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A Female School Student Investigates the Python Programming Language

Ekamjot Kaur
CARMEL CONVENT SCHOOL, CHANDGARH

Abstract:- This research paper focuses on the importance of Python programming language and how upskilling and studying Python can help you advance your career in the IT industry. This paper also includes an introduction to Python and its features, as well as an application review. Python is a multidisciplinary technique of breaking down difficult problems into simple ones in a multitude of sectors. Integration of Python and Data Science, as well as Machine Learning, provides excellent work prospects and can aid in economic development.Python is a useful language for learning as well as real-world programming. Guido van Rossum designed Python, a powerful high-level, object-oriented programming language. I will first introduce you to the properties and features of python programming.My study also examines the reasons for Python's popularity& known for being the fastest growing programming language

I. INTRODUCTION

Python is a high-level programming language with a broad range of applications that has become increasingly popular in recent years.To satisfy the demands of industry, young people must be up-skilled and trained. Universities and colleges must modify their educational programmes to satisfy the demand for digital technology and graduating students must be industry ready for the Indian economy to grow. Python is recognised as the number one programming language by Popularity of Programming Language (PYPL, 2022), with a significant share of 27.95%. Python grew the most in last 5 years i.e., 11.5%. As per stack overflow 2021, Python passed SQL to become the third most popular technology. Data science and Python have the highest job and future prospects, allowing one to reach new heights. Python is now used by IT organisations for the majority of their operations. On both a small and large scale, the language constructs allow the user to design clear programmes. The most remarkable aspect of Python is that it enables a variety of computing paradigms, such as object-oriented, procedural, functional, and formal programming.Python has a large and well established standard library, as well as a vibrant system and memory allocation that is automatic. For various operating systems, Python interpreters are available.

II. FACTORS ATTRIBUTING TO RAPID GROWTH OF PYTHON LANGUAGE

- A boom in data science applications is fueling position of Python as the fastest-growing programming language. A recent investigation by Stack Overflow, the Q&A site that houses the world's largest online developer community, has established this relationship. According to J Kazil, a former board director of the Python Software Foundation (PSF), Python's reputation will continue to grow as the language's availability and usefulness continue to appeal to academics undertaking analytics."The number of Python developers interested in data science technologies is increasing very fast. This indicates that Python's popularity in data science and machine learning is most likely the driving force behind its rapid rise."
- Other evidence supports the overarching interest in data science among Python developers. Pandas, a Python data analytics software module, is the fastest increasing tag across Python labelled queries. Despite the fact that it was only launched in 2011, it already accounts for around 1% of all Stack Overflow question requests. However, among Python users, JavaScript is the second commonest tag, demonstrating that Python is widely utilised by web developers.
- Python is a programming language that allows you to quickly prototype complex applications. It contains interfaces to a variety of operating system APIs and libraries and can be extended to C or C++. The Python programming language is used by NASA, Google, YouTube, BitTorrent, and other large organisations. Python is widely used in advanced computer science disciplines such as Artificial Intelligence, Natural Language Generation, and Neural Networks, among others.
- Python has replaced Java as the most popular introductory language due to its appeal as a beginner-friendly language. Python is extremely versatile as a dynamically typed language. Additionally, because Python is more forgiving of failures, you'll be able to compile and run your programme until you reach the issue section.
- Python is an example of FLOSS (Free/Libre and Open Source Software), or free and open source software. It is based on the idea of a community that shares information and is always improving, resulting in a better world. Even for commercial use, Python is absolutely free.
- PORTABLE -Python can run on a wide range of hardware systems and, thanks to its open-source nature, offers a consistent user interface across all platforms. It, like its standard library, operates natively on Windows, Mac OS, Linux, and other platforms.
- Python is extensible, with first-class interoperability with C or C++.

- Python Libraries – Python containsvery skillfully prepared libraries such as NumPy, Panda, SciPy, and Scikit-Learn that support a significant toolset for Math, Statistics, Computing Science, and other technical areas.

