An Overview on Python Programming

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ABSTRACT: Guido Van Rossum invented Python in the late 1980s as a strong high-level, interpreted, interactive, and object-oriented programming language. Python is a great language for beginners since it has a lot of features. the creation of a diverse variety of applications, ranging from simple text processing to web browsers to game development the simplicity of Python's syntax is one of the main reasons for its fast growth. It's almost as though the language is simple. English facilitates the creation of complex programmes. Python is a high-level programming language with general-purpose object-oriented programming features. It has become well-known for its obvious and simple syntax, portability, and ease of learning. Python is a computer language that combines C and Java capabilities. It has the same manner of creating elegant code as C, and it has the same classes and objects as Java for object-oriented programming.

KEYWORDS: Casting, Framework, Object-Oriented, Python, Variable.

1.INTRODUCTION

Python is a high-level, easy-to-learn, and dynamically in Nationalized the programming language Python is a general-purpose programming language. Python's development began as a pastime for its inventor. He rolled them because he wanted to create a language that was unique to him. Instead of using indentations, use attractive and easy-to-read indentations. The code blocks that arrived with curly braces to be secured are described by curly braces to be secured. Inside the words, there was a point on, but it was not accepted love as it should have been. In comparison to other languages, machine learning and artificial intelligence Python's intelligence has gotten a lot of attention recently[1].

Guido van Rossum of Central Wiskunde & Informatica (CWI) in the Netherlands developed Python in the late 1980s and implemented it in December 1989. Python was considered as the ABC language's successor[2]. that is capable of managing exceptions and interacting with other systems with the Amoeba operating system Guido's love for the television show Monty Python's Flying Circus inspired the name Python. Python is an interpreted and dynamically-typed programming language, which means that programmers do not need to declare the data type of variables or compile them, and they may obtain immediate feedback by using the interactive command-line instead of waiting for the entire programme to finish. The Python Software Foundation (PSF) is a non-profit organization that has held the intellectual property rights to Python since version 2.1[3]. Python is the fastest-growing programming language. One of the primary reasons for Python's increase is its prominence in data science [4]. YouTube, Google, Instagram, Reddit, Spotify, Dropbox, Quora, and other software tools are created in Python. Python is used by companies like as IBM, Disney, NASA, Instagram, Spotify, Amazon, SurveyMonkey, and Facebook, among others[5].

1.1 Features of Python

- Easy to Learn and Use: In comparison to other languages such as Java, C, C++, and others, Python is simple to develop and read. Python syntax may be learned in a short amount of time by anyone. Python code is similar to English in that it allows the student to concentrate on the outcome.
- Expressive: In comparison to other languages, Python can perform a complex function with only a few lines of code.
- Free and Open Source: Python is a free and open-source programming language. The people may help and contribute to the language's progress. The Python source code is available for download, modification, and distribution.
- High-level language: Python is a programming language that is designed to be used at a high level. Python is highly appealing since it eliminates the need-to-know architecture and memory management.

