Abstract

In this paper an insight into the awareness of the programming language Python and other ones among engineering students from a private university of Peru is provided. Python is a programming language widely used in many research fields, especially in the fields of physical sciences and engineering. Hence this computational tool can be of great benefit to Peruvian universities looking not only to be officially authorized and recognized as research universities but also to improve their research output in the aforementioned fields of research. In order to assess the knowledge of Python and other programming languages among computer science and electronic engineering students, a survey was carried out in a Peruvian private university. The surveyed populations reached a total of 191 engineering students, among men and women. The survey was made up of 12 questions and as a main result of this, it was discovered a lack of awareness of Python among the surveyed students. The knowledge of Python among the 20.9% of the students surveyed, which ranged from the first until the tenth semester, was mainly a basic one, whereas only 0.5% of the total population mentioned an intermediate level. Java, which is also a very popular programming language worldwide, was not well known by some of the students that participated in the study. A considerable percentage of the students, 55.5%, indicated to have a basic knowledge of this, while only 12.0% had an intermediate level. In addition to the aforementioned results, it was possible to observe as well a gender gap in the survey, which unfortunately is still a global trend in many engineering fields. Overall, this study can serve as an indicator to show that some higher education institutions in Peru have still some work to do to teach their students better skills at programming in Python and other popular programming languages. By undertaking the foregoing task, these institutions can profit when looking for official recognition as research universities and also will have the chance to provide the students with additional computational tools for their professional lives.

Keywords: Higher education, programming, programming languages.

1 INTRODUCTION

Peru is an emerging South American economy. As it is nowadays, part of the economies of countries are quite tied up to their technological development [1]; and this technological development is to a good extent driven by the information technology (IT) industry. A career which is in high demand in the IT industry is programming, and this is only expected to significantly increase over the next decade [2]. Programmers especially skilled in Python are and will be widely sought in the coming years [3]. Python is a high--level programming language and it is quite suitable to introduce students to coding given its readability [4].

Python is not only suitable to learn programming, but most importantly is a language being widely used to do research in different fields, since the biological sciences [5] to the physical sciences and engineering [6], [7], [8]. This point is a very crucial one for Peruvian universities because according to the requirements imposed by the Superintendencia Nacional de Educación Superior Universitaria (SUNEDU), research is a necessary condition in order that universities are recognized as higher education institutions [9]. It is true that other software tools like Microsoft Excel, Matlab or programming languages like C or Java allow to do research, but Python is such a widespread and easy-to-use programming language, that its benefits to do research should not be missed. Hence, it is a suggested priority to universities to start teaching Python to their students as this would not give Peruvian universities credibility as better research institutions but also it would promote the career prospects of the future Peruvian researchers.

In this study, a survey among the students of a private Peruvian university was carried out and it was inquired about their knowledge of Python and additionally about other programming languages.
2 METHODOLOGY

To gather information about the knowledge of Python and other languages among Peruvian university students, a survey of twelve questions was developed. Besides focusing on the level of Python among the students, it was also decided to inquire about four more languages (Java, C, C++ and C#). According to the TIOBE index, which measures the popularity of programming languages worldwide monthly, Java, C, C++, Python and C# are the five most popular programming languages around the world [10].

The survey was carried out over the period of two weeks and was focused only in students from the departments of electronic engineering and computer science. The participants were handed out the printed survey in their classrooms. In the sample there were a total of 191 participants, 128 and 63 from the systems and electronic engineering faculties, respectively.

Because the questions about the level of knowledge on computer languages were from the multiple choice type, a quantitative analysis of the collected data was undertaken. The level of knowledge of a particular programming language was ranked according to null, beginner, intermediate and advance.

3 RESULTS

In order to facilitate our analysis before asking the level of a particular programming language, the participants were asked if they have ever heard about one of the selected five programming languages. In Fig. 1 we can see that the most unheard of language among the participants is C#, 80.6% have not heard of it, while on the other hand most of them (89.0%) have heard of Java. The percentage of the students which heard about Python is 37.7%.

In Fig. 2 the percentage of students with different levels of knowledge of Python, Java, C, C++ and C# is presented. As suggested by Fig. 1, we can see that the preference among students of knowing and using a certain programming languages lies with Java and C++. The percentage of students from our sample which have a basic and intermediate knowledge of Java are 55.5% and 12.0%, respectively. C++ also was highly ranked among the students: 39.3% had a basic level, 4.2% intermediate level and 0.5% advanced level. On the other hand only 20.9% and 0.5% of the participants had a basic and intermediate knowledge of Python, respectively. C# is the least preferred language among the students, only 6.3% had a basic level, 0.5% intermediate level and 0.5% advanced level. In addition, a good percentage (40.8%) of the total of the students surveyed have heard about Python but do not have any experience whatsoever with this language (null knowledge).

![Figure 1. Percentage of the number of participants which have heard or not about the five most popular computer languages (according to the TIOBE index).](image-url)
In Fig. 3, it can be observed how there is also a gender divide when it comes to the knowledge of the different programming languages. Due to the availability of data, in Fig. 3 only the number of students with a basic knowledge of each programming language was used. For all five chosen languages, it is clear that the quantity of men with a basic knowledge in a language is bigger than women. Part of this result is also due to the general gap in our sample, 30 out of the 191 participants were women and 161 men. This simply follows as a consequence of the global trend where women are mainly underrepresented in engineering and some scientific fields [11].
As a consequence of the results, it can be seen that Java and C++ are the two most preferred or used programming languages among the sample of higher education Peruvian students. Python really does not show up as a preferred programming language among them. This fact could be a great hindrance for the sections of Peruvian universities that do research, because by simply not promoting the use of Python among their students (some of them future researchers), they diminish the chances to do more research using this computational tool in the future. Moreover it is the students that not having the proper knowledge of this programming language, that will struggle at the time of going into the job market. As it was also mentioned, Python in comparison with Java, C, C++ and C# characterizes for its readability; hence, Peruvian students learning for the first time programming can benefit from this language, rather than going through sometimes the cumbersome terminologies of other programming languages. Due to its readability, the writing of better and more efficient algorithms can be as well promoted among university students.

4 CONCLUSIONS

A survey was carried out to learn about the knowledge of Python and other programming languages among the students of a Peruvian private university. The sample was made up of students from the electronic engineering and computer science departments. It was shown that Python is not really preferred or used much by the students. Only 20.9% of the sample had a basic knowledge of this programming language and 0.5% an intermediate knowledge. This is a bit disconcerting because the sample included students from the first till the last (tenth) semesters. Thus, the prospects to do research using Python are quite low, which could affect the output of research that is happening at not only this but presumably at other Peruvian universities, and also these institutions can struggle at the moment of requiring an official recognition by SUNEDU. Moreover, we have also observed and confirmed a gender gap, which is still occurring worldwide in the engineering fields.

Due to the size of the sample for this survey, the future work will consist in extending this study to students from other Peruvian universities, in order to shed more light into how the knowledge of Python stands among the university student population of Peru. The objective of this is not only to improve the future research output of Peruvian universities but also to promote the creation of introductory programming courses given in their entirety in Python.

REFERENCES


