Buddhist Wisdom and Artificial Intelligence

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Abstract

Technology is growing at a rate quicker than most of us can comprehend. Whether we agree with such a trend or not, the influence of technology in society is moving forward, and quickly. Where we go from here and how we handle our own inventions comes with a certain responsibility that computer scientists cannot handle alone. Leaders in science, philosophy, and religion need to work together to ensure that all people will benefit from the exponential growth of technology. When it comes to artificial intelligence (AI), Buddhism plays an especially interesting role. This paper aims to examine and explore the interplay of Buddhist Wisdom and Artificial Intelligence through documentary research. The expected outcome is the mutual benefits for both Buddhism and Artificial Intelligence that will finally contribute to the growth and development the human mind in particular and the global development in general.

Key words: Buddhism, Wisdom, Artificial Intelligence

Introduction

The philosophy and practices of Buddhism directly relate to A.I. As a study of the mind, Buddhism speaks to highly relevant topics in A.I, including consciousness and identity. In light of both the potentially positive and disastrous outcomes of A.I. Buddhism can and should continue to serve as a grounding ethical, informing force. Not only does it provide a comprehensive framework for comprehending a "smart" computer, but its philosophy can provide clarity for those experiencing data overload.

The five aggregates in Buddhism, or the five factors that constitute a sentient being, are physical form, feelings, perceptions, mental formations, and consciousness. (Mahachulalongkornrajavidyalaya ,Tipitaka,Abhidhamma Vibhanga, 33/32 p. 17. Consciousness

here is an integrated factor of experience, or an impression and awareness of each object. Consciousness is not unique but rather one of several parts from which sentience emerges.

The Buddha taught that consciousness is everywhere at different levels, so humans should have compassion to help alleviate suffering for all beings. If being conscious means having the ability to feel something, then it is an intrinsic property of everything. Therefore, although a material thing such as an A.I. computer may have a form of consciousness, it would probably lack certain states of consciousness that human beings possess. Or maybe it could create new ones.

Scientists and Buddhists agree that consciousness is everywhere. Panpsychism, or the belief that every material thing has an element of individual consciousness, is one of the oldest philosophical theories attributed to many prominent thinkers, including Pythagoras. Neuroscientist Christof Koch has worked with researcher Giulio Tononi to create a tool to measure phi, a theoretical amount of consciousness, in a human brain by sending a pulse into it and watching the pulse reverberate through the neurons. The more intense the reverberation, the higher the amount of consciousness. Through this test, they are able to determine if a subject is awake, asleep, or anesthetized.

It could be that consciousness was gained through millions of years of evolution, because as a process of awareness, it is beneficial for our use. We actually do not know much about the human brain, but computer scientists have had AI self-learn based off of a human brain model of neurons. This is at once unpredictable but also reveals how the AI responds in a way different from how it was taught. The point at which an AI is considered a sentient being, if it comes to that point, can be guided by the ethical complexities that Buddhism teaches.

Buddhist wisdom

In Buddhism, any sentient being is combined by the 5 factors or aggregates as mentioned above. Summarily speaking it is composed with 2 elements namely the concrete or material element in Buddhist term known as "Rupa", on the other part, the non-material element in Buddhist tern known as Nãma.

1) **Rupa;** The material element according to Buddhism, has no consciousness because it is made of mainly 4 elements, i.e., the earth element, the water element, the fire

element and the air element. It stays unconscious like a table, a grass, the Sun or the stars. When sentient beings die, their physical body lay down on the ground having no any feelings of pain or happiness or it could nor run away from the dangerous. This implies that the physical body does not have consciousness.

As the Buddha said to the ill monk thus:

"Bhikkhu ayam tava kayo apetavinnano nirupakaro hutva kalingaram viya pathaviyam sayissatiti (Monk this your body having rejected without consciousness, will lie down on the earth like a useless log of wood). Mahamakuttarajavidyalaya, Dhammapadatthakatha, Part II, Cittavagga, 7 Putigattabhikkhu, Bangkok : Mahamakuttarajavidyalaya Press, 2530, p. 147.

Said the Buddha

13.41| Aciram vatayam kayo   pathavim adhisessati

         chuddo apetavinnano   niratthamva kalingaram.

"Before long, alas, this body will lie on the earth, rejected without consciousness, like a useless log of wood.) PTS, The Word of the Doctrine, Dhammapada, III the thought(Cittyavagga) 41, London: Oxford University, 2004,p.7.

