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Comparative study of Machine learning and Artificial Intelligence

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***Abstract*:** *Artificial Intelligence and Machine Learning are the terms of computer science. This article discusses some points on the basis of which we can differentiate between these two terms. The word Artificial Intelligence comprises of two words "Artificial" and "Intelligence". Artificial refers to something which is made by human or non natural thing and Intelligence means ability to understand or think. There is a misconception that Artificial Intelligence is a system, but it is not a system .AI is implemented in the system. There can be so many definition of AI, one definition can be "It is the study of how to train the computers so that computers can do things which at present human can do better."Therefore It is a intelligence where we want to add all the capabilities to machine that human contain.Machine Learning is the learning in which machine can learn by its own without being explicitly programmed. It is an application of AI that provide system the ability to automatically learn and improve from experience. Here we can generate a program by integrating input and output of that program. One of the simple definition of the Machine Learning is "Machine Learning is said to learn from experience E w.r.t some class of task T and a performance measure P if learners performance at the task in the class as measured by P improves with experiences."*
The key difference between AI and ML are: — Artificial Intelligence, Machine Learning, integrating input .

I. Introduction

Machine learning is a branch of artificial intelligence, simply put by Professor and Former Chair of the Machine Learning Department at Carnegie Mellon University, Tom M. Mitchell: "Machine learning is the study of computer algorithms that improve automatically through experience." ML it's one of the ways we expect to achieve AI. Machine learning relies on working with large data-sets, by examining and comparing the data to find common patterns and explore nuances.For instance, if you provide a machine learning program with a lot of x-ray images, along their corresponding symptoms, it will be able to assist (or possibly automate) the analysis of x-ray images in the future. The machine learning application will compare all those different images and find what the common patterns are in images that have been labeled with similar symptoms. In addition, when you provide it with new images it will compare its contents with the patterns it has gleaned and tell you how likely the images contain any of the symptoms it has studied before.

In a simple example, if you load a machine learning program with a considerable large data-set of x-ray pictures along their description (symptoms, items to consider, etc.), it will have the capacity to assist (or perhaps automatize) the data analysis of x-ray pictures later on. The machine learning model will look at each one of the pictures in the diverse data-set, and find common patterns found in pictures that have been labeled with comparable indications. Furthermore, (assuming that we use a good ML algorithm for images) when you load the model with new pictures it will compare its parameters with the examples it has gathered before in order to disclose to you how likely the pictures contain any of the indications it has analyzed previously.

The type of machine learning from our previous example is called "supervised learning," where supervised learning algorithms try to model relationship and dependencies between the target prediction output and the input features, such that we can predict the output values for new data based on those relationships, which it has learned from previous data-sets Unsupervised learning, another type of machine learning are the family of machine learning algorithms, which are mainly used in pattern detection and descriptive modeling. These algorithms do not have output categories or labels on the data (the model is trained with unlabeled data).

Reinforcement learning, the third popular type of machine learning aims at using observations gathered from the interaction with its environment to take actions that would maximize the reward or minimize the risk. In this case the reinforcement learning algorithm (called the agent) continuously learns from its environment using iteration. A great example of reinforcement learning are computers reaching super-human state and beating humans on computer games .Machine learning is interesting; particularly its advanced sub-branches, i.e. deep learning and the various types of neural networks. In any case, it is "magic" , regardless of whether the public at times have issues observing its internal workings. In fact, while some tend to compare deep learning and neural networks to the way the human brain works, there are important differences between the two.

On the other hand, the term "artificial intelligence" is exceptionally wide in scope. According to Andrew

Moore [6], Dean of the School of Computer Science at Carnegie Mellon University, "Artificial intelligence is the science and engineering of making computers behave in ways that, until recently, we thought required human intelligence."This is a great way to define AI in a single sentence; however, it still shows how broad and vague the field is. Several decades ago, a pocket calculator was considered a form of AI, since mathematical calculation was something that only the human brain could perform. Today, the calculator is one of the most common applications you will find on every computer's operating system, therefore, "until recently" is something that progresses with time.Assistant Professor and Researcher at CMU, Zachary Lipton clarifies on Approximately Correct , the term AI "is aspirational, a moving target based on those capabilities that humans possess but which machines do not."

AI also includes a considerable measure of technology advances that we know. Machine learning is only one of them. Prior works of AI utilized different techniques, for instance, Deep Blue, the AI that defeated the world's chess champion in 1997, used a method called tree search algorithms to evaluate millions of moves at every turn.

II. Evolution

The term "artificial intelligence" came to inception in 1956 by a group of researchers including Allen Newell and Herbert A. Simon , AI's industry has gone through many fluctuations. In the early decades, there was a lot of hype surrounding the industry, and many scientists concurred that human-level AI was just around the corner. However, undelivered assertions caused a general disenchantment with the industry along the public and led to the AI winter, a period where funding and interest in the field subsided considerably.Afterwards, organizations attempted to separate themselves with the term AI, which had become synonymous with unsubstantiated hype, and utilized different terms to refer to their work. For instance, IBM described Deep Blue as a supercomputer and explicitly stated that it did not use artificial intelligence , while it actually did.

