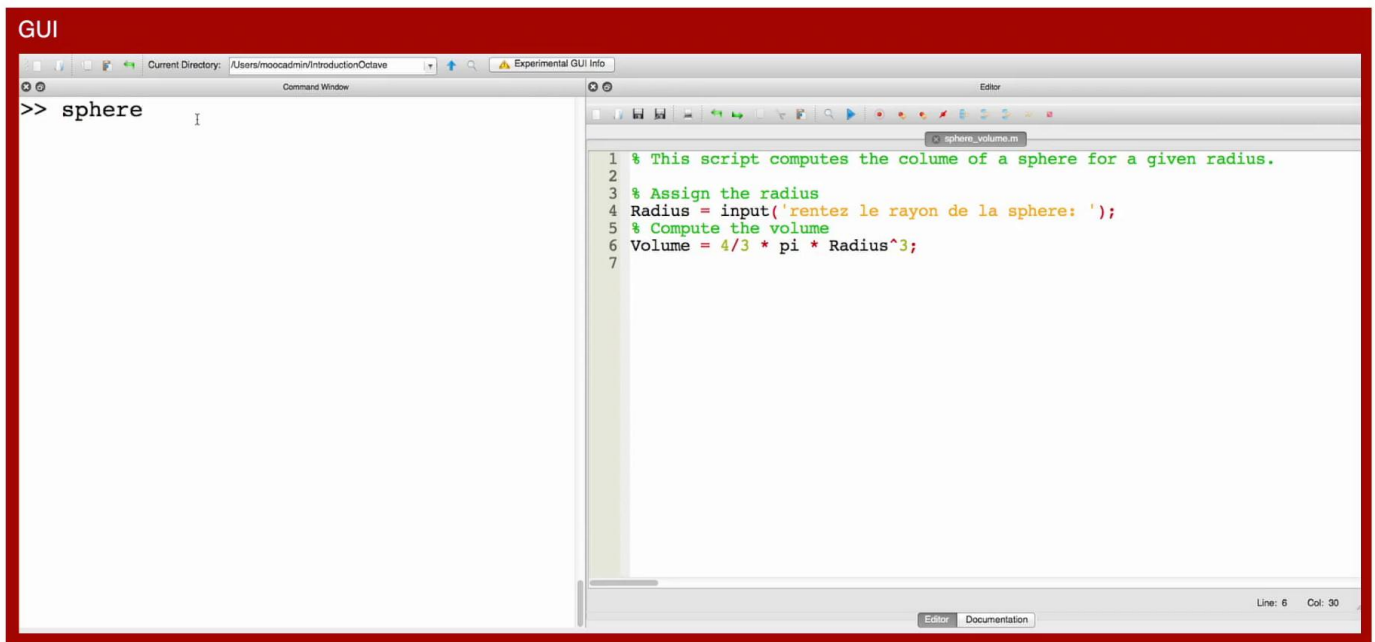
So in the next file most taught other comments not only the help but also as a good habit you have to put a comment for each computation that you do or almost every computation that you do. So first I say assign the radius and then compute the volume so that somebody read zero scripts understands what's going on. If I run the script nothing has changed. okay, so there is still only the volume which is compute often want be able to change some data during the execution.

Notes

Summary



7m 41s



MATLAB and Octave for beginners

For example we want to ask the user to provide a the radius as an input. So, I can use the input function How does it work? So as an example I want to get a number 'a' equal to input and then I provide some text So I give a number I want it unknown and when I type enter so it okay tells me give me a number I enter 87 I type enter and a is equal to 87. So this function input help us in getting some input from the user and now I go into my script and there replace the change of the values by an input which is asked to the user. so 'rentez Le rayon de la sphere' which means please give me the values of the sphere. I save now when I run the program I get asked the radius of the sphere I can give one for example, then I get the volume. so I can call again and change radius and now I give a dot 9 and I give the different volume and they can run like this forever. The output of this algorithms rentez may be displayed on the comment line or simply just save the in a variable. So if we put up semicolon here then when we run the script after saving we will not see anymore the result of the last comment but in reality all the computation is done.

Notes

Summary



8m 20s

Output

GUI

Command Window

Editor

```
>> Radius = 4.3;
>> sphere_volume
>> Volume
Volume = 333.04
>> |
```

```
1 % This script computes the volume of a sphere for a given radius.
2
3 % Assign the radius
4 % Radius = input('rentez le rayon de la sphere: ');
5 % Compute the volume
6 Volume = 4/3 * pi * Radius^3;
7
```

Line: 4 Col: 3

MATLAB and Octave for beginners

so now I I can type against if volume give a 1.5 nothing is shown but indeed the variable volume has changed. okay so we have volume equal 14 dot 137. We can even clear all and then run again our script. I put for 1 dot 5 enter and then look at the volume which is a new variable which has the the volume of the sphere of radius 1 dot 5. What is important to know is that the script uses all the variables that are in the common window okay so also across the variable that you said in the script, so when you define a variable in the script and it is also existing in the comment line. So for now I comment the line what I asked the radius and I say radius okay, still it is there already because I run this sphere volume script already before and if I call sphere volume If we compute without asking the radius but the radius has been used which is the variable that is in my common window. but now if I clear all and they run this sphere volume but within the script the radius is not defined any more so I have to define the radius take 4.3 then I call the script and the volume is defined. So you see the variables are define in the common window and in the script. So there is an interchange between the two.

