TECHNIUM
SOCIAL SCIENCES JOURNAL

Vol. 25, 2021

A new decade for social changes

www.techniumscience.com

ISSN 2668-7798

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Comparison of Artificial Intelligence and Human Motivation

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Abstract. According to Maslow's hierarchy of needs, humans act according to their needs. Humans also act with an interest in the internal process itself, rather than solely based on external rewards. Artificial intelligence, on the other hand, is trained through a large amount of data and neural network learning. Unlike humans who are greatly affected by emotions and various circumstances, AI is neutral and objective. With no clear limitations and vast potential for development. AI has been receiving a lot of attention. Many futurists say AI will replace humans in areas that we, in the past, couldn't imagine machines doing the work. However, there are still areas where AI cannot replace humans. Metacognition to judge one's thoughts and creativity, the power to come up with new ideas, still remains in human domains that artificial intelligence has not been able to enter. This paper explores the reinforcement of humans and AI and explores the original human realm. Furthermore, understanding the original human domain can suggest developing human competitiveness.

Keywords. Motivation, machine learning, DMN, metacognition, Maslow's Hierarchy of needs, creativity

Introduction

Motivation is the drive that stimulates a living body to act. According to Maslow, humans act out of desire (Maslow, 1972). Unlike other living things, humans act not only to be rewarded or to avoid disadvantages, but they also act out of satisfaction out of the actions themselves. On the other hand, artificial intelligence is generally defined as the property of machines that mimic human intelligence as characterized by behaviors such as cognitive ability, memory, learning, and decision making. Therefore, the purpose of a machine is to produce highly accurate results in the most effective way according to the set goals. So, can we conclude that humans are inferior to artificial intelligence? In this paper, we learn about the motivations that drive human and artificial intelligence behavior, and about meta-cognitive creativity, an ability only humans have.

Human Motivation and Behavior: based on Maslow's Hierarchy of needs

Maslow's hierarchy of needs argues that needs are arranged hierarchically from lower to higher levels and that the next level of needs must be met to trigger their next demand. The first phase of Maslow's is physiological needs, a basic need for food, clothing, and shelter, and to sustain fundamental human life. Next is a drive to escape from the fear of physical danger. The third Stage needs are "belongs and love". As humans are social beings, we have a desire to belong to various groups and be accepted by different communities in the forms of friendship.

The fourth level of desire is the desire to enjoy honor or power as a member of an organization. This need includes factors of internal respect, such as self-esteem, autonomy, and achievement. It also includes external factors, such as status, identification, and being the center of attention. The last of the hierarchy is the highest, one of a desire to achieve everything one can by fully exercising his or her talents and potential with self-actualization. It is a desire to exercise one's potential to the fullest, including a desire for growth and self-completion.

Figure 1. Maslow's Hierarchy of Needs

Motivation systems in human beings

External motivation is something that drives people to act such that they gain compensation or avoid a disadvantage. Internal motivation, on the other hand, is gaining satisfaction with the act itself. Often with intrinsic motivation, the desire for and interest in the act keeps it going. External motivation has a great effect on short-term goal achievement, and internal motivation has a great effect on short-term and long-term goal achievement.

For instance, one of the examples that utilize external motivation to promote action is the Saemaul Movement in South Korea. Saemaul Movement was a community-based integrated rural development program of South Korea in the 1970s which contributed to narrowing the development gap between urban cities and rural communities over that decade (Park, 2009 pg1). At that time, many villages were very underdeveloped after the Korean war. Accordingly, the government provided free cement for each village to build modern residential facilities and roads. In addition, the classes were divided into 3 classes such as basic, self-help and self-reliance villages to give better benefits to the successful villages, resulting in rapid growth in a short period. As a result, rural areas saw 166% expansion of village roads, 98% installation of electrical system installation in less than a decade after the Saemaul Movement. (Park, 2009 pg.8) In summary, the people of these regions were motivated by the improvement in the quality of life as facilitated by the economic support from the Korean government.

Figure 2. Saemaul Movement

Contrary to the Saemaul Movement, which achieved great economic development by stimulating external motivation, the Gwangju Democratic Movement symbolizes significance. The Gwangju Democratization Movement was a democratization movement of the Republic of Korea from May 18 to May 27, 1980, demanding the resignation of Chun Doo-hwan's dictatorship and the abolition of martial law. The government called it a "riot" and indiscriminately suppressed its citizens and their democratic movements. However, citizens of all ages, men, and women, came to the streets to protest against dictatorship, treated injured citizens, shared food among the protesters when the government brute force. These were acts of internal motivation for the public good at the risk of life.

