Title: AI and Machine Learning: Beginner’s Guide to Understanding Its Power and Process

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Let’s say I gave two pictures of a grape and an apple and asked a Sungshin student whether she can tell an apple apart from a grape. Most students will answer yes. If a reason is asked, they will answer by describing that the apple’s color is red and circular in shape while the grape is purple and not circular but ellipses: However, if another pair of pictures of a Red Delicious and Honeycrisp, different varieties of apples are given, it is likely that Soojungs will discriminate between them, but it is quite hard to explain in specific words how these two look different due to their subtle differences in features. The above hypothetical experiment of image classification shows exactly **why AI is needed**. AI, an acronym for Artificial Intelligence, refers to the ability of machines to simulate human intelligence. Traditional programming methods are of course efficient in some areas but sometimes writing a set of rules to classify each fruit will be a time-consuming and difficult approach.

Traditional programming and AI look completely different but have the same objective. There is a problem we want to solve and both are part of the process of finding the solution for it. Explaining the benefits of AI can be done in 5 steps. The steps are very much like teaching a child. Examples would be made under a hypothetical situation that an anonymous person is instructing a child how to classify various pictures of Red Delicious and Honeycrisp. First, we have to gather data for the training. Various pictures of Red Delicious and Honeycrisp would be given to the model, in the example, a child. Second, cleaning training data. It is significant to make sure that it is the right format for the model. The third step is training the model. Using the training data, we make the AI model. Plugging this into the example, the anonymous teach the child what Red Delicious is and Honeycrisp is by giving pictures and matching answers for them. Next, to find out if the model performs well, an anonymous person tests the model’s performance assessing whether the model has a representative nature so that it can work well in diverse data besides training or test data. It is the same as giving new pictures of Red Delicious and Honeycrisp besides the ones we gave out the answers to find out if the child has understood correctly. The last is Inference. Finally, because the anonymous person is quite sure the model is trained profoundly, the model can be deployed in a real-world application. Now we can find out the answer to the problem by asking the AI model. According to those discussed above, we hand the child the picture that we’re not sure whether this is a Red Delicious or Honeycrisp and his or her answer would be considered the answer to the question.

As described above, machine learning is a subset of AI that enables machines to learn from experience without explicitly programming specific rules directly as in classical programming. The most prominent three types of training methods are supervised learning, unsupervised learning, and reinforcement learning. Supervised learning is a machine learning model which is trained on labeled data(answers). It is the method of training the computer by giving samples and labels. The assignment of the computer would be to find the general rule by mapping the input data and the output data. When it comes down to it, the classification of Red Delicious and Honeycrisp is one of the typical types of supervised learning. Unsupervised learning is a type of machine learning where the model is trained on unlabeled data (no answers). Unlike supervised learning, no label data(answers) is given. The task of the computer would be to find a specific pattern without label data. With common sense, supervised training looks easier and seems to have a better understanding which is true. However, in real life, data can be incomplete or complicated. In these circumstances, predicting patterns using unsupervised learning would be a wise choice. Lastly, reinforcement learning is a type of machine learning where an agent acquires the ability to make decisions by interacting with the environment. Every action that the agent takes is given feedback through a signal called a reward which can be positive, negative, or zero. If the agent is successful in reaching a goal, then the agent will receive a positive. In contrast, when results are unsuccessful, a negative signal will be given and a neutral result would be a zero. Reinforcement learning aims to train the agent to take actions that maximize the cumulative reward over time, which helps the agent learn to make better decisions when faced with new input.

Computers began to be used as a handy tool in finding solutions to problems instead of humans. The first idea in AI was to search all the possible cases to overcome a problem. Nevertheless, this approach quickly encountered difficulty, as searching all possible cases proved impossible in the terms of time. Next, the idea of solving problems through expert knowledge emerged, but it was limited by the difficulty of extracting and organizing the necessary information. At last, the idea of teaching the computer to learn on its own emerged, which led to the development of AI known today. Rooting from different theories, various training methods were invented to find solutions to different matters. While these are developed independently, they did influence each other, and now machine learning techniques of the ensemble are used to improve the performance of AI as well. Despite having a short history compared to other fields, the rapid growth and development of AI research are driving breakthroughs and advancements which are eagerly anticipated.