Notes

Summary



10m 12s

GUI

Current Directory: /Users/moocadmin/IntroductionOctave

Experimental GUI info

Command Window

```

>> Radius = 4.3;
>> sphere_volume
>> Volume
Volume = 333.04
>> |

```

Editor

sphere_volume.m

```

1 % This script computes the volume of a sphere for a given radius.
2
3 clear all
4 % Assign the radius
5 Radius = input('rentez le rayon de la sphere: ');
6 % Compute the volume
7 Volume = 4/3 * pi * Radius^3;
8
9 disp('The volume of a sphere of radius')
10 disp( num2str(Radius) ' is ' num2str

```

Line: 10 Col: 35

MATLAB and Octave for beginners

Your environment has variables which are defined in the script and in the comment line. So as a good habit I always tell my student to clear all the variables when I start using a script okay, so that I know that everything I do in the script it is only within the script okay, I don't get anything different from the environment okay, I think it's a good habit. Now I want to run this script, but I still want to see something when I want it. I can either remove the semi columns or use the display function, display takes a string as an input. so I can say 'disp' and then parentheses and then quotation marks single quote and then write the volume of sphere is volume of a sphere of radius something now I have to display the radius So, you need to display the variable radius how to do that, well I have to convert the variable name. so the variable radius into a string and to do this I, I have to use the function known to string. so known to string, transform the value of the radius into a string Which I can now display. Okay so have the second line I will have a the radius and then I would like to concatenate this first string with a another string which is a space is a space and then none to string the volume.

Notes

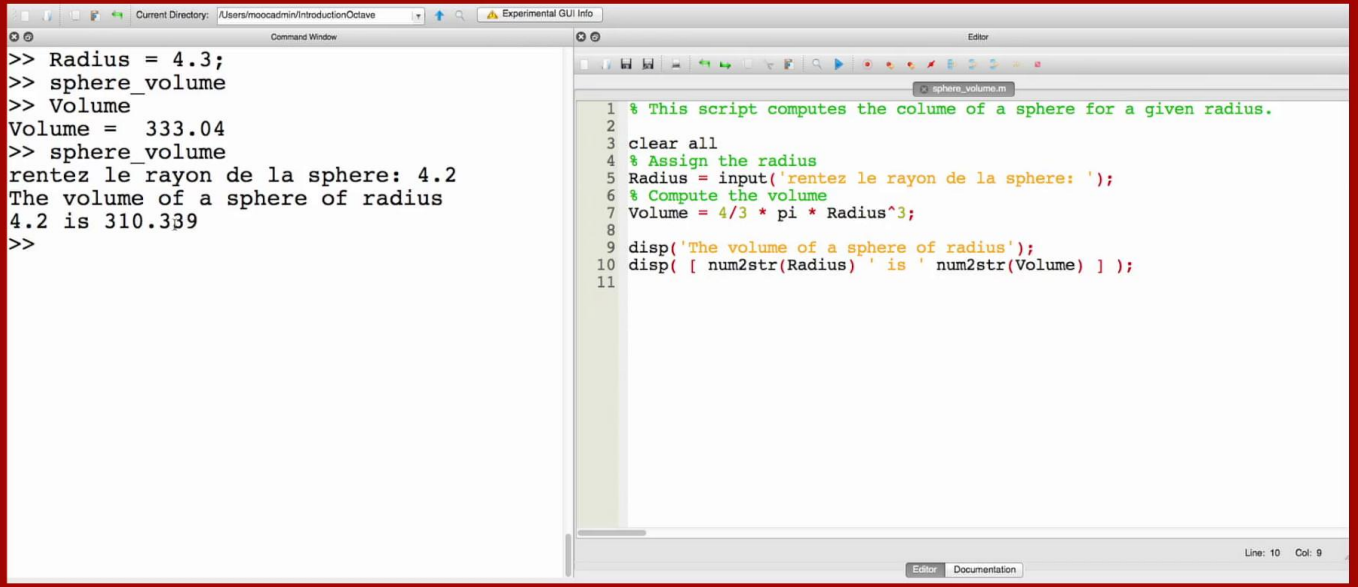
Summary

12m 06s



Output

GUI



The screenshot shows the MATLAB/Octave GUI. The Command Window on the left displays the following session:

```
>> Radius = 4.3;
>> sphere_volume
>> Volume
Volume = 333.04
>> sphere_volume
rentez le rayon de la sphere: 4.2
The volume of a sphere of radius
4.2 is 310.339
>>
```

The Editor window on the right shows the script `sphere_volume.m` with the following code:

```
1 % This script computes the volume of a sphere for a given radius.
2
3 clear all
4 % Assign the radius
5 Radius = input('rentez le rayon de la sphere: ');
6 % Compute the volume
7 Volume = 4/3 * pi * Radius^3;
8
9 disp('The volume of a sphere of radius');
10 disp( [ num2str(Radius) ' is ' num2str(Volume) ] );
11
```

MATLAB and Octave for beginners

but to concatenate strings it is a, as we can do with the matrices and vectors I can use the brackets so I put a bracket at the beginning, a bracket in the end and the, this two brackets will join together the strings. okay so I will have two lines The radius of a sphere of radius blah blah is blah blah and now I can run the script so this will first clear all the variables ask me for the radius and then here it is in prints out the volume of the sphere and this is what I asked To write complex operations it is necessary to use files In these files we'll write all comments we need in there right order.

Notes

Summary



13m 58s

3.1 Scripts and algorithms



One can also modify or save them to continue to work later on. such files are called script. Later we will see that we can also use functions. Functions are a little bit different but have the same principle. clearly write down only elements of a program or algorithm. so we saw the users scripts and also now how to organize the work in relation to the input of the algorithms. The algorithm ask execution and it's output. Here the algorithm was very simple. We'll see in the next sections the essential tools for coding more sophisticated algorithms.

Notes

Summary



14m 48s