



# Comparison of Python & Matlab in Data Analysis

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## ABSTRACT

*Matlab and Python have all been utilized effectively in organizing to get it the concepts of arithmetic & measurements. In today's information driven environment, the consider of information through enormous information analytics is exceptionally capable, particularly for the reason of choice making and utilizing information measurably in this information wealthy environment. MatLab can be utilized to educate initial arithmetic such as calculus and measurements. But Python can be utilized to form choices including enormous information. On the one hand, Python is idealizing for instructing initial insights in a information wealthy environment. This paper clarifies the comparison situation of Python and Matlab.*

**Keywords:** MatLab, Python.

## 1. INTRODUCTION

This paper compares the effectiveness of MatLab and Python (Numpy, SciPy in a educating environment. In this paper we have tried to set up which programming language is best to teach operations research and statistics to understudies in a college setting. We have too endeavored to decide which ability is most desirable to have knowledge about within the working environment. To start, Python could be a sort of programming dialect. The most common execution to this programing language is that in C (moreover known as CPython). Not as it were is Python a programming language, but it comprises of a huge standard library. This library is organized to center on common programming and contain modules for os particular, threading, organizing, and databases. Another, Matlab is most profoundly respected as not as it were a commercial numerical computing environment, but moreover as a programming language. Matlab so also includes a standard library, but its uses incorporate network variable based math and a expansive organize for information handling and plotting. It too contains toolkits for the eager learner, but these will taken a toll the client additional. Whereas programs such as Exceed expectations and SPSS may be easier and quicker to memorize, their computational capacities are distant second rate to those of Python and Matlab, which require as it were basic programming knowledge. Between these three programs, when it comes to usability, Python may be distant better; a much better; a higher; a stronger; an improved">an improved choice since the sentence structure it employments compares more so also to other dialects. The degree of Python and Python, be that as it may, comes to various extra measurements of huge information investigation capability. Colleges may wish to seek after offering instruction on these programs as they are superior suited for working with huge information and more broadly utilized within the work environment.