2) Nãma, The mind, the Mental or Non- material Element is subdivided into 4 aggregates namely: Vedanã; the feeing or sensation, Sa**ňň**ã; perception Sankhãra; the mental formation or volitional activities and Vi**ňň**ãna; the Coscinousness. (Tipitaka Samyuttanikaya, Khandhavaravagga, pp 58-59.)

Now come to Citta or Consciousness's explanation, The Citta ;mind or consciousness is a kind of nature which is aware of objects. Mind is the knower agent. What the mind knows is object; what the mind knows is object.

In other words, it shows that the mind is that perceives, remembers, thinks and knows objects. In Pali, cintetiti cittam, arammanam vijanatiti cittam(The agent that thinks named as Citta or awares of the object. In the Pali Maha Vagga Patisambhida presents that this mind has 10 synonym names : mano, hadayam, manasam, pandharam, manayatanam, maninthriyam, vinnananam, vinnanakhandho, tajja manovinandhatu. (Abhidhammatthasamgaha and Abhidhammatthavibhavini Tika pp.66-67.)

Citta operates with mental factor; Cetsikas; the left 3 mental aggregates; feeling, perception and mental formations. Therefore, mind in a whole is what make physical body alive. As the Buddha said   "Mental phenomena are preceded by mind, have mind as their leader, are made by mind. If one acts with or speaks with an evil mind or a pure mind from

that sorrow or happiness follows him as the wheel follows the foot of the ox or like a shadow not going away.(PTS, The Word of the Doctrine, Dhammapada, I the Pairs (Yamakavagga) 1 and 2 , London: Oxford University, 2004,p.1).

The Interplay of A.I. and Buddhism

Generally, humans need a sense of stability, of solidness, as well a sense of compassion and connection, to feel safe. On the surface, Buddhist teachings on emptiness seem to challenge our need for a stable foundation from which to operate. At the same time, however, they point to a sense of interconnectedness and interdependence suffused with care and compassion.

Fields such as cognitive science, artificial intelligence (A.I.) and the applied technology of the internet often assume the stability and permanence of things as a foundation, while nonetheless confronting the reality of interdependence. In this series of discussions, we'll look at the implications of emptiness and compassion from the perspective of these contemporary fields as a means to better understand the foundational Buddhist teachings as they play out in the world of science.

The Deal with A.I. Ethics, on this stand point, Prof. Dr. Soraj Hongladarom had written article which is reasonable to considered. I will recite all his presented article as the follows:

Buddhism teaches us to focus our energy on eliminating suffering in the world.

"The explosive growth of artificial intelligence has fostered hope that it will help us solve many of the world's most intractable problems. However, there's also much concern about the power of A.I. and growing agreement that its use should be guided to avoid infringing upon our rights.

Many groups have discussed and proposed ethical guidelines for how A.I. should be developed or deployed: IEEE, a global professional organization for engineers, has issued a 280-page document on the subject (to which I contributed), and the European Union has published its own framework. The A.I. Ethics Guidelines Global Inventory has compiled more than 160 such guidelines from around the world.

Unfortunately, most of these guidelines are developed by groups or organizations concentrated in North America and Europe: a survey published by social scientist Anna Jobin and her colleagues found 21 in the US, 19 in

the EU, 13 in the UK, four in Japan, and one each from the United Arab Emirates, India, Singapore, and South Korea.

Guidelines reflect the values of the people who issue them. That most AI ethics guidelines are being written in Western countries means that the field is dominated by Western values such as respect for autonomy and the rights of individuals, especially since the few guidelines issued in other countries mostly reflect those in the West.

Guidelines written in different countries may be similar because some values are indeed universal. However, for these guidelines to truly reflect the perspectives of people in non-Western countries, they would need to represent the traditional value systems found in each culture as well.

People both in the East and the West need to share their ideas and consider those from others to enrich their own perspectives. Because the development and use of AI spans the entire globe, the way we think about it should be informed by all the major intellectual traditions.

With that in mind, I believe that insights derived from Buddhist teaching could benefit anyone working on AI ethics anywhere in the world, and not only in traditionally Buddhist cultures (which are mostly in the East and primarily in Southeast Asia).

Buddhism proposes a way of thinking about ethics based on the assumption that all sentient beings want to avoid pain. Thus, the Buddha teaches that an action is good if it leads to freedom from suffering.