III. APPLICATIONS OF PYTHON

Python is a real-time and growing programming language that may be used to create applications in a variety of disciplines, including:

- **Internet Development** -Python frameworks like Django, Pyramid, Flask, and Bottle, as well as content management systems like Plone and django CMS, can be used to quickly construct online applications. Python's standard library is used to handle a variety of internet protocols, including HTTPS, FTP, SSL, and the processing of JSON, XML, and EMail, among others.
- Cryptographic functions, which include a wide range of algorithms for constructing secure applications, are implemented in Python. Python allows users to create clients and servers for both connection-oriented and connectionless protocols.
- Python is widely used in empirical and statistical computing, featuring tools such SciPy for Engineering, Math&Science, Pandas for data research and forecasting, IPython for efficient editing and recording of work sessions, as well as visual representations and parallel processing.
- Python is also used in the development of ERP and e-commerce systems. Tryton is a three-tier high-level general purpose application platform, while Odoo is an all-in-one management software for enterprise administration applications.
- In Python, everything is an object. **Object-oriented** programming (OOP) aids in the intuitive solution of difficult problems. You may use OOP to break down these big problems into smaller chunks by creating objects.

IV. PROGRAMS THAT CAN BE WRITTEN USING PYTHON

The most common programs that can be written using Python are :

- **GUI- Graphical user Interface**--Tkinter and wxPython are the most used Python interfaces for creating graphical user interfaces. Tkinter is an object-oriented user interface included with the Python interpreter. It comes with all of the tools needed to create a graphical user interface.
- **Internet Programming & Network**-The Python standard library includes a number of modules that give network programmers with a variety of capabilities, including client-server connections, socket programming, FTP, Telnet, email functions, RPC, SOAP, and more.
- **Database programming**-Most common databases, such as Sybase, Oracle, Informix, MySQL, PostgreSQL, SQLite, and others, are supported by Python. Pickle is a standard module for storing and recovering files' objects.In addition, ZODB is a database management system that is entirely object-oriented. SQLite has been regarded a standard feature of Python since Python 2.5.
- **Integrity of Components**-Python is able to connect its code and other components in a seamless manner. Swing and SIP, for example, can import compiled code from other languages for use in Python.
- **System Programming**-Python's internal APIs make working with operating system services much easier, making it an excellent choice for system development. The standard library for Python may run on a variety of platforms and operating systems. It comes with tools for working with system resources such as environmental variables, files, sockets, pipes, processes, multiple treatments, command line, standard stream interfaces, shell programming, and more.
- **Other applications**-Python is the language of choice for a wide range of programming tasks. PyGame, for example, is a game programming tool, and PIL is an image processing tool. PyRo is a programming language for robotics. Under the name NLTK, a full package for artificial intelligence, network simulation, and shell programming was released. Almost every area has enough modules to assist you in achieving your objectives. Python users with various needs can choose from a variety of tools. Python is ideal for any type of programming because of this useful feature. The fact that many major websites and applications use Python is the best proof of this.

V. USERS OF PYTHON

Many businesses have used and continue to use Python for a variety of purposes.

- Google has been one of the Python users who has incorporated the language into its web search system, as well as employing Python's creator.
- Python is widely used in the YouTube video-sharing service.
- Python is the programming language behind the popular BitTorrent peer-to-peer file sharing technology.
- For its popular GIS mapping tools, ESRI leverages Python as an end-user customization tool.
- Python is used for scientific programming activities by NASA, Los Alamos National Laboratory, Fermilab, JPL, and others.
- Python is used by iRobot to create commercial robotic vacuum cleaners.
- Python is used for hardware testing by Intel, Cisco, Hewlett-Packard, Seagate, Qualcomm, and IBM.
- Python is used by the National Security Agency (NSA) for cryptography and intelligence analysis.
- To fulfil its duty, the IronPort email server uses about 1 million lines of Python code.
- The One Laptop Per Child (OLPC) project uses Python to create its user interface and activity model.
- Python is used in the development of cinematic animation by companies such as Industrial Light & Magic, Pixar, and others.
- Python is used by JPMorgan Chase, UBS, Getco, and Citadel to forecast financial markets.

