MATLAB vs Python

Python is a high-level, general-purpose programming language designed for ease of use in accomplishing a variety of tasks from implementing deep learning algorithms to building GUIs. Python was created by *Guido van Rossum* and was released in the early 1990s. It is currently being developed by the Python software foundation. MATLAB is an abbreviation for Matrix Laboratory. It is a high-level programming language primarily suited for matrix manipulation and program solving related to Linear Algebra. It is currently being developed and maintained by MathWorks.

There is an important philosophical difference between MATLAB and python: MATLAB is proprietary, closed-source software. The license required to use MATLAB can be quite expensive – a barrier to entry for most people. Users are also charged for each additional toolbox they install to extend MATLAB's functionality. On the other hand, Python is free and open-source software. Not only can you download python and any of it packages at no cost, but you can also download, look at, and modify its source code as well. This provides an advantage to python since it has developed a very broad community of developers who extend its functionality by developing different niche packages. This also allows for the development and maintenance of very sophisticated open-source algorithms and tools for different applications such as deep learning (*pytorch*, *tensorflow*), and image analysis (*opencv*). Whereas in MATLAB, the development of these tools is much slower since only one team of developers is responsible.

Furthermore, python's open-source nature allows code developed in python to be shared more easily between users. On the other hand, MATLAB code always requires the proprietary MATLAB interpreter to be executed, which poses a barrier to code portability.

In addition to the philosophical differences, MATLAB code can only be executed in the MATLAB application; this limits the customizability of MATLAB. On the other hand, there are several different IDEs (integrated development environment) available for python which can enhance the development experience. These different IDEs allow for extensive user customizations to improve efficiency of software development.

In terms of applications, MATLAB is focused on developing scripts and programs to tackle engineering problems. It can be extended to other areas using different toolboxes. On the other hand, python is used in a wide variety of software development applications ranging from GUI and dashboard development to data analytics and machine learning.

Finally, MATALB and python differ significantly in their syntax. Since MATLAB is more engineering-focused, its syntax gives more emphasis to simplifying matrix operations and linear algebra tasks. On the other hand, python is much closer to a traditional programming language, and this is reflected in its syntax, Although, with packages like *numpy* python can be made to behave more similarly to MATLAB.