The implication of this teaching for artificial intelligence is that any ethical use of AI must strive to decrease pain and suffering. In other words, for example, facial recognition technology should be used only if it can be shown to reduce suffering or promote well-being. Moreover, the goal should be to reduce suffering for everyone—not just those who directly interact with AI.

We can of course interpret this goal broadly to include fixing a system or process that's unsatisfactory, or changing any situation for the better. Using technology to discriminate against people, or to surveil and repress them, would clearly be unethical. When there are gray areas or the nature of the impact is unclear, the burden of proof would be with those seeking to show that a particular application of AI does not cause harm.

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Do no harm

A Buddhist-inspired AI ethics would also understand that living by these principles requires self-cultivation. This means that those who are involved with AI should continuously train themselves to get closer to the goal of totally eliminating suffering. Attaining the goal is not so important; what is important is that they undertake the practice to attain it. It's the practice that counts.

Designers and programmers should practice by recognizing this goal and laying out specific steps their work would take in order for their product to embody the ideal. That is, the AI they produce must be aimed at helping the public to eliminate suffering and promote well-being.

For any of this to be possible, companies and government agencies that develop or use AI must be accountable to the public. Accountability is also a Buddhist teaching, and in the context of AI ethics it requires effective legal and political mechanisms as well as judicial independence. These components are essential in order for any AI ethics guideline to work as intended.

Another key concept in Buddhism is compassion, or the desire and commitment to eliminate suffering in others. Compassion, too, requires self-cultivation, and it means that harmful acts such as wielding one's power to repress others have no place in Buddhist ethics. One does not have to be a monk to practice Buddhist ethics, but one must practice self-cultivation and compassion in daily life.

We can see that values promoted by Buddhism—including accountability, justice, and compassion—are mostly the same as those found in other ethical traditions. This is to be expected; we are all human beings, after all. The difference is that Buddhism argues for these values in a different way and places perhaps a greater emphasis on self-cultivation.

Buddhism has much to offer anyone thinking about the ethical use of technology, including those interested in AI. I believe the saame is also true of many other non-Western value systems. AI ethics guidelines should draw on the rich diversity of thought from the world's many cultures to reflect a wider variety of traditions and ideas about how to approach ethical problems. The technology's future will only be brighter

for it." **Soraj Hongladarom is a professor of philosophy at the Center for Science, Technology, and Society at Chulalongkorn University in Bangkok, Thailand.** Soraj Hongladarom archive page January 6, 2021)

In this sense A.I. robot works without intension dislike human being's action motived be their extensionalities. A.I. robot's activities could not be counted as good or bad, then, the A.I. robots have to response whatever the deeds they had done in the future. Since they have no consciousness played as motif that intends to do or work. So, on this case, ethical response should belong to the owner of that A.I. Robots. It should be like any weapon by itself is neither good nor bad, but it is regarded as good or bad depends upon the one who use that weapon.

Buddhist Wisdom for more or less Artificial Intelligence

The coming idea about how Buddhist wisdom concerns to A.I. In Buddhism the wisdom arises or originates from 3 sources:(D.III.219 Sutta Pitaka Vol 3 Dighanikaya Patikavagga,11/128/321) namely:

1) Sutamayapanna; the wisdom resulting from study, knowledge that is learned from others)wisdom gained from hearing of external experiences,

2) Cintamapanna; the wisdom resulting from reflection; knowledge that is thought out, the thoughtful reasoning or Contemplation, the internal experience

3) Bhavanamapanna; wisdom resulting from mental development; knowledge that is gained by development or practice, the practical meditation, the intuition.

The process of learning or thinking according to Buddhism, is the function of mind that I mean the consciousness(Citta) functions with mental factors(Cetasikas). In the internal function of mind it composed of feelings (Vedana), perceptions(Sañña) and thought(Sankhara) having activated systematically inside the consciousness. It is the mental state that cannot observed be sensory organs but it can be understood how it functions by reasoning of mind.

To understand how mind internally activates is to compare with the functions of the 5 parts of a computer :

1) Motherboard. All components of a computer communicate through a circuit board called the motherboard or mainboard compared as the glue holding everything else together.

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2) Central Processing Unit (CPU). The CPU is often called the "brain" of a computer having direct plug connected to the motherboard, and communicated with all of the computer's other components. Whenever you write a line of code (in Python, Java, C++, or any other programming language), it's broken down into assembly language—which is a language that the processor can understand. It fetches, decodes, and executes these instructions. Thai means all the processes a computer handles are taken care of by the CPU.

