22. DIGITAL IMMORTALITY: MIND UPLOADING

Liashkevich U.L.

Belarusian State University of Informatics and Radioelectronics
Minsk, Republic of Belarus

Kaspiarovich N.G. – Senior Lecturer

Digital immortality and mind uploading with the focus on identity continuity, consciousness, and neural mapping are examined in the paper. Breakthroughs such as high-resolution electron microscopy are considered. Advances in AI, neurotechnology, and brain-computer interfaces are underscored.

Theoretical concepts of eternity have been explored since the dawn of humanity across the world civilizations. Questions arise about the certainty of our continuity as individuals – whether the person we are today reflects who we were yesterday, or who we will become tomorrow. The persistence of the ethereal self-sparks curiosity when contemplating its survival after dreamless sleep or the possibility that consciousness is an illusion. Speculation lingers around the notion of existence beyond the functionality of the brain, inviting reflection on the essence of being. According to Derek Parfit's work, the core of identity is shown through experiments involving the splitting, fusing, and modification of the brain via neurosurgery to change or swap memory and personality, and finally, teleportation across space to Mars. He stands that according to the Physical Criterion, our identity over time consists in the existence of our brain [1]. On the other hand, according to the Psychological Criterion, our identity consists in overlapping chains of psychological continuity and connectedness. Consequently, the growth of technology has reached the level comparable to that of science fiction. While teletransportation and brain manipulations remain unreal, brain uploading is swiftly transitioning into reality, transforming the theory of digital immortality from a dream into a viable strategy.

Digital immortality, often referred to as "uploading" or "downloading", involves scanning the structure of a brain in detail and constructing a software model that behaves identically to the brain when executed on suitable hardware. This concept has been popular in science fiction as well as in some preliminary scientific studies.

Mind uploading itself is based on some key assumptions: brain activity is Turing-computable, the mind resides in the brain's structure, its arrangement, and biochemistry, and software can host the mind. These assumptions imply that the mind is computable, and there is no physical property in the brain, including consciousness, that cannot be simulated. However, it raises philosophical questions about identity,

consciousness, and the nature of existence, along with ethical considerations regarding the accuracy and impact of such simulations. The brain's building blocks are complex. Neurons are not just wires; they alter and process information. Synapses contain receptors for hundreds of chemical signals, making them susceptible to influences. Hormones as serotonin and histamine play significant roles in mood and learning. The brain is also influenced by body parts, from heart nerves to gut bacteria. To digitize this interconnected network, we need advanced scanning technologies. Current scanning technology, such as fMRI machines, is insufficient for this task. However, a promising method involves cutting a brain into slices and scanning them with a high-resolution electron microscope to create a map of all cells and connections.

In 2019, scientists successfully mapped a cubic millimeter of mouse brain, containing 100,000 neurons, a billion synapses, and four kilometers of nerve fibers. This process took five electron microscopes running continuously for five months and produced a data set of two million gigabytes. To simulate a human brain, we may need to map smaller building blocks, potentially generating more data than all current storage capacity on Earth. Only superintelligent AI might reconstruct human traits from this information, requiring significant computational power and possibly quantum computers or simulations. Both concepts raise philosophical questions about identity, continuity, and the mind's nature. These technologies also share ethical considerations, such as the implications of simulating consciousness and the potential societal impact. While progress has been made in understanding and mapping the brain, much work remains. Research in neurotechnology, brain-computer interfaces, and AI continues to advance our capabilities. Potential applications of these technologies include enhancing mental health, preserving legacy, and extending human life. However, technical, ethical, and societal challenges must be addressed.

In summary, the growth of technology has brought us closer to realizing digital immortality and mind uploading. While these ideas were once the realm of science fiction, they are becoming feasible strategies. Continued research and ethical considerations are crucial as we explore the future of human consciousness in the digital realm.

References:

1. Parfit, D. Reasons and Persons / D. Parfit. – Oxford University Press, 1984. – 360 p.

2. Electron imagining technology for whole brain neural circuit mapping / K.J. Hayworth // International Journal of Machine Consciousness, 2012. – P. 87-106.

3. Whole Brain Emulation: A Roadmap, Technical Report #2008-3 / A. Sandberg, N. Bostrom // Future of Humanity Institute, Oxford University, 2008. – P. 7-31.