- Interpreted Language: Python is a scripting language. The code does not require compilation because it is performed line by line rather than all at once, making debugging easier than in other languages. As a result of this feature, Python is slower than Java.
- Object-Oriented: Python uses an object-oriented approach to programming, which allows programmers to build reusable code and construct applications with less code.
- Extensible and embedded: Python's extensibility allows code to be written and compiled in other languages such as C or C++. This code may then be utilized in Python as necessary. Python's embedded feature makes it possible to utilize Python in other programming languages[6].
- Large Standard Library: Python offers a wide selection of modules and functions, thanks to the huge standard library. So that the programmer does not have to write the code themselves; instead, they can just import it[7].
- Dynamically Typed: Python is said to be a dynamically typed language because it does not need to specify the data-type of the variable while declaring it. The type of value is decided during the run time
- Portable: Python is claimed to be portable because the same Python programme may run on a variety of systems, including Windows, Linux, Unix, and others, assuming system-dependent features are avoided.
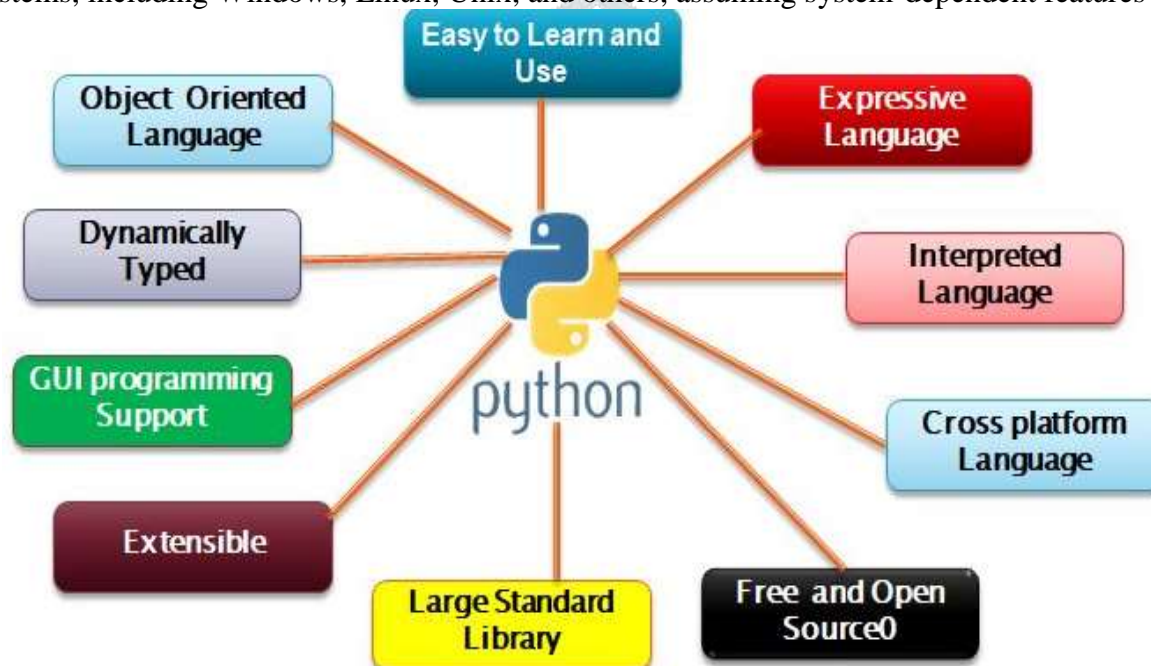

Figure 1: Diagrammatic Representation of Features of Python [SAHOSOFTTUTORIALS].

1.2 Applications of Python

Python is recognized for its general-purpose character, which allows it to be used in nearly any software development sector. Python may be found in almost every new field. It is the most popular programming language and may be used to create any application.

- Artificial Intelligence and Machine Learning: Artificial Intelligence and Machine Learning are two hot subjects that will continue to be discussed in the future. Python is widely used in artificial intelligence and machine learning because of its reliable, safe, and adaptable nature, as well as its numerous tools. SciPy, Pandas, Seaborn, Keras, TensorFlow, Scikit-learn, NLTK, Pytorch, Accord.NET, and other Python libraries and frameworks are used in Artificial Intelligence[8].
- Desktop GUI applications: Python is also used to create desktop programmes. PyQt, PyGtk, Kivy, Tkinter, WxPython, PyGUI, and PySide are some of the GUI toolkits and frameworks that make developing a highly functioning desktop application a breeze.
- Web scraping applications: Python is a fantastic tool for extracting big amounts of data from a website, which may subsequently be utilised for job postings, pricing comparisons, and other purposes. Web scraping tools include Beautiful Soup, Mechanical Soup, LXML, and others.

