Relationship between brain and mental activity in intelligence

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A deep understanding of intelligence would help individuals to understand and assess many unknowns. The brain plays an important role in an intelligence. The relationship between brain activity and mental activity defines the neural bases of intelligence. Dennis Garlick proposed the neural plasticity model. According to this model, intelligent people have a brain that changes productively in reaction to their surroundings (Garlick., 2002). The empirical research has demonstrated that neural plasticity enables the development, modification, and reorganization of synaptic connections between neurons in reaction to stimulation of the environment (Hebb, 1949; Rosenzweig, 2003). Bratton.(2017) stated that AI plays a critical role in the augmentation of an individual's intelligence and systemic intelligence to automate. AI requires the development of computer algorithms that can perform activities that engage human intelligence. The computer can process any neural process digitally. The machine could simulate any sensory feelings if it has the sensors.

Drfus.(1965) stated that the brain process information globally and continuously, while a computer utilizes a finite and unobtrusive set of deterministic activities. In the studies (Thagard, 2005; 2009), a computer program defined not just to be a cognitive theory, but also full of minor detail related to the particular kind of programming language. Therefore, it is necessary to differentiate between models, theories and programs. The theory tries to describe the mechanism of parts and their connectivity producing regular changes. In a neural theory, neurons and neural groups were defined as the parts, and they are connected based on excitatory,

inhibitory interaction.

Connectionist models are networks consisting of neurons or neuronal compo nents and the relations between these neurons are typically changed by exp erience (Rumelhart & McClelland, 1986).

AI must have all aspect of the human body, including its suffering, needs, and ways of moving’s to achieve strong AI. The proponents of strong AI claimed that computers can effectively have mental states similar to human beings (Bringsjord and Schimanski. 2003). The symbolic modeling tries to simulate the cognitive process that correlates with human behavior. The employment of computer programs to model cognitive processes causes to have precise statement of behavior (Newell et al., 1989)

Inhelder and Pget, (1958) proposed development theory. According to this theory, designing intelligent machines would use mental maturity in stages and different steps as a guide. Human intelligence is not just about logic and rationality, but it also has features that are necessary for human thought including purpose, objectives, goals, telos, caring, intuition, imagination, humor, emotions, passion, desires, pleasure, aesthetics, joy, curiosity, values, morality, experience, wisdom, and judgment. The neural process allows the different characteristic of intelligence in the human being, but these are not present in current AI systems (Thagard, 2005). While some instances of machine intelligence may receive sensory input, but the complex images that are a significant component of human creativity such as visual and auditory representations could not be manipulated in machine. However, neuroimaging studies can sample brain activity in healthy volunteers systematically and noninvasively, and with effective

methodologies, they can obtain information about the functional connectivity of brain regions (Moran and Zaki, 2013; Poldrack and Farah, 2015). Nicolelis and Lebedev. (2009), proposed a Brain-computer interface that allows direct neural control of a prosthetic device or a communication interface. The activity of the artificial neurons defined by the activity of other neurons that link to it. They apply a simple formula to simulate what neurons perform. A researchers at Deep mind made a theory of mind named " ToMnet" [1]. They have made a series of neural networks that simulate the theory of mind. ToMnet can see, learn and analyze from the activities of other computers. The findings
show that neural networks have a remarkable capacity to learn skills on their own by watching others.

The remarkable development in the computer science and mathematics has caused to a revolution in the probabilistic models. The fact that a lot of cognitive processing is defined as an uncertain assumption shows the significance of probabilistic methods at computational level. Grenander's pattern theory (Grenander,. 1993) and Pearl's work on Bayesian networks (Pearl, J. 2014), are the examples of the sophisticated probabilistic model. This approach has resulted in broad improvements in the design of intelligent machines, with applications for computer vision, language, machine learning, voice processing, and decision making. The probabilistic perspective's advantage is that it leads to methods that combine different sensory models and integrate perception with planning. A probabilistic model shows to be consistent with human intelligence as they are artificial neural network's close relatives.

However, probabilistic models are mostly restricted by probabilistic logic (Chater et al., 2006).

In sum, Certainly AI is impressive in providing a tool that could detect emotions in facial expression, body language, and voice. Apple created a software that can understand facial expression called Emotient (Winkler et al., 2006). The AI programs like, ALEXA and SIRI are programmed by Emotient. There are numerous potential advantages of applying AI programs to detect human moods. However, current AI systems are programmed to perform specific tasks such as cooking. On the other hand, human are able to perform many acts such as driving, teaching, and socializing.

References

- Garlick, D. (2002). Understanding the nature of the general factor of intelligence: the role of individual differences in neural plasticity as an explanatory mechanism. *Psychological review* , *109* (1), 116.
- Hebb, D. (1957). 0.(1949). *The organization of behavior* .
- Rosenzweig, E. S., & Barnes, C. A. (2003). Impact of aging on hippocampal function: plasticity, network dynamics, and cognition. *Progress in neurobiology* , *69* (3), 143-179.
- Thagard, P. (2005). Being interdisciplinary: Trading zones in cognitive science. *Interdisciplinary collaboration: An emerging cognitive science* , 317-339.
- Thagard, P. (2009). Why cognitive science needs philosophy and vice versa. *Topics in Cognitive Science* , *1* (2), 237-254.
- Rumelhart, D. E., & McClelland, J. L. (1986). On learning the past tenses of English verbs.

- Bratton, B. The Evolution Revolution. Available online: http://techonomy. com/wp-content/uploads/2016/12/The-Evolution-Revolution-with-Ray-Kurzweil-Benjamin-H-Bratton-and-Vivienne-Ming. pdf(accessed on 27 November 2017).
- Dreyfus, H. L. (1965). *Alchemy and artificial intelligence* (No. P-3244). RAND CORP SANTA MONICA CALIF.
- Bringsjord, S., & Schimanski, B. (2003, August). What is artificial intelligence? Psychometric AI as an answer. In *IJCAI* (pp. 887-893).
- Newell, A., Rosenbloom, P. S., & Laird, J. E. (1989). *Symbolic architectures for cognition* (No. AIP-62). CARNEGIE-MELLON UNIV PITTSBURGH PA ARTIFICIAL INTELLIGENCE AND PSYCHOLOGY PROJECT.
- Moran, J. M., & Zaki, J. (2013). Functional neuroimaging and psychology: What have you done for me lately?. *Journal of cognitive neuroscience* , *25* (6), 834-842.
- Poldrack, R. A., & Farah, M. J. (2015). Progress and challenges in probing the human brain. *Nature* , *526* (7573), 371.
- Nicolelis, M. A., & Lebedev, M. A. (2009). Principles of neural ensemble physiology underlying the operation of brain–machine interfaces. *Nature reviews neuroscience* , *10* (7), 530.
- Grenander, U. (1993). *General pattern theory-A mathematical study of regular structures* (No. BOOK). Clarendon Press.
- Pearl, J. (2014). *Probabilistic reasoning in intelligent systems: networks of plausible inference* . Elsevier.
- Chater, N., Tenenbaum, J. B., & Yuille, A. (2006). Probabilistic models of cognition: Conceptual foundations.

- Winkler, R., Wakabayashi, D., & Dwoskin, E. (2016). Apple buys artificial-intelligence startup Emotient. *Wall Street Journal*
- [1]. https://www. sciencemag. org/news/2018/07/computer-programs-can-learn-what-other-programs-are-thinking