Artificial Intelligence #1

A British science fiction writer Arthur C. Clarke famously wrote, “Any _____ _____ technology is _____ from magic,” and that is very _____ ____ _____ with Artificial Intelligence today. In 2016, Google’s Go-playing algorithm called AlphaGo _____ ____ _____ Go champion, Lee Sedol. Go is the most complex board game _____ _____ _____ and creativity, so the game had _____ _____ _____ to be difficult for machines. But AI _____ _____ humans much earlier than _____ , making headlines around the world. Machine Intelligence has _____ _____ results in practical fields as well, such as _____ pictures, _____ _____ language, and driving cars. _____ _____ ____ will make AI _____ even more like magic. But it is _____ a computer software, not ___ _____ _____. The only thing computers can do is computing— _____ _____. Instead of _____ _____ by ____ _____, we need to understand what exactly is AI—what it ____ do and what it _____ do—and properly _____ ____ _____ _____ to the economy ____ ___ ____ daily lives.

A British science fiction writer Arthur C. Clarke famously wrote, “Any sufficiently advanced technology is indistinguishable from magic,” and that is very much the case with Artificial Intelligence today. In 2016, Google’s Go-playing algorithm called AlphaGo defeated the world Go champion, Lee Sedol. Go is the most complex board game that requires intuition and creativity, so the game had long been considered to be difficult for machines. But AI prevailed over humans much earlier than predicted, making headlines around the world. Machine Intelligence has achieved impressive results in practical fields as well, such as labeling pictures, recognizing spoken language, and driving cars. News like this will make AI seem even more like magic. But it is essentially a computer software, not an almighty god. The only thing computers can do is computing—mathematical calculations. Instead of being tricked by its illusion, we need to understand what exactly is AI—what it can do and what it can’t do—and properly evaluate its potential impact to the economy and to our daily lives.

sufficient	十分な、足りる		prevail	打ち勝つ、勝る
indistinguishable	見分けがつかない		headline	見出し、主な項目
require	必要とする、要求する		label	識別する、レッテルを貼る
intuition	直感		almighty	全能の

Artificial Intelligence #2

Most computer scientists _____ AI ___ a computer algorithm _____ by _____ machine learning. Let's start _____ ___ algorithm. An algorithm is __ ____ ___ _____ _____ can be used to reach decisions and _____ problems. An algorithm _____ __ particular solution or decision, but ___ _____ ___ process _____ when providing a solution. For example, if you want to _____ the _____ between two numbers, you can use a simple algorithm. The algorithm says: 'First step: ____ the two numbers together. Second step: _____ ____ ____ by two.' When you _____ the numbers 3 and 5, you will get 4. When you enter 64 and 82, you will get 73. ___ _____ _____ , an algorithm is a set of _____ that _____ _____ based on specific input. Computer algorithms ____ essentially the same way. But they _____ ___ much more complicated problems by _____ ____ _____ computing power. For example, go-playing algorithm receives input such as the _____ _____ ___ ____ _____ and the last _____ by ___ _____ , and generates output, which is your next move that most likely _____ _____. Similarly, text-to-image algorithms like _____ _____ are given text _____ ___ input and generate __ _____ picture as the output. Algorithms for medical _____ ____ ____ ____ skin images ___ __ patient, and then _____ _____ and other potential health risks.

Most computer scientists define AI as a computer algorithm powered by advanced machine learning. Let's start with an algorithm. An algorithm is a set of steps that can be used to reach decisions and resolve problems. An algorithm isn't a particular solution or decision, but the method or process followed when providing a solution. For example, if you want to calculate the average between two numbers, you can use a simple algorithm. The algorithm says: 'First step: add the two numbers together. Second step: divide the sum by two.' When you enter the numbers 3 and 5, you will get 4. When you enter 64 and 82, you will get 73. In other words, an algorithm is a set of procedure that produces output based on specific input. Computer algorithms run essentially the same way. But they work on much more complicated problems by harnessing its massive computing power. For example, go-playing algorithm receives input such as the current face of the board and the last move by the opponent, and generates output, which is your next move that most likely claims victory. Similarly, text-to-image algorithms like Stable Diffusion are given text descriptions as input and generate a corresponding picture as the output. Algorithms for medical diagnosis are fed with skin images of a patient, and then detect cancer and other potential health risks.

