

Declaration on Paradigm Revolution in AI

International Conference on the Study of Information
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The 6th International Conference on the Study of Information was held Aug. 14-16, 2023 in Beijing. After discussions, systematically new and greatly significant findings on “paradigm revolution in AI” are stressed and worth to be shared to the public.

Part I New Findings and New Theories on Scientific Research

1, The Secret on the Origin of Science and Technology (S&T)

Neither science nor technology existed in the early primitive time. Throughout the practice of evolution, humans realized that their own abilities were not sufficient for achieving the success in living and development. Then they gradually discovered a way to strengthen human abilities, that is to make tools by utilizing the resources from the outside world. The general idea for making tools became the origin of primitive science and the skills became the origin of primitive technology. Assisting humans in expanding their abilities -- this is the secret of the origin for S&T to emerge.

2, The Secret on the Advance Path Map of S&T

There have been four categories of human ability to expand -- constitution ability, physique ability, information ability and intellectual ability, from relatively simple to relatively complex. The order for human ability expansion determines the path of S&T advancing:

- Material S&T has been developed to strengthen human constitution ability since the agricultural era, or even earlier;
 - Energy S&T to strengthen human physique ability since the industrial era;
 - Information S&T to strengthen human information ability since the information era;
 - Intelligence S&T to strengthen human intelligence ability since the intelligence era.
- Material S&T and energy S&T are termed physical discipline while information S&T and intelligence S&T are the information discipline. Meeting the needs of human ability expansion -- this is the secret for S&T to advance.

3, The Intelligence Era is Coming

The intelligence ability has resulted from complex integration and upgrading of all kinds of information ability. Information S&T has experienced great development since World War II. Yet, the explosive development of artificial intelligence, AI in brief, and its huge implications to human society have been evidenced since the 2010s. This marks clearly that the world is entering into the intelligence era.

4, Paradigm Change: The Insuperable Law for Emerging Discipline

4.1, Paradigm for a scientific discipline is defined as the scientific worldview and the associated methodology for the discipline, which is the supreme force for leading and regulating the advancement of the discipline.

4.2, According to 4.1, different scientific disciplines should have different paradigms.

4.3, The paradigm can merely be refined from the activities of the discipline. Yet, this is an extremely difficult task and may take a very long period of time. The latter of which is termed the time for paradigm formation, TPF for short.

4.4, Within TPF, an emerging scientific discipline will have its own paradigm unavailable. The research activity within this period of time will have to borrow a paradigm from other disciplines.

4.5, The emerging scientific discipline within its TPF will be at a low level of advancement because the borrowed paradigm is not matched with the discipline.

4.6, The solution which is able to make the discipline walk out of the low-level advancement stage is to summarize its own paradigm and to replace the borrowed paradigm with its own. This process is called “paradigm revolution”.

Part II Applying the General Theory to AI Research

5, Paradigm for Physical Discipline (PPD)

5.1 The physical discipline has been more than 400 years old and has successfully refined its own paradigm already, called the paradigm for physical discipline.

5.2 The scientific worldview of PPD declares “What the physical discipline studies must merely be objective matters and no subjective factors are allowed”.

5.3 The methodology requests that the studies carried on in physical discipline observe the principles of “pure formalization” (castrating the value and meaning factors) and “divide and conquer” (dismembering the system into pieces).

6, AI is an Emerging Discipline

6.1, Born in the mid-20th century, AI is essentially a kind of open and complex information system. According to 4.2, AI should follow the paradigm for information discipline, PID in brief.

6.2, Due to its high complexity, AI is still within the period of its TPF (see point 4.3).

This means that the PID is still unavailable till the present day.

6.3, According to 4.4, AI has borrowed PPD to follow in practice, which is not matched with the needs of AI research though.

6.4, As a result, the advancement in AI is at a lower level: (1) AI has been dismembered into three pieces (Structuralism, Functionalism, Behaviorism) and thus no unified AI theory, (2) The value and meaning factors of information have all been castrated and thus no true intelligence can be produced. These are the major problems in AI, including the GPT series.

6.5, As mentioned in 4.5, the right solution for walking out of the lower level of AI advancement is to summarize PID and then replace PPD with PID. This is the so-called“ Paradigm Revolution in AI”.

7, Paradigm for Information Discipline (PID)

7.1, As stated in 4.1, the paradigm for information discipline is defined as the integration of scientific worldview and the associated methodology dedicated to the information discipline. PID can be summarized as follows.

7.2, The scientific worldview of PID declares “What AI studies is the information ecology process generated by the interaction between subjects and the objects under the control of subjects and the constraints from objects in environment”.

7.3, The methodology of PID requests that the studies carried out in AI observe the principles of the information ecology process without dismemberment and castration.

8, Paradigm Change: The Establishment of General AI Theory Completed

8.1, Giving-up PPD, forbidding castration and dismemberment, PID wipes out all the major problems in AI caused by borrowing PPD and reveals the universal mechanism of producing intelligence -- the “Law of Information Conversion and Intelligence Creation” with which all rational problems in practice can intelligently be solved.

8.2 Much more importantly, the “law of information conversion and intelligence creation”, together with the “law of matter conversion and the inextinguishability of matter”, and the “law of energy conversion and energy conservation”, form the completed system for contemporary science.

8.3 Based on the universal mechanism of producing intelligence, the establishments of Universal Theory for Artificial Intelligence with understanding ability, Universal Logic Theory and Factor Space Theory have all been completed.

9, The Harmonious Relationship between PID and PPD in AI System

9.1, PID should be followed within the entire information ecology process in AI.

9.2, PPD should be followed with respect to the supporting systems of AI, which are the material system and the energy system.

9.3, PID and PPD can achieve the unity of opposites in AI systems within which PID is for the mainstream of AI systems whereas PPD is for supporting the mainstream.

Part III Conclusions

10, Paradigm Change: The Significant Regulations in AI Research

10.1, Paradigm for a scientific discipline is the indispensable guidance in the scientific research.

10.2, In order to recognize the paradigm, the breaking out the boundary that separates natural science from philosophy is necessary.

10.3, When the research area is expanded from objective entities to involve subjective factors, then the paradigm must be changed from PPD to PID -- this is the demand from the era advancement.

10.4, Paradigm Revolution has been the criterion for testing if the AI research can be successful or not.