Figure 3. May 18th Democratic Uprising

Artificial Intelligence's Motivation and Behavior: based on machine learning algorithm

Humans and artificial intelligence have basic aspects in common in that they both have structures to convey, store, and process stimuli and information; central processing functions that manage information; requirements for energy sources to operate. However, human desire for reward and other emotions have great influence on human behavior. On the other hand, machines are not affected by irrelevant stimuli and produce accurate output through given algorithms. They are not influenced by seemingly unpredictable and erratic estimations and decisions as made by humans based on emotions.

1. Machine Learning

Arthur Samuel (1959) claims that Machine Learning is a field of study that gives computers the ability to learn without being explicitly programmed. Machine learning uses algorithms to analyze data, learn from it, and make judgments or predictions based on what people have learned. Artificial intelligence learns from large amounts of data and algorithms to learn how to perform tasks. Machine learning is currently making great process in areas such as computer vision, but the limitation of artificial intelligence is that it requires massive stores of training data, it is a tedious process to label data, and it takes time to train.

Algorithm of Machine Learning

The algorithms of machine learning can be divided into three main categories: supervised learning, unsupervised learning, and reinforced learning. Although each learning method is very different, it aims to achieve a high success rate through many iterations.

1. Supervised Learning

Supervised learning is a way for training computers by telling them what the correct label is. There are correct inputs and outputs in supervised learning, which are divided into classification and regression. Classification problem produces an output variable that is a category. On the other hand, a regression problem produces an output variable that is a real value.

Classification: Binary Classification and Multi-Label Classification

Output categories that can be separated by yes and no are called binary classification. Differently, outputs that are not distinguished merely between yes and no are called multi-label classification.

Regression

Regression is the problem of predicting consecutive values based on the features of previous data. It is usually used to predict patterns and trends. Example of regression is stock market trends that can be predicted using machine learning. In fact, one reason why Linear Regression is so useful is that linear regression is fast. It also does not require tuning of parameters. However, it has a high variability on predictive accuracy, depending on the trend in the data. If the data shows a parabolic trend, then linear regression will not produce very accurate results when compared to parabolic regression.

Application of Supervised Learning

These predictive models are commonly used for forecasting results from values within a continuous range, such as stock price or exchange rate analysis.

2. Unsupervised Learning

Unlike supervised learning, unsupervised learning is a training method that predicts the future by clustering similar data without giving the correct answer. Unsupervised learning allows the system to identify patterns within data sets on its own. As a result, we can classify new data when it is given as input. In sum, unsupervised learning is a process that allows you to classify data by similarities, patterns, and differences, and so on between data.

Application of Unsupervised Learning

Unsupervised learning is used in a variety of different areas ranging from medicine to public relations. In medical fields it is used to identify the distribution area and spread path of diseases through spatial cluster analysis of specific diseases, and in public relations, clustering

is used to segment customers into identifiable groups. In addition, various clustering algorithms and methodologies are used to analyze data of interest in the field of statistics.

3. Reinforcement Learning

If supervised and unsupervised learning has conducted learning in a static environment with no change in the environment, reinforcement learning gets either rewards or penalties for the action it performs to get the machine to do what the programmer wants. Its goal is to maximize the total reward. Reinforcement learning seems similar to supervised learning because the agent learns by receiving feedback from the environment, but it differs in that supervised learning the machine does not get reward from a human being.

Process of Reinforcement Learning

1. Observes the current state of the environment given the defined agent and takes action based on it.
2. As the environment changes, defined entities receive rewards.
3. Based on this reward, the defined entity learns the behavior in the best action to gain more positive feedback.

Application of Reinforcement Learning

Reinforcement learning is currently being used in a variety of fields, including process control, network management, and robotics. AlphaGo, an artificial intelligence familiar to many of us, was developed using the basic rules of Go and reinforcement learning algorithms that learn 30 million game sets learned through their games and then train themselves. In addition, various research attempts using reinforcement learning are actively being conducted in autonomous vehicles and drones.

Similarities between Human motivation and AI motivation

Input and Output

Both human and artificial intelligence respond to information that is entered.

