Python Language: From Trending to Laying Future Foundation of Big Data and AI

Introduction

In July 20, 2017, The Sciences and Technology Department (IST) at George Mason University (GMU) emailed Information Technology (IT) undergraduate students introducing Python language in capstone courses. Moreover, the email sent by the IST Undergrad Inquiries (Follow-up to New IT 106 Python Sections Announcement, July 20, 2017) announced the opening of two Python programming sections, which would substitute for Java programming under the designated course IT 106. Furthermore, the Syllabus for IT 106: IT Problem Solving (Python), found in the syllabus archive of GMU website, detailed implementation of python to learn main computer programming concepts (Hashmi, I., 2017, pp. 1). Likewise, many other top academic institutions, colleges, and universities began implementing python language as an introductory programming course in computer science departments according to study done by Guo, P. (2014), and a supporting article by Johnson, (2017). Not only python ranked number five in the top 10 programming languages in 2017 as Benson (2017) explained, but CASS, S (2017) started his article with: “Python jumps to No. 1” according to the IEEE spectrum ranking of 2017, Therefore, an analysis of python’s popularity, what made it thrive, how it became the language of choice for Big Data world and Artificial Intelligence (AI) realm, its security implications, and its ethical concerns, will be elaborated and explained.

Python in the Top Five Today, How and Why?

Developed by Guido van Rossum, late 1980s, then released in 1991, Rossum. G (1995) defined Python in the abstract of a report he had written that it “is a simple, yet powerful programming language that bridges the gap between C and shell programming”. (p.3). Moreover, Dawson (2009), stated that python is considered a high-level language yet it requires less time in coding and development if compared to other high languages such as C#, VB, and Java. (P. 3-5). Furthermore, python uses objected oriented programming, serves variety of business, commercial, and web applications, and its Syntax produces less lines of code compared to C, C++, and java. Additionally, python is dynamic to different systems types, and it’s compatible with functional and imperative programming. One of the many advantages of Python that it’s free open source, it can run on variable platforms, and it’s supported by online communities. Python’s power is derived from most popular companies who used it such as IBM, Google, NASA, and Microsoft. Simplicity of python’s syntax, made it best selection for beginners who want to learn programming. (Kazil & Jarmul, 2016; Benson, 2017; Dawson, 2009; Johnson, 2014; Wolf, 2017). Additionally, Guo, P. (2014) ranked python in the top five in four different rankings. According to him, python dominated other languages in a study he performed among 39 CS departments across the United States. Subsequently, he mentioned that many other academic institutions are considering python as a beginner language instead of Java. Python witnessed a huge rise through variety of rankings in the former years as Huruka (2017), Cass (2017) indicated. Then a year ago during 2016, it was...
As a result, Python language has already set a foot in the future securing its place as language of science and technology. Its scientific ecosystem libraries make it the preferred choice for developing analytical algorithms and exploring the vast amount of data. Furthermore, Siddiqui, Alkadri, and Najeeb (2017) specified that “The high-level interactive nature of this language makes it suitable for use in various fields, such as in scientific computation, advanced computing, and machine learning. As for the Big Data field, Python is proven the best in parsing data and analyzing it. For instance, it is used in Big Data analytics, machine learning, and natural language processing. Nevertheless, Python is also becoming a popular language in the field of Artificial Intelligence. Mason (2017) explained in his article that Python began to be implemented in Artificial Intelligence. In addition, he mentioned other areas where Python is being used, such as in data science, web development, and networking.

The increasing popularity of Python language helped shape the future in many fields but specifically in Big Data and Artificial Intelligence. The language has gained popularity due to its simplicity, flexibility, and robustness. Python’s syntax is easy to learn and use, making it accessible to both beginners and experienced developers. This is a significant advantage in the rapidly evolving field of data science and machine learning, where researchers and practitioners need to quickly prototype and experiment with new ideas.

Python’s scientific libraries, such as NumPy, SciPy, and Pandas, are widely used for data manipulation and analysis. These libraries provide powerful tools for handling large datasets and performing complex calculations. Python’s strength in handling data is further enhanced by libraries such as Matplotlib and Seaborn, which are used for data visualization. This capability is crucial in data science, where visual representation of data is essential for understanding complex patterns and relationships.

In the field of Artificial Intelligence, Python’s popularity is due to its extensive machine learning libraries, such as scikit-learn, TensorFlow, and PyTorch. These libraries provide a wide range of tools for building and training machine learning models, from simple linear regression models to complex deep learning networks. Python’s simplicity and flexibility make it easier for developers to experiment with different models and algorithms, which is crucial in the fast-paced field of AI.

Python is also popular due to its flexibility and the vast ecosystem of open-source libraries. This ecosystem includes libraries for web development, networking, and system administration. For example, Flask and Django are popular web frameworks that use Python. These frameworks provide developers with a robust platform for building web applications, making it easier to develop complex applications with ease.

Python’s popularity is also due to its strong community support. The Python community is one of the largest and most active in the programming world. This community includes developers, researchers, and enthusiasts who share their knowledge and expertise through conferences, meetups, and online forums. This community support encourages collaboration and sharing, which is essential for the development of new tools and technologies.

Python’s versatility and robustness have made it a popular language for penetration testing. Python is used in various penetration testing tools, such as Metasploit and Hackbar. These tools use Python to automate various aspects of penetration testing, such as scanning, vulnerability assessment, and the exploitation of vulnerabilities. Python’s flexibility and robustness make it an ideal language for building these types of tools.

In conclusion, Python is a versatile and popular language that is widely used in various fields, including science, technology, and artificial intelligence. Its simplicity, flexibility, and robustness make it an ideal language for both beginners and experienced developers. The Python community’s support and the vast ecosystem of open-source libraries further contribute to its popularity. Python is expected to continue its rise in the future, as more developers and researchers discover the power and flexibility of this language.
Who knew that in 2017, Python language will become the most popular language? As a web developer, I always thought that PHP, java, and C are the languages of the future, however, Python proved me wrong. Moreover, the findings in this research convinced me to begin learning python, and to take the Python section for IT 106 next semester instead of Java. Finally, Python's aspects of IT security and the ethical issues it follows is extremely important, because what separates a penetration tester from a hacker is the thin line, the first improves security, and the latter causes ethical concerns.

References


Follow-up to New IT 106 Python Sections Announcement. (2017).


Python is the first-choice language of a vast majority of students and skilled programmers. The huge group of both future and present programmers want to know what to learn to get actual jobs. For most people, it makes very little sense to enter a field with knowledge about something that's not in demand. And Python is definitely in demand nowadays. Since the number of data science students and programmers is rising, together with a rising number of Python recommendations for use, the number of Python enthusiasts will not be descending. The app development market is greedy but flexible. Trends define the need, and needs define actual trends. Python is now a trend, no doubt about it. Since it's so easy to learn, you can start your programming journey with Python. As these technologies lay the foundation for the future, programming languages associated with these emerging technologies are already gaining popularity. Therefore, this makes the position of languages such as R and Python, among others extremely powerful. Another reason is its compatibility with Hadoop, the most popular open source Big Data platform. Read more on this here and some mistakes that Python developers must avoid while using it for Big Data here (link the previous blogpost). In fact, Python is slowly yet steadily becoming the most preferred language for the field of Data Science. According to the interactive list of top programming languages by IEEE Spectrum, Python sits on the top of the table. It enjoys the top spot followed by C, Java and C++.