The complete study on Python scripting language and its GUI's

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ABSTRACT

Python uses an elegant syntax, making the programs you write easier to read. It's an easy-to-use language that makes it simple to get your program working. This makes Python ideal for prototype development and other ad-hoc programming tasks, without compromising maintainability. It comes with a large standard library that supports many common programming tasks such as connecting to web servers, searching text with regular expressions, reading and modifying files. Python's interactive mode makes it easy to test short snippets of code. There's also a bundled development environment called IDLE. It's easily extended by adding new modules implemented in a compiled language such as C or C++. It can also be embedded into an application to provide a programmable interface. Python runs anywhere, including Mac OS X, Windows, Linux, and UNIX, with unofficial builds also available for Android and iOS.[1]

Keywords:- Python2, python3,cpyth on(compiler python), Thonny(python IDE), tk GUI(toolkit Graphical User Interface)

1.Introduction

Python was conceived in the late 1980s, and its implementation began in December 1989 by Guido van Rossum at Centrum Wiskunde & Informatica (CWI) in the Netherlands as a successor to the ABC language (itself inspired by SETL) capable of exception handling and interfacing with the AMOEBA Operating System. Python is probably one of the few programming languages which are both simple and powerful. Python is a popular object-oriented language used for both standalone programs and scripting applications in a variety of domains. It's free, portable, powerful, and remarkably easy to use. Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages. Python is free software in two senses. It doesn't cost anything to download or use Python, or to include it in your application. Python can also be freely modified and re-distributed, because while the language is copyrighted it's available under an open source license.

2. Features of Python

A variety of basic data types are available: numbers (floating point, complex, and unlimited-length long integers), strings (both ASCII and Unicode), lists, and dictionaries. Python supports object-oriented programming with classes and multiple inheritances. Code can be grouped into modules and packages. The language supports raising and catching exceptions, resulting in cleaner error handling. Data types are strongly and dynamically typed. Mixing incompatible types (e.g. attempting to add a string and a number) causes an exception to be raised, so errors are caught sooner. Python contains advanced programming features such as generators and list comprehensions. Python's automatic memory management frees you from having to manually allocate and free memory in your code.Coreldraw, D-link(networking devices), Eve online(game), Google, forcast watch, Honeybell testing), Philips(task to robot), NASA are the organizations which uses python language for their coding purpose.[2]

3.Power of Python

Python is easy to use, powerful, and versatile, making it a great choice for beginners and experts alike. Python's readability makes it a great first programming language, it allows you to think like a programmer and not waste time understanding the mysterious syntax that other programming languages can require. Python is an easy to learn, It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. Python is often used as a support language for software developers to build, control and manage testing. Python is useful for, among other purposes: Application Domains Database Access, Desktop GUIs, Education, Game and 3D Graphics, Network Programming, Scientific and Numeric, Software Development, Web and Internet Development.[3]

4. What makes python so popular

Python is one among the most popular dynamic programming languages that is being used today. The reasons behind that are Python is an open-source and object-oriented programming language: uses an elegant syntax, making the programs you write easier to read. Due to its elegance and simplicity, top technology organizations like Drop box, Google, Quora, Mozilla, Hewlett-Packard, Qualcomm, IBM, Instagram and Cisco have implemented Python Compared to other programming languages, it requires the programmer to develop lesser codes can be utilized for a wide range of applications like scripting, developing and testing. It offers automatic memory management and several standard libraries for the programmer. The large standard library included in this language supports several programming tasks in multiple domains like web programming, GUI development, desktop software development, data analysis and machine learning. The interactive mode for testing code's short snippets. We can easily append new modules that are being implemented in other compiled language like C++ or C. Python is platform independent: allows developer to run the code anywhere.[6]

5.Domain of use

5.1Web development

Python is used for developing sites, it is a scripting language like PHP, Perl, Ruby and so much more. It can be used for web programming (django, Zope, Google App Engine, and much more). But it also can be used for desktop applications (Blender 3D, or even for games pygame) Web applications created in python are made with the Flask or Django module.Most of the web applications (such as SQLite or MySQL) or data structures (JSON).[15]