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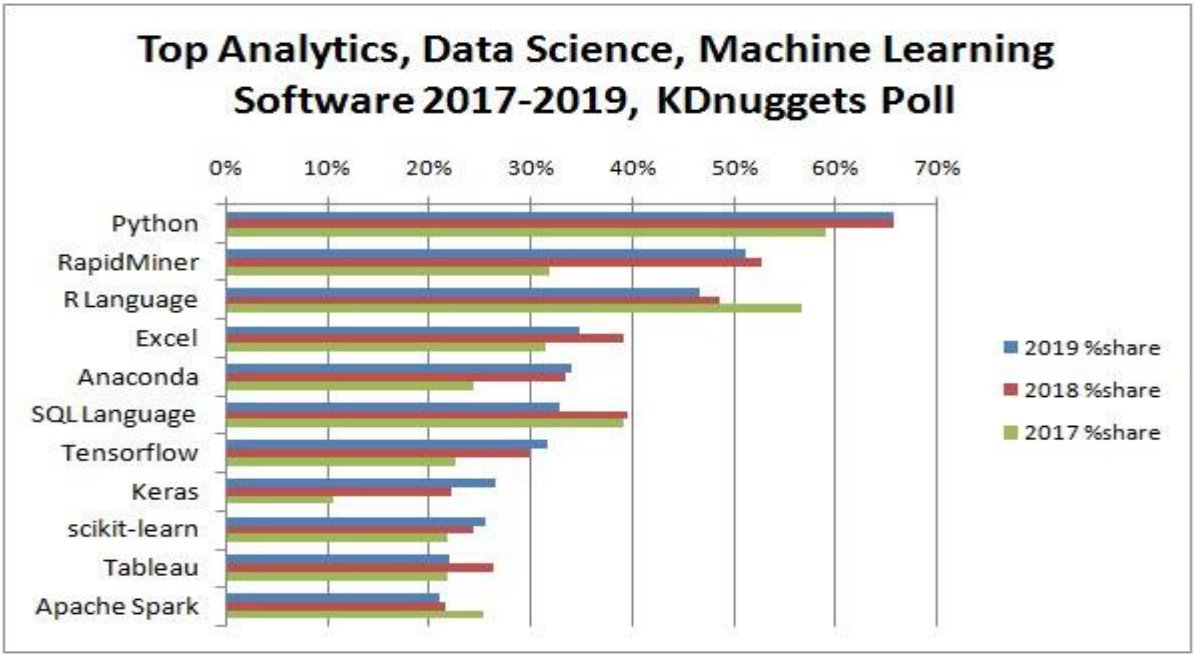

Software	2019 % share	2018 % share	2017 % share
Python	65.8%	65.6%	59.0%
RapidMiner	51.2%	52.7%	31.9%
R Language	46.6%	48.5%	56.6%
Excel	34.8%	39.1%	31.5%
Anaconda	33.9%	33.4%	24.3%
SQL Language	32.8%	39.6%	39.2%
Tensorflow	31.7%	29.9%	22.7%
Keras	26.6%	22.2%	10.7%
scikit-learn	25.5%	24.4%	21.9%
Tableau	22.1%	26.4%	21.8%
Apache Spark	21.0%	21.5%	25.5%

TIOBE INDEX FOR MARCH 2022

Mar 2022	Mar 2021	Change	Programming Language	Ratings	Change
1	3	↑	Python	14.26%	+3.95%
2	1	↓	C	13.06%	-2.27%
3	2	↓	Java	11.19%	+0.74%
4	4		C++	8.66%	+2.14%
5	5		C#	5.9	

VI. CONCLUSION

This paper introduced the Python programming language as a good alternative for learning and meaningful programming. The characteristics, features, and forms of programming support supplied by Python were examined in this study. We discovered Python to be a quick, powerful, portable, simple, and open source language that supports other technologies based on these traits. Following that, the many types of programmes that Python may write were examined. The paper also discusses some of the most recent Python applications by well-known organisations. Based on facts acquired from prominent and trusted journals and websites, the paper has highlighted the reasons why the Python programming language is having the quickest growth.

Python is used extensively in data analytics to analyse a large amount of data, make predictions, diagnose problems, and mine data to make recommendations for future actions. Python is a computer language that can be used to make commercial decisions, forecast weather, investigate protein structures in biology, or develop a marketing campaign for transdisciplinary data science needs. Pythonhas built-in capabilities that make it simple to address the needs of data science. The ultimate goal of this study is to raise Python awareness and utilisation in research activity, as there is a demand for Python developers in the realm of analytics.

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