3) Graphics Processing Unit (GPU). Graphics cards often communicate directly with the display monitor, meaning a $1,000 graphics card won't be of much use if there isn't a high-end monitor connected to it.

4) Random Access Memory (RAM). RAM, also known as volatile memory, stores data regarding frequently accessed programs and processes. RAM helps programs and games start up and close quickly.

5) Storage. All computers need somewhere to store their data. Modern computers either use a Hard Disk Drive (HDD) or Solid State Drive (SSD). HDDs are made of an actual disk onto which data is stored. The disk is read by a mechanical arm. SSDs (think SIM cards) have no moving parts and are faster than a hard drive, because no time is spent waiting for a mechanical arm to find data on a physical location on the disk.(Https://www.idtech.com/blog/parts-of-a-computer, Available on 12 May 2021)

From the above parts of computer, the Motherboard works like human body, the Central Processing Unit (CPU) functions like human brain that controls all activities of components, the Graphics Processing Unit (GPU) works as bodily and verbally performants while the Random Access Memory (RAM) works as conscious mind and finally the Storage function as the unconscious memory that will be ready to recall whenever needed.

So, some parts of computers function lie human mind that is to say, they can automatically think and feedback towards the input arousing. Nowadays, the AI works in the factory robots or in the present the human robots like Sophia and the other human robots.

But A.I. Robots cannot automatically develop their deep learning and thinking, I think, because A.I. robots are just only the instruments or the tools that human created for their convenience in such a repetitive work by preprograming them. Therefore, they operate according to the prior setting orders.

According to this opinion I would like to recite the article written by Subodh Saxena in the article "Deep Learning AI and Buddhist Wisdom" in 2019 as he had pointed out that:

"There was a striking similarity between the Deep Learning AI and Buddhist wisdom. For over 2,500 years, Buddhism has investigated the mind which is non-matter and different from the brain although both are interconnected and interdependent. Buddhist wisdom is key to the mind. Despite extensive research by the neuroscientists on the anatomy and functioning of the brain, there is very little understanding of the mind, thought, consciousness, intuition, and intelligence. Artificial Neural Networks miss out on brain to mind translation. The performance of Deep Learning AI, which mimics the biological brain, can be bolstered by assimilating Buddhist learning.

Deep Learning, a statistical process, mimics the mammalian brain. The artificial neurons (perceptron) are simplified homogeneous digital versions of biological neurons. The human brain has about 100 billion neurons and 1000 trillion synapses (neural connections). The artificial neural networks differ to a large degree from brain structure in the number of neurons & synapses, shape, size & pattern of activation of neurons, innate structure, generating and inserting new neurons in existing circuits, and selectively using particular areas.

In the Artificial Neural Networks, the neurons (perceptrons) are arranged in input, hidden, and output layers. The input data is assigned weight and bias as it reaches another neuron in the adjacent layer. This input passes through an activation function and the output goes to next layer neurons. The process goes on until artificial neuron triggers reach the output layer. Here they are subjected to optimization (loss) and back-propagation algorithms. The actual and desired outputs are compared and the difference is propagated back to the input layer to optimize weights and biases. The iterative process continues until the near desired output is achieved. The structures of 'Shallow' and 'Deep' neural networks are illustrated in Figure 2. After optimizing weights and biases, the Artificial Neural Network model provides more accurate output parameters for training, validating, and testing the model. Sub-sequential tasks can learn from transfer learning. Deep Learning algorithms require millions of training examples. Ingesting tons of quality data, Deep Learning AI is still far short of human capabilities of reasoning, understanding, and common-sense.

Buddhist wisdom (prajna) comprises three tools namely hearing (Sutas), contemplation (Cinta), and meditation (Bhavana). For intellectual understanding, we have to hear, learn, and study (sutras). We can internalize this knowledge through the wisdom of contemplation and reflection (Cinta). Based on these two pearls of wisdom, we begin to practice meditation (Bhavana) further awakening our inner understanding. During the stabilization (Samatha) meditation and insight (vipassana) meditation the brain is the object of a cognitive process that is turned inward rather than outward. The values are assigned to certain states to increase their prevalence. The synaptic connectivity changes accordingly. It is somewhat similar to what happens in the learning process through interactions with the outer world. The three Buddhist wisdom tools are symbolically represented in Figure 1.