B. How does Python fit into web development?

Python can be used to build server-side web applications. While a web framework is not required to build web apps, it's rare that developers would not use existing open source libraries to speed up their progress in getting their application working. Python is not used in a web browser. The language executed in browsers such as Chrome, Firefox and Internet Explorer is JavaScript. Projects such as pyjs can compile from Python to JavaScript. However, most Python developers write their web applications using a combination of Python and JavaScript. Python is executed on the server side while JavaScript is downloaded to the client and run by the web browser.[4]

6.GUI development

Python provides various options for developing graphical user interfaces (GUIs). Most important are:

Tkinter: is the Python interface to the Tk GUI toolkit shipped with Python. We would look this option in this chapter;

wxPython: This is an open-source Python interface for wxWindows;

JPython: JPython is a Python port for Java which gives Python scripts seamless access to Java class libraries on the local machine.[9]

6.1 Tkinter:

Tkinter is the standard GUI library for Python. It provides a fast and easy way to create GUI applications. Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit.

These are the few steps to be followed for creating a GUI application using Tkinter:

i)Import the Tkinter module.

ii)Create the GUI application main window.

iii)Add one or more widgets to the GUI application.

iv)Enter the main event loop to take action against each event triggered by the user.

6.2 Tkinter Widgets

Tkinter provides various controls, such as buttons, labels, frames and text boxes used in a GUI application. These controls are commonly called widgets.[9]

7.Scientific and numeric

7.1 Python in Scientific & Numeric Domain:

Many scientists and engineers in the scientific and engineering world use R and MATLAB to solve their data analysis and data science problems. Python can be used as an alternative to MATLAB or R programming .Python offers specialized modules, like Numpy, Scipy, Matplotlib, Pandas and so, for solving numerical problems or for data analysis.

7.2 Numpy & Scipy

NumPy and SciPy are open source add-on modules to Python that provide common mathematical and numerical routines in pre-compiled, fast functions. These are growing into highly mature packages that provide functionality that meets, or perhaps exceeds, that associated with common commercial software like MatLab. The NumPy (Numeric Python) package provides basic routines for manipulating large arrays and matrices of numeric data. The SciPy (Scientific Python) package extends the functionality of NumPy with a substantial collection of useful algorithms, like minimization, Fourier transformation, regression, and other applied mathematical techniques.[7]

7.2.1Numpy

It's the core library for scientific computing in Python. It provides a high-performance multidimensional array object, and tools for working with these arrays. To import numpy module we are making use the keyword import.

```
>>>import numpy as np  #importing numpy module[7]
```

7.3Broadcasting Concept

Broadcasting is a powerful mechanism that allows numpy to work with arrays of different shapes when performing arithmetic operations. Frequently we have a smaller array and a larger array, and we want to use the smaller array multiple times to perform some operation on the larger array.[7]

7.4 Scipy

Provides a large number of functions that operate on numpy arrays and are useful for different types of scientific and engineering applications.

Image operations: SciPy provides some basic functions to work with images. For example, it has functions to read images from disk into numpy arrays, to write numpy arrays to disk as images, and to resize images.[7]

7.5 MATLAB files

The functions scipy.io.loadmat and   scipy.io.savemat allow you to read and write MATLAB files.

7.5.1 Matplotlib

It is a plotting library. matplotlib.pyplot module provides a plotting system similar to that of MATLAB.

Plotting: The most important function in matplotlib is plot, which allows you to plot 2D data.[8]

8.System administration

The OS module in Python provides a way of using operating system dependent functionality. The functions that the OS module provides allow you to interface with the underlying operating that Python is running on (Windows, Mac or Linux). You can find important information about your location or about the process. Before you start, make sure that you have imported the OS module "import os".[10]

9.CONCLUSION

What we can retain about Python is a programming language that is:Easy-to-Learn: python has few keywords, simple structure and a clearly defined syntax. Easy-to-read: python code is more clearly defined and visible to the eyes. Easy-to-maintain: python's source code is fairly easy-to-maintain. Used for databases: Python provides interfaces to all major commercial databases. Has a broad standard library: python's bulk of the library is very portable and cross-platform compatible on UNIX, Windows, and Macintosh.

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