define	定義する		diagnosis	診断
harness	動力化する、利用する		feed	餌をやる、投入する
description	記述、描写			

Artificial Intelligence #3

19 years before AlphaGo defeated the human champion, IBM's chess-playing computer "Deep Blue" _____ the human chess champion, Garry Kasparov. These two achievements look almost _____ , but these two board game algorithms _____ _____ quite differently. Deep Blue was programmed by expert chess players and computer scientists, _____ AlphaGo learned ___ _____ . Learning is the key thing _____ . AlphaGo self-learned how to play the game of ___ _____ data. In other words, Deep Blue had human _____ , but AlphaGo didn't. Instead, AlphaGo was _____ by data. First, AlphaGo was ____ _____ 100,000 games that strong _____ played as a training data set and _____ human players. Then, it _____ _____ different _____ ___ _____ millions of times and learned from ____ ____ data. This self-learning mechanism is _____ "machine learning." The idea itself is nothing new, but ____ ____ the massive increases in computing power in recent years, machine learning has become extremely powerful. Machine learning _____ a variety of methods ___ ____ _____ , including Deep _____ network, which essentially _____ ____ _____ neurons work in the brain. The _____ _____ of machine learning algorithms is _____ _____ they are learning for themselves, they can ___ _____ what we human _____ know how to do. They make _____ in many practical areas, _____ ___ _____ _____ and self driving.

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19 years before AlphaGo defeated the human champion, IBM's chess-playing computer "Deep Blue" beat the human chess champion, Garry Kasparov. These two achievements look almost identical, but these two board game algorithms were built quite differently.
Deep Blue was programmed by expert chess players and computer scientists, while AlphaGo learned by itself. Learning is the key thing here. AlphaGo self-learned how to play the game of go from data. In other words, Deep Blue had human teachers, but AlphaGo didn't. Instead, AlphaGo was taught by data. First, AlphaGo was fed with 100,000 games that strong amateurs played as a training data set and mimicked human players. Then, it played against different versions of itself millions of times and learned from its own data. This self-learning mechanism is called "machine learning." The idea itself is nothing new, but due to the massive increases in computing power in recent years, machine learning has become extremely powerful. Machine learning involves a variety of methods as its subset, including Deep neural network, which essentially imitates the way neurons work in the brain. The whole beauty of machine learning algorithms is that because they are learning for themselves, they can go beyond what we human programmers know how to do. They make breakthroughs in many practical areas, such as image recognition and self driving.

identical	まったく同じの		subset	下部集合
mimic	まねる		imitate	見習う、模範とする

Artificial Intelligence #4

One of the technologies that have been _____ by ____ _____ machine learning is image labeling, which is essential ____ self-driving cars. In order to drive safely, the machine has to be able to tell the difference between a plastic bag, which can be ____ _____ , and a cat on the road, _____ _____ definitely ___ _____ . Previously, if you _____ ____ algorithm to identify a strawberry, for example, the only choice was to teach machines what exactly is a strawberry. We had to _____ _____ the fruit; red, almost _____ -shaped with _____ _____ and regular dots, ____ ___ ____ . But what ___ it's not _____ ? What ___ it's _____ and not ____ _____ of a cone? You have to _____ every possible case, including very unusual ones, and ____ _____ _____ the algorithm. Machine learning ____ _____ _____ _____ this ridiculously _____ work. Instead of teaching machines by human hands, we _____ _____ _____ of pictures as training data. Some of them have to include strawberries. Then the machine figures out _____ _____ of the fruit and self-learns how to identify the object. Machine learning seems to _____ _____ possibilities, but we have to ___ _____ ___ its limitations. First, machines don't understand. They successfully identify the object, not by understanding what it means, but by _____ ___ _____ and _____ recognition. They only know that the new image is similar to _____ _____ images _____ ____ labeled "strawberry." The same is true for machine translation algorithms. When you type in "strawberry" on Google translate, _____ you get the result. But it doesn't know what exactly is strawberry. It only learned from data to give back "ichigo" _____ _____ the translation of "strawberry." Second limitation is that they depend on _____ _____ ___ data. For human _____ to learn how to identify strawberries, they only have to see the object several times. But computers _____ millions of images ___ training data. The _____ _____ in machine learning capability in ____ _____ _____ is ____ ___ the easier and cheaper access to big data.