During this period, a variety of other terms such as big data, predictive analytics and machine learning started gaining traction and popularity. In 2012, machine learning, deep learning and neural networks made great strides and started being utilized in a growing number of fields. Organizations suddenly started to use the terms machine learning and deep learning to advertise their products.Deep learning started to perform tasks that were impossible to do with classic rule-based programming. Fields such as speech and face recognition, image classification and natural language processing, which were at early stages, suddenly took great leaps.Hence, to the momentum, we are seeing a gearshift back to AI. For those who had been used to the limits of old-fashioned software, the effects of deep learning almost seemed like "magic" , especially since a fraction of the fields that neural networks and deep learning are entering were considered off limits for computers. Machine learning and deep learning engineers are earning skyward salaries , even when they are working at non-profit organizations, which speaks to how hot the field is.All these elements have helped reignite the excitement and hype surrounding artificial intelligence. Therefore, many organizations find it more profitable to use the vague term AI, which has a lot of baggage and exudes a mystic aura, instead of being more specific about what kind of technologies they employ. This helps them oversell, redesign or re-market their products' capabilities without being clear about its limits.

In the meantime, the "advanced artificial intelligence" that these organizations claim to use, is usually a variant of machine learning or some other known technology.Sadly, this is something that tech publications often report without profound examination, and frequently go along AI articles with pictures of crystal balls, and other supernatural portrayals. Such deception helps those companies generate hype around their offerings. Yet, down the road, as they fail to meet the expectations, these organizations are forced to hire humans to make up for the shortcomings of their so-called AI In the end, they might end up causing mistrust in the field and trigger another AI winter for the sake of short-term gains.

III. Data Science Libraries

Data Science is the single biggest reason why everyone is migrating top Python. Data Science offers exciting work along with high pay. Now let us see deep-dive and know about the details the following three Data Science Libraries.

Fig.1: Python Libraries

Pandas: Pandas is a software library written for the Python programming language for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series.It is free software released under the three-clause BSD license. pandas assumes general familiarity with NumPy.

NumPy: NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays.pandas is built on top of NumPy and is intended to integrate well within a scientific computing environment with many other 3rd party libraries.

Matplotlib: Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms.Matplotlib can be used in Python scripts, the Python and IPython shell, the jupyter notebook, web application servers, and four graphical user interface toolkits.

2. Web development frameworks

Django: jango is a high-level Python Web framework that encourages rapid development and clean, pragmatic design.

Flask: Flask is a Python web framework built with a small core and easy-to-extend philosophy. Flask is considered more Pythonic than Django because Flask web application code is in most cases more explicit.Flask is easy to get started with as a beginner because there is little boilerplate code for getting a simple app up and running.

3. Machine learning

Machine learning and AI has been a hot topic for the IT industry. We see every IT firm just latching on this new opportunity. Algorithms have become sophisticated as the time has gone.

Fig.2: Machine Learning Application

Google search engine is the most common example as it predicts our searches. This is a huge reason why everyone who is interested in machine learning or AI is learning Python as presently it is the major language which makes the task easy.

4. Simplicity & convenience

Python being a comparatively easier language becomes an easy alternative for beginners to opt for it. It's obvious that a beginner wouldn't want to bother itself with the complex codes and syntax of other programming language.Python is simple as well asreadable which gives it an edge over languages such as Java and C++ where the coder has to deal with classpath & compiler problems respectively.

5. Multipurpose

One thing that sets Python apart from other languages is that it serves multiple purposes. Unlike other languages, it can be utilized in more multiple technologies. For example, R is only good in Data Science and Machine Learning.However, it can't be of any use when it comes to web development. On the other, Python can do so many things like creating your web application using Flask and Django, Data analysing using Scikit-Learn, Scipy, NumPy, and NLTK.

6. Large communities

Learning is a long process and it is shortened if you got assistance. Usually, the ones who help are the friends. However, even if you don't find any friend near your vicinity you can always google your queries.Apart from being easy Python has huge presence on the internet in the form of communities. These communities play a significant role in imparting knowledge and solving queries of the beginners as well the pros.

IV. Conclusion

In any case, data science is an exhilarating, rising field, and there's ample room for numerous languages to prosper. My foremost inference is to cheer developers early in their career to start building skills in data science.

Python is the fastest growing programming language and data science is the fastest growing field in computer science.

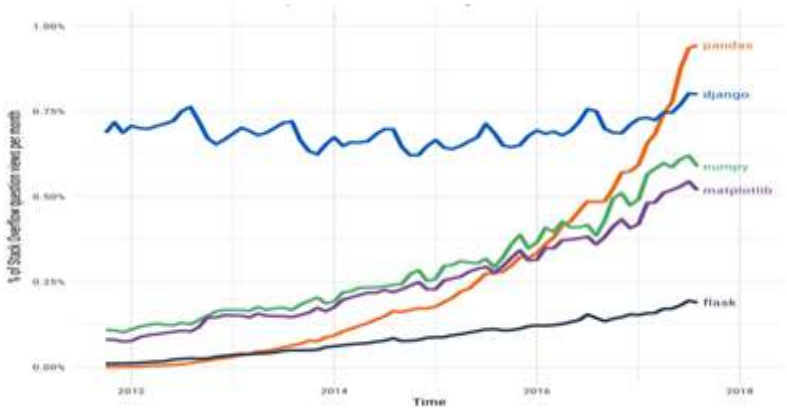

Fig.3: Stack Overflow Traffic To Questions About Slected Python Packages

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