## 2. MATLAB VS. PYTHON

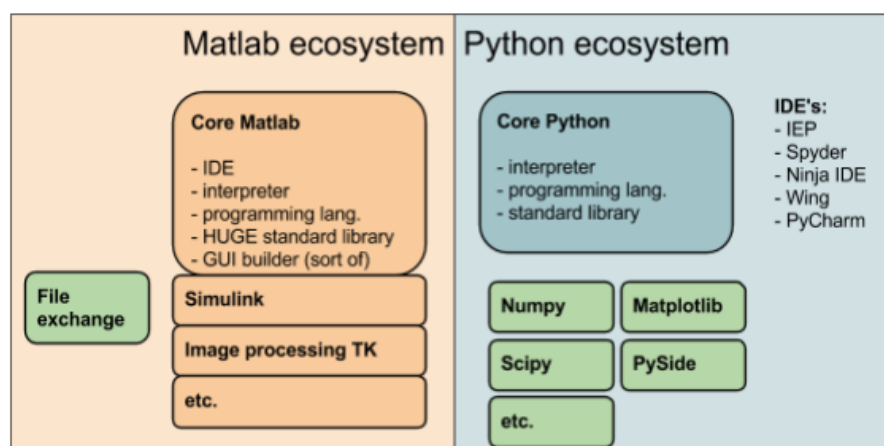


Fig-1. MatLab vs. Python

## 3. BASICS OF MATLAB



MATLAB could be a problem-oriented language and interactive computing surroundings that permits you to perform computationally intensive tasks quicker than with ancient programming languages like C, C++, and fortran. MATLAB is meant to work with matrices, where a matrix is defined to be a rectangular array of numbers. All variables used are thought of to be matrices. Scalars and vectors can be used since they can be thought of as matrices with dimension  $1 \times 1$  (scalars) and  $1 \times n$  or  $n \times 1$  (vectors). In contrast to programming languages like C or Java, MATLAB doesn't require any type declarations or dimension statements. When MATLAB encounters a brand new variable name, it automatically creates the variable and allocates the appropriate amount of storage. If the variable already exists, MATLAB changes its contents and, if necessary, allocates new storage. To check to see what variables exist already and what dimensions they're, sort the command whos at the prompt. To clear existing variables from memory enter the command clear at the prompt. At the MATLAB prompt, you'll run some basic UNIX commands such as cd and ls. For a lot of info on UNIX commands, see the UNIX Documentation Page. To induce general MATLAB facilitate, sort facilitate at the prompt to induce an inventory of a facilitate topics. To induce assistance on a selected topic or perform, sort facilitate at the prompt, substitution with the subject or perform you want to induce assistance on. To exit MATLAB, sort exit or quit at the prompt. MATLAB is Associate in Nursing interactive program for numerical computation and knowledge visualization; it's used extensively by management engineers for analysis and style. There area unit totally different many various many alternative toolboxes obtainable that extend the essential functions of MATLAB into different application areas; in these tutorials, we'll build intensive use of the management Systems tool cabinet. MATLAB is supported on UNIX, Macintosh, and Windows environments; a student version of MATLAB is obtainable for private computers.

#### 4. BASICS OF PYTHON

Python is beyond question one in every of the foremost well-liked programming languages in today's world. With its quickly updated libraries and also the ease to code, Python has managed to form its place within the chop-chop growing technology era. Python features a straightforward syntax kind of like the English language. Python has syntax that permits developers to jot down programs with fewer lines than another programming language. Python runs on Associate in Nursing interpreter system, which means that code are often dead as before long because it is written. This implies that prototyping are often terribly fast. Python could be a wide used all-purpose, high level artificial language. It absolutely was created by Guido van Rossum in 1991 and more developed by the Python software system Foundation. It absolutely was designed with a stress on code readability, and its syntax permits programmers to specific their ideas in fewer lines of code. Python could be a artificial language that permits you to work quickly and integrate systems a lot of with efficiency. Python could be a all-purpose understood, interactive, object-oriented, and high-level artificial language. It absolutely was created by Guido van Rossum throughout 1985- 1990. Like Perl, Python ASCII text file is additionally obtainable below the antelope General Public License (GPL). This tutorial provides enough understanding on Python artificial language. Python could be a high-level, understood, interactive and object-oriented scripting language. Python is meant to be extremely decipherable. It uses English keywords oftentimes wherever as different languages use punctuation, and it's fewer grammar constructions than different languages. Python could be a should for college students operating and dealing } professionals to become an excellent coder specially after they area unit working in internet Development Domain. I'll list down a number of the key blessings of learning Python:

**Python is Interpreted** – Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.

**Python is Interactive** – You can actually sit at a Python prompt and interact with the interpreter directly to write your programs.

**Python is Object-Oriented** – Python supports Object-Oriented style or technique of programming that encapsulates code within objects.

**Python is a Beginner's Language** – Python is a great language for the beginner-level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

#### A. Characteristics of Python

Following are important characteristics of Python Programming –

1. It supports functional and structured programming methods as well as OOP.
2. It can be used as a scripting language or can be compiled to byte-code for building large applications.
3. It provides very high-level dynamic data types and supports dynamic type checking.
4. It supports automatic garbage collection.
5. It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java.



## B. Python Advantages

Let's first dive into the advantages of Python.

### Advantages of Python

#### 1. Easy to Read, Learn and Write

Python is a high-level programming language that has English-like syntax. This makes it easier to read and understand the code. Python is really easy to pick up and learn, that is why a lot of people recommend Python to beginners. You need less lines of code to perform the same task as compared to other major languages like C/C++ and Java.

#### 2. Improved Productivity

Python is a very productive language. Due to the simplicity of Python, developers can focus on solving the problem. They don't need to spend too much time in understanding the syntax or behavior of the programming language. You write less code and get more things done.

#### 3. Interpreted Language

Python is an interpreted language which means that Python directly executes the code line by line. In case of any error, it stops further execution and reports back the error which has occurred. Python shows only one error even if the program has multiple errors. This makes debugging easier.