Figure 1 — Hearing, Contemplation, and Meditation for Brain-Mind Translation

Deep Learning seems to have taken a leaf out of Buddhist wisdom. The practice of Deep Learning comprising of input, assigning weights & bias, optimization and output are similar to Buddhist wisdom tools of hearing, contemplation, stabilization (Samatha) meditation, and insight (vipassana) meditation. Whereas stabilization meditation covers loss function and back-propagation perturbations until optimization, insight meditation is like getting outputs giving

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inputs to a trained model. This correspondence, in-process steps, is illustrated in Figure 2 below.
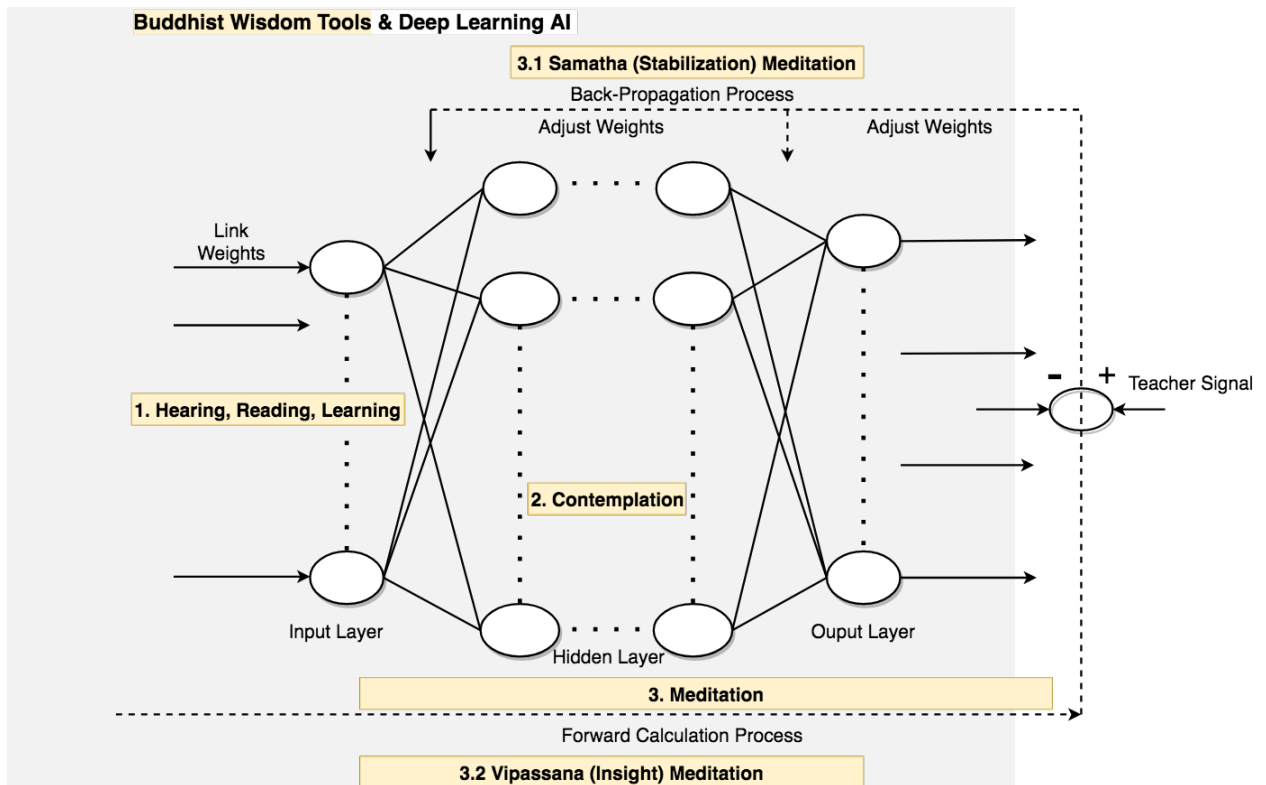

Figure 2 — Deep Learning Steps follow Buddhist Wisdom Tools (Image created by Saurabh Saxena)

Buddhist learning to bolster Deep Learning

Deep Learning AI's dependence on massive data and complex computations is the source of its woes like 'black box' nature (not knowing which inputs or links are important), inability to use abstract concepts for different applications (due to maze of data), and difficult to engineer models (unwieldy number of layers and neurons in each layer and difficulty in selection of activation and loss function algorithms especially in case of complex problems). Integrating Buddhist learning, AI will use less data, minimize large mathematical operations, and combine the algorithms with human experience and intuition to solve problems like climate change and incurable diseases facing humanity. The following finding named after AI researcher Hans Moravec is relevant in this context.