Abstract Information Processing: Artificial Neuron Network

The human brain has more than 10 billion neurons connected in parallel through more than 10 trillion synapses. (Wang, 2003) Each of these synapses are the locations where each neuron receives an input signal from another neuron through a protoplasmic process and sends it through an axon to another neuron. Output signals occur when input signals are gathered and exceed a certain capacity. Just as biological neurons take inputs from several different neurons and store them in a cell body, then send outputs once reaching a certain capacity, artificial neural network neurons receive multiple inputs and activate at a certain level. The part where neuron receives the input from the dendrites is expressed as the value of X in perceptron, the weight of neuron's cell body is expressed as the sum of the product of the connection weight connected to each unit of X , and finally, if it exceeds the threshold, the part that carries the signal is expressed to obtain the output value by a function.

Learning Obligation

People and artificial intelligence also both need training at first. Both go through a certain system of processing, and this is done on the central processing unit corresponding to the brain and CPU, respectively. As the number of training iterations increases, the accuracy or efficiency of processing work gradually increases.

Difference between Human motivation and AI motivation

Metacognition

Metacognition is a perception that allows people to recognize what they know and what they do not know to find and solve problems on people's own, and furthermore, it is a true metacognition that when one acknowledges his or her imperfection. However, machine learning does not have meta-cognitive capabilities because it cannot create rules or process things beyond actual data. It cannot continue to learn beyond original programming, and artificial intelligence can't explain the process about the results that artificial intelligence gets.

Creativity

Creativity is defined as the tendency to generate or recognize ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entertaining ourselves and others. As mentioned above, the machine is given input and produces output accordingly. Without input, output cannot be produced, and only what is taught can be learned. Without instruction or input, output cannot be produced, to be specific, artificial intelligence cannot decide to do something new, find new ideas or concepts, or combine existing ideas or concepts unless specifically instructed to do so. As such, ideas and constructs like Democracy and self-realization are uniquely human constructions.

The efficiency and productivity of artificial intelligence are much higher than that of humans. Therefore, the Korea Research Institute for Vocational Education & Training (KRIVET) reported that by 2027, 52% of Korean jobs would be replaced by AI. As a result, it is clear that creativity, which is a unique and original ability of humans, is an increasingly important ability for humans to cultivate. Source of creativity was only in white matter until the default mode network, DMN was discovered. Basically, the connection between brain nerves is the white matter in the brain, but there is the DMN, a neural network that mediates creativity in areas such as problem solving and insight, which primarily works when the unconscious mind, when people are not doing anything.

Also, DMN plays a big role in self-forming, memory, and decision making as well as creativity. Creativity is said to be closely related to whites matter such as frontal lobe, brain volume, bilateral stratum, right temporal lobe, parietal lobe, and right occipital lobe. This allows creative thinking to be possible because white matter connects neural circuits well to integrate information, resulting in a variety of higher-order cognitive functions (Takeuchi et al., 2010b). So a study of the roles of DMN in creative thinking could lead to a better understanding of how a human brain produces creative output and how such structures or processes relate to other parts of the nervous system.

Conclusion

Humans are social animals that think, understand and act for themselves. Of course, basic needs have a significant effect on what they do, but they do not act solely on rewards or desires. Humans act by assigning meaning in the act itself and are not solely goal-oriented. On the other hand, artificial intelligence, designed to mimic humans, acts through algorithms. The algorithms of machine learning are divided into three categories: supervised learning, unsupervised learning, and reinforced learning. Supervised learning is a way of learning computers by telling them what the correct answer is, unsupervised learning is a way of predicting the future by clustering similar data, unlike supervised learning; reinforcement learning is not classifiable, as there is no fixed answer and there is no reward for your actions. Artificial intelligence obeys a given input and continues to learn to make the most accurate

output. Unlike humans who are affected by emotions and the environment, artificial intelligence is valued for not being independent of the environment and for being accurate and usually without errors. Then, does the emergence and development of artificial intelligence make humans meaningless? No, I believe it stands that humans are more valuable than artificial intelligence because they are the only ones with metacognition and creativity. I believe that Meta-cognition, which means knowledge and control of one's cognitive activities, is the domain we humans need to develop and focus on. Artificial intelligence is unable to recognize what is wrong with itself, while humans have the ability to make and implement plans to supplement assessments from self-reflection. In addition, artificial intelligence can only output a given input, but humans can find new ideas or concepts without a given input, or combine existing ideas or concepts. These two abilities that only humans have, surpassing the values of other living things and artificial intelligence, remind us of human identity and greatness as artificial intelligence continues to develop.

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