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CSE 262: Quiz #5

Due Dec 6th, 2022 at 11:59 PM

The quiz has ONE question. Please submit your answer by editing this file and then pushing it to your Bitbucket account. You can use as much space as you want for each answer. Please be detailed in your answer. Remember: this quiz is worth 9% of your grade.

Question 1: There are many (many!) innovations in programming languages today. Some examples include no-code environments, domain-specific languages, programming languages for formally verifying the correctness of software, new approaches to memory safety, and languages for secure computing, to name a few. Reflect on the career you hope to have, and how innovations in programming languages will affect that career. Then answer the following question: "What do you think will be the most important programming language innovation or issue for the career you imagine yourself having?"

I wish to have a career in machine learning, a branch of artificial intelligence that imitates how humans learn, because of its impacts on daily lives. The ability to create an automated program that can learn like a human gives endless possibilities to automate all sorts of processes that can make everyone's life better and simpler. Tesla, for example, have created AI that analyzes, and processes information based on cameras, sensors, as well as driving habits of previous consumers to learn how to automate driving as well as braking anticipated crashes. They can essentially create a super-human driver; but there is an obstacle within the machine learning field.

Machine learning is one of the most complex computer science fields. A career in Machine learning requires an individual who can incorporate many aspects of complex mathematics and have a deep understanding of programming algorithms. These traits are necessities because computers can only analyze and process information as fast as the algorithms and resources that we provide it. Even with the fastest machine learning algorithms and computer resources nowadays, some applications require years of time before they produce a viable product. After creating a viable product, machine learning is still necessary to improve their service. Alexa, Amazon's virtual assistant, for example takes about two weeks to learn someone's voice. How nice would it be if it took only one week, or maybe even a day? Anything that can accelerate this process would revolutionize applications that use artificial intelligence and improve daily lives. One way to accelerate this field is the development of programming languages innovations.

The basis of machine learning starts with the code. Computer programmers that specialize in machine learning must choose the right programming language. Different programming languages have their own strengths and weaknesses; therefore, it is important to choose one that would suit them and provide the best structure, resources, and speed for the designated task. For a career like machine learning that consists of hundreds of thousands of employees and have problems that are computationally hard, it is important for the programming language to be simple, readable, and efficient. With a simple and readable language, programmers can put their entire focus into solving the machine learning problem rather than deal with the nuances of the programming language. It is also important the programming language provides tools to make machine learning efficient; this can come in libraries or data structures designed to make deep learning, the essence of machine learning, optimized and easy. I believe the most important programming language innovation is the one that can improve efficiency, but most importantly readability, and simplicity. Currently, the one programming language innovation that is widely used by machine learning developers is Python.

Python is notoriously known for its easy learn and use syntax while maintaining moderate efficiency. Furthermore, Python's Pytorch library has been tested to have some of the highest performances for optimized deep learning algorithms while being easy to debug. As I have mentioned in the previous paragraph, these features are vital for the programming language that machine learning engineers use, and Python checks off all the boxes. The creation of Python and its Pytorch library are two examples of two important programming innovations for the machine learning field; this is supported by how commonly Python is used for machine learning programs. The example of Python and

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Pytorch supports my belief that the most important programming innovation for the machine learning career is the one that improves efficiency, and most importantly simplicity and efficiency.