- Data Science and Data Visualization: Many people choose Python for massive data processing and visualization. Python is connected with statistical methods used by data scientists to analyses and visualize complex data. NumPy, Pandas, Sci-Kit, and other Python packages are utilised.
- Web development: Python is a popular web development language. Python provides frameworks such as Django, Pyramid, Flask, and Bottle. Python web frameworks are well-known for their scalability, flexibility, and security. Libraries such as Requests, Beautiful Soup, Paramiko, Feedparser, Twisted Python, and others are featured in the Python Package Index.
- Game development: Python comes with a number of built-in libraries that are useful for game development. PyGame and PyKyra are game creation tools, while PySoy is a 3D cloud gaming engine for Python3.
- Businees Application: Standard apps are not the same as business applications. Business applications include e-commerce and enterprise resource planning. This type of programme necessitates a lot of scalability and readability, which Python delivers. Oddo is an example of a Python-based all-in-one application that provides a variety of commercial applications. The commercial application is built on the Tryton platform, which is provided by Python.
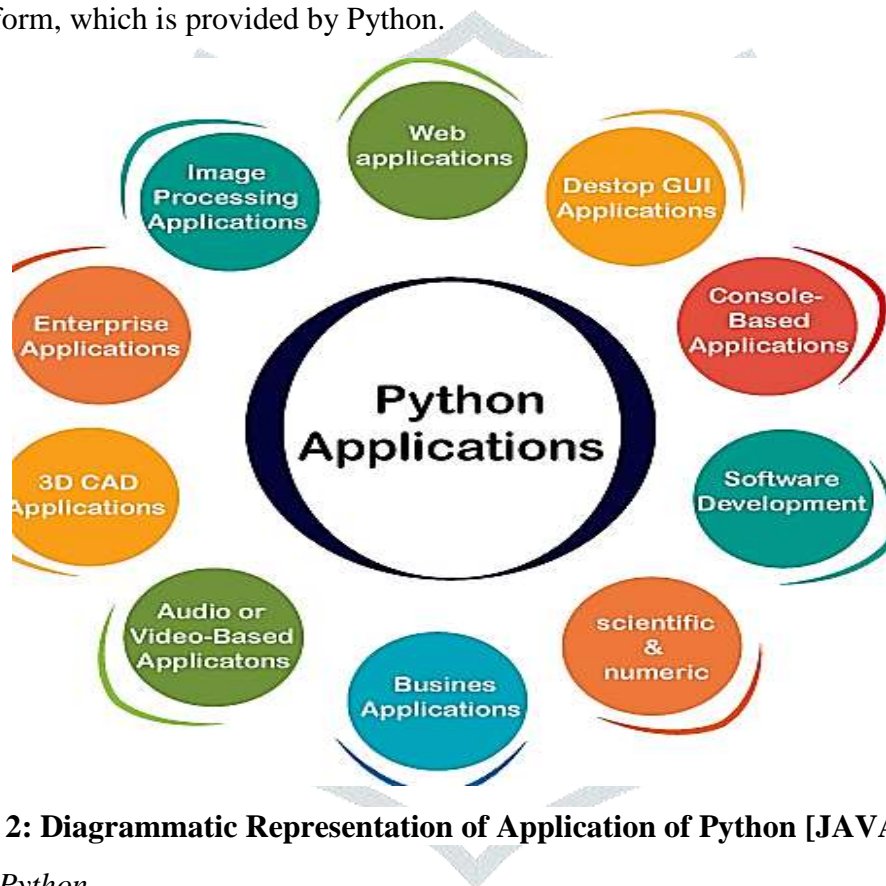
Figure 2: Diagrammatic Representation of Application of Python [JAVATPOINT]

1.3 Advantages Of Python

- Python is a simple language to read, learn, and write in. As a result, it is suitable for beginners.
- Python requires less code when compared to other languages for the same purpose.
- Python is a free and open-source programming language. As a result, it has a wide range of applications.
- The programmer can simply perform complicated operations thanks to the extensive libraries available.
- Python is fantastic for data visualization, making reports and data visualizations simple to comprehend.
- Object-oriented programming, imperative and functional programming, structured programming, and procedural programming are just a few of the programming paradigms available in Python.

1.3 Elements Of Python

- Variables: Before assigning a value to a variable in Python, it is not necessary to define it with a specific datatype. Python is now dynamically typed. Once the values have been set, they may be changed to a new type, for example, if a variable x = 5 is an integer, it can be changed to x= 1j, which is a complex number, in the following stage. Multiple variables can be defined and saved on one line using the "=" operator, or

with distinct values separated by a ','. Variables in Python are divided into two categories: class variables and instance variables.

- Comments: Comments are lines of text or code written in the source code to make it easier to read. They are not put to death. Python declares it as a remark by using the "#" character. For multi-line comments, use "#" for each line or " " " " " " " " " " (triple quotes) as python ignores string literals that aren't assigned to a variable.
- Casting: The process of assigning a data type to a variable is known as casting. The "type ()" function in Python is used to display the type of the variable's value. Casting can be done while defining the variable, such as x=int (1.8) i.e., x=1 where type(x) returns an int. After the value has been assigned, another way of casting can be used, such as b=str(a), where a=1 indicates convert the number 1 stored in a to a string.
- Print Function: To show the result, Python just needs print (). A variable can be concatenated to a print statement in two ways. The print function in Python utilises the character "," to show variables. Whitespace is automatically inserted before the variable's value. If you want to concatenate a variable to a print function by using the "+" character, the variable's data type must always be a String.