Moravec's paradox - Contrary to traditional assumptions, high level reasoning requires very little computation, but low-level sensorimotor skills require enormous computational resources.

The assimilation of Buddhist learnings in AI is a complex subject. It will require a coordinated effort of Buddhist scholars, neuroscientists, and AI specialists to identify how Buddhist learnings will benefit the current approach we are taking in AI and devise methodologies for their integration. Some of the representative examples are listed below.

Incorporating Innate Brain Structure: A child, unfamiliar with Buddhist practices, is capable of reasoning and understanding scriptures using small data. This innate brain structure is present at birth in the child's brain. AI has to acquire a semblance of it to be closer to nature rather than depending on nurture. The brain circuitry indicates a wide variety of neurons to shape neural transmission and information processing. There are different types of neurons like motor, sensory, and interneuron, and the ones having synaptic connectivity with their neighbour, local, and long-distance neurons. Beyond early processing stages in perception, vision, hearing, etc., to capture later stage cognitive steps some heterogeneity in neuron types and connectivity has to be introduced in the over-simplistic uniform neurons in the artificial neural networks.

Precedence of Outer Layers using Sparse Topology: Neuroscientists have studied the brain structure of long time practitioners of Buddhist wisdom tools. The cortex, the outermost layer of the brain's biological networks, has neurons both with local and long-range connections. It has been observed that the monks develop cortical thickening associated with increased neuron density & number of synapses in the brain regions associated with attention & sensory processing. In the AI network topology, it will translate to giving precedence to outer layers over the hidden layers. The standard architecture of Artificial Neural Networks with fully connected layers should be modified. The synapses between feed-forward layers will be removed (sparse topology dropouts) and synapses that jump several layers can be created. A fully generic network topology that allows any node connected to any other with synapses, will facilitate outer layers getting precedence over hidden layers.

Using Part of Deep Neural Architecture: Buddhist meditators develop significant left-sided brain activation. This signifies that only a particular area instead of a wider brain region or the whole brain is used in solving most of

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the problems. As a departure from traditional forward feed topology, Artificial Neural Networks could use generic interconnected networks allowing the use of a particular area of the network. The processing units for such sparse Deep Neural Topology are under development.

The integration of benefits from Buddhist wisdom tools in Deep Learning AI is feasible with available and in some cases under development processors. For example, as proof of the concept 'Precedence of Outer Layers using Deep Neural Sparse Topology' can be implemented to solve a simple real-world problem using current technology. We can thus compare solutions obtained through AI integrating Buddhist wisdom tools with results from traditional Deep Learning AI and actual measurements. Such a transformed intuitive reasoning machine, using Buddhist learning, will be scalable to address bigger problems like climate change using minimal data endorsing Moravec's observation that greater computational capability does not lead to more intelligent systems.

Deep Learning AI in the present form ingests and analyzes a huge amount of data in its hidden layers to train a model. As the complexity of models increases, it becomes difficult to interpret how they work. It is not practical to solve complex problems using opaque models. Deep Learning AI resembles Buddhist learning and can empower itself by assimilating Buddhist wisdom tools. The architecture, key algorithms, optimization, and analysis of the model inspired by Buddhist wisdom will require fewer data and build explainable and holistic technical solutions to big problems like disease and climate change. Buddhist wisdom for AI will allay fears of another AI winter and AI posing an existential threat to humans."

Conclusion

On Buddhist stand point, while turning to A.I.'s capacity to think,   it is only mechanism that run automatically based on the software having pre-operated on batch files. It runs like no man controlled machine. Another example it is like the   Voyager spacecraft operated by Computer Command System (CCS), the central controller of the

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spacecraft, is two 18-bit word, interrupt type processors with 4096 words each of non-volatile plated wire memory. During most of the Voyager mission the two CCS computers on each spacecraft were used non-redundantly to increase the command and processing capability of the spacecraft. The CCS is nearly identical to the system flown on the Viking spacecraft.

Therefore, A.I technology is not at all a mind or consciousness which belongs to sentient beings. It is only instrument that has been operated computer command program.

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