#### 4. Dynamically Typed

Python doesn't know the type of variable until we run the code. It automatically assigns the data type during execution. The programmer doesn't need to worry about declaring variables and their data types.

#### 5. Free and Open-Source

Python comes under the OSI approved open-source license. This makes it free to use and distribute. You can download the source code, modify it and even distribute your version of Python. This is useful for organizations that want to modify some specific behavior and use their version for development.

#### 6. Vast Libraries Support

The standard library of Python is huge, you can find almost all the functions needed for your task. So, you don't have to depend on external libraries. But even if you do, a Python package manager (pip) makes things easier to import other great packages from the Python package index (PyPi). It consists of over 200,000 packages.

#### 7. Portability

In many languages like C/C++, you need to change your code to run the program on different platforms. That is not the same with Python. You only write once and run it anywhere.

## 5. REASONS PYTHON IS BETTER THAN MATLAB

### 1. It's free.

This one is simple, but one of the most important ones for anyone working outside academia. As Matlab is an expensive software, many companies only have one (if any) license. For this reason, using a free alternative might be attractive for many companies.

### 2. It's open source

Having a language where everyone can contribute to the development of it means new features will constantly be added and bugs will be fixed. It also means you can go and inspect exactly how the functions you use works. This also aids in the growth of the language and helps making a big community of advanced users and contributors.

### 3. It's the future

The popularity of Python has just kept increasing in an exponential fashion over the past years. Having a more popular language means it's easier to find answers to any questions you may have, and to find code examples of what you need.

### 4. It has more features

Unlike Matlab, Python is not just a scripting language for math — it's also an imperative and function language which can be used for crawling web-servers, controlling external devices or making user interfaces.

### 5. It's portable

Python is, just like Matlab, a cross-platform, language which can run on all OSs — even embedded systems having a small Linux kernel. Deploying Python code is also easier — you just need to install python (which comes by default in many OSs) and not deal with having the right version of Matlab runtime. This also means it is super easy to deploy Python code to servers.



#### 6. It's THE go-to language for machine learning

With the increasing popularity of machine learning and AI, Python is light years ahead of Matlab, as all major frameworks are based on Python: Tensorflow, Keras, PyTorch, Scikit-learn. And since all AI research is made using these frameworks it is way easier to find state of the art algorithms for Python than Matlab.

#### 7. It's highly flexible

In Python, there are many ways to achieve the same functionality. Some are of course more efficient than others, but having a language which allows you to do things the way that suits you is highly appreciated.

#### 8. It allows for using different IDEs

When using Matlab you're forced to use the Matlab IDE shown in the image below. Luckily the Matlab IDE works quite well, but you are also quite limited to the features that Matlab has chosen to implement: For instance is Git support quite poor. As Python can be compiled from the command-line many different IDEs are available — from simple text editors to full-fledged Matlab-like solutions.

#### 9. Simpler (prettier) language

Even though it might not appear so at first sight, Python can actually produce much simpler, and thus prettier, code than Matlab. One such example is in for-loops where you can get both the index  $i$  and  $i$ 'th item when iterating over an array.

#### 10. Named arguments

Named arguments in Python lets you call a function ala. `mean(X, axis=1)`, where you in Matlab would write `mean(X,1)` i.e. it would be unclear what the 1 is used for. This makes the code much easier to read and debug.

## 6. CONCLUSION

This paper explains the main points of Python and MatLab. we've compared and contrasted every of the languages to one another, while also talking concerning the educational worth of each program in a very teaching environment. we reached to the conclusion of that Matlab have invaluable for signal process, incredibly broad array of useful libraries , Simplest and most concise language for all the world involving matrix operations, works okay for all the world that's merely represented as a numeric feature matrix, large pain to use for anything that may not simply represented as a numeric feature matrix and Lacking a good open source ecosystem. And Python have terribly fragmented however comprehensive scientific computing stack, Pandas, scikit.learn, numpy, scipy, python, & matplotlib are my most-used scientific computing libraries, very good for problems that do not return as an easy feature matrix, between tools like pandas and nltk, unbelievable open source scheme. Therefore with these it's clear that Python is the best language among the other languages.

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