One of the technologies that have been accelerated by the latest machine learning is image labeling, which is essential for self-driving cars. In order to drive safely, the machine has to be able to tell the difference between a plastic bag, which can be run over, and a cat on the road, which should definitely be avoided. Previously, if you wanted an algorithm to identify a strawberry, for example, the only choice was to teach machines what exactly is a strawberry. We had to mathematically define the fruit; red, almost cone-shaped with shiny texture and regular dots, and so on. But what if it's not ripe? What if it's bitten and not the shape of a cone? You have to predict every possible case, including very unusual ones, and put them into the algorithm. Machine learning gets humans free from this ridiculously troublesome work. Instead of teaching machines by human hands, we feed vast amount of pictures as training data. Some of them have to include strawberries. Then the machine figures out distinctive characteristics of the fruit and self-learns how to identify the object. Machine learning seems to possess infinite possibilities, but we have to be aware of its limitations. First, machines don't understand. They successfully identify the object, not by understanding what it means, but by relying on statistics and pattern recognition. They only know that the new image is similar to previously seen images that are labeled "strawberry." The same is true for machine translation algorithms. When you type in "strawberry" on Google translate, soon you get the result. But it doesn't know what exactly is strawberry. It only learned from data to give back "ichigo" when asked the translation of "strawberry." Second limitation is that they depend on enormous amount of data. For human infants to learn how to identify strawberries, they only have to see the object several times. But computers require millions of images as training data. The drastic increase in machine learning capability in the last decade is due to the easier and cheaper access to big data.

Vocabulary List: No. 19~24

Artificial Intelligence #5

There is a type of algorithm _____ “ _____ learning,” which doesn’t _____ training data and learns from _____ _____ _____ alone. Just one year _____ AlphaGo _____ Lee Sedol, _____ _____ _____ a much more elegant algorithm _____ AlphaZero. Unlike its previous version, AlphaZero knows nothing _____ _____ _____ of the game and learns _____ from _____ . Instead of learning from human data, it simply _____ _____ _____ completely randomly _____ _____ _____ _____ every game ___ _____ . In 2018, AlphaZero _____ Stockfish8, the 2016 top algorithm in chess. Can you guess how long it took AlphaZero to learn chess from scratch, _____ _____ the match _____ Stockfish? Only four hours. Not four years or four days. Just four hours of _____ learning _____ AlphaZero to be the strongest chess algorithm in the world.
Reinforcement learning ___ _____ _____ any tasks which _____ _____ _____ _____ _____ and limiting conditions. In self-driving, for example, _____ _____ is to move from point A to point B as quickly as possible. Limiting conditions include _____ _____ _____ other cars and not hitting the _____ . Then you _____ _____ _____ _____ for a number of times. At first, cars on the software drive completely randomly and perform quite _____. However, they gradually learn to drive safe and _____ _____ human drivers. Machine intelligence still _____ _____ _____ of human intelligence. _____ machines can learn to avoid a cat on a road, they don’t understand what a cat is, and never find _____ _____ . A Human driver can go home and make pancakes for his daughter and read books, while a self-driving algorithm can do nothing else _____ _____ . However, _____ ___ _____ _____ a taxi is to _____ ___ to the _____ ___ quickly, safely and _____ ___ _____ . What _____ the _____ _____ in the future look like when computers outperform humans in specific tasks like driving a car, _____ cancer and even drawing a picture?

There is a type of algorithm called “reinforcement learning,” which doesn’t require training data and learns from trial and error alone.
Just one year after AlphaGo beat Lee Sedol, the team developed a much more elegant algorithm named AlphaZero. Unlike its previous version, AlphaZero knows nothing beyond the rules of the game and learns literally from scratch. Instead of learning from human data, it simply plays against itself completely randomly and continually improves from every game it plays. In 2018, AlphaZero defeated Stockfish8, the 2016 top algorithm in chess. Can you guess how long it took AlphaZero to learn chess from scratch, prepare for the match against Stockfish? Only four hours. Not four years or four days. Just four hours of self-reinforcement learning brought AlphaZero to be the strongest chess algorithm in the world.
Reinforcement learning is fit to any tasks which can clearly state its goal and limiting conditions.
In self-driving, for example, the goal is to move from point A to point B as quickly as possible. Limiting conditions include not crushing with other cars and not hitting the wall. Then you let the simulation run for a number of times. At first, cars on the software drive completely randomly and perform quite miserably. However, they gradually learn to drive safe and eventually outperform human drivers.
Machine intelligence still falls far short of human intelligence. Though machines can learn to avoid a cat on a road, they don’t understand what a cat is, and never find cats adorable. A Human driver can go home and make pancakes for his daughter and read books, while a self-driving algorithm can do nothing else but drive.
However, all we want for a taxi is to bring us to the destination as quickly, safely and cheaply as possible. What will the labor market in the future look like when computers outperform humans in specific tasks like driving a car, diagnosing cancer and even drawing a picture?

Vocabulary List: No. 25 ~ 34