2.LITERATURE REVIEW

S. Van Der Walt et al.[8] proposed the scikit-image is an image processing library that implements algorithms and utilities for use in research, education and industry applications. It is released under the liberal Modified BSD open-source license, provides a well-documented API in the Python programming language, and is developed by an active, international team of collaborators. In this paper we highlight the advantages of open source to achieve the goals of the scikit-image library, and we showcase several real-world image processing applications that use scikit-image

S. P. Ong et al.[9] proposes the powerful, open-source Python library for materials analysis is the Python Materials Genomics (pymatgen) package. A robust set of software tools to perform initial setup for the calculations (e.g., generation of structures and necessary input files) and post-calculation analysis to derive useful material properties from raw calculated data is a key enabler in high-throughput computational materials science efforts. The pymatgen library aims to meet these needs by defining core Python objects for materials data representation, providing a well-tested set of structure and thermodynamic analyses relevant to a wide range of applications, and providing an open platform for researchers to collaborate on sophisticated analyses of materials data obtained both from first principles calculations and experimentation. Using the Materials Project's REpresentational State Transfer (REST) Application Programming Interface (API), the pymatgen package also provides handy methods for obtaining relevant materials data.

P. Peterson [10] proposed how to tackle the problem of connecting low-level Fortran programs to high-level Python programs. The difficulties of mixed language programming between Fortran and C are resolved in an almost compiler and platform independent way. We provide a polished software tool F2PY that can (semi-)automatically build interfaces between the Python and Fortran languages and hence almost completely hide the difficulties from the target user: a research scientist who develops a computer model using a high-performance scripting approach

3.DISCUSSION

Python is a dynamically semantic, interpreted, object-oriented high-level programming language. Its high-level built-in data structures, along with dynamic typing and dynamic binding, making it ideal for Rapid Application Development and as a scripting or glue language for connecting existing components. Python's concise, easy-to-learn syntax promotes readability, which lowers software maintenance costs. Modules and packages are supported by Python, which facilitates programme modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Python is popular among programmers because of the improved productivity it offers. The edit-test-debug cycle is very quick because there is no compilation phase. Python scripts are simple to debug: a bug or poor input will never result in a segmentation fault. Instead, when the interpreter finds a mistake, it throws an exception. The interpreter produces a stack trace if the application fails to catch the error. A source-level debugger allows you to

inspect local and global variables, evaluate arbitrary expressions, create breakpoints, and walk through the code one line at a time, among other things. The debugger is developed in Python, demonstrating Python's introspective capabilities. On the other hand, adding a few print statements to the source code is typically the easiest method to debug a programme: This basic technique is highly successful because of the quick edit-test-debug cycle.

4.CONCLUSION

Python is short, simple, and easy. A novice can easily understand a Python program for it is written in simple English. In Python since indentation is compulsory, it makes the code more readable. However, this is not the case for Java as there is no effect for indentation and the whole program can be written in one line to make it look short. The use of semicolon which indicates the end of the line in Java is sometimes overlooked which leads to a major compilation error. Python being dynamically typed leads to longer execution time as the variable type is checked during run time whereas Java is statically typed so the exact datatype for variables is known during compilation leading to faster execution than Python. Because most programming languages have similar basics, it doesn't matter which one you choose. The individual that is picked can study another programming language. clearly understandable language the beginner should not continuously adjusting the settings. language before learning it, since this will result in a loss of proficiency. confidence. As a result, the newbie should select the programming. language in accordance with their preferred objectives If the individual If you want to do app development, go with Java or Python. Flutter or Swift? If someone wants to make a game, they should do it. It's possible that a language like JavaScript, Java, C, or C++ might be preferable. If the individual is interested in web development or artificial intelligence, when it comes to intelligence, etc., languages like Python and JavaScript comes to mind.

Python programming is a better option for both beginners and professionals. This paper discussed why python is becoming more popular in the real world, as well as the benefits of this programming language, such as its speed, ease of use, power, portability, simplicity, and free open source language that supports other technologies, and the various domains in which it can be used. This research has looked at three distinct types of Python web development frameworks: full-stack, micro, and asynchronous.

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