

# **Ecological Characteristics of Information and Its Scientific Research <sup>1</sup>**

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# Abstract

- This paper **aims** to explore the ecological characteristics of information and its scientific research from various aspects. The **method** is: Firstly, it explores formal information including eight basic types, and then explores the essence of information involved the logic of position and order or sequence. Finally, it reveals the ecological characteristics of information ontology related to terminology framework and conceptual system, which is characterized by not only the ambiguity of formal semantics and formal information can be automatically identified and eliminated in the computer-aided information processing environment, but also the ambiguity of the content semantics and content information, can pass through language chessboard and knowledge chess game, with essential information and ontological information, to resolve ambiguity. The **result** is that the basic law of information and its existence is highlighted, and the social and ecological characteristics of information science research are embodied by macro models (ideas and methods) and micro models (Chinese chessboard and English chessboard). Its **significance** is information ecology and its supporting methodology, formalization and method system to obtain a new breakthrough, specifically for the classification of information phenomenon and attribution on the determination of its scientific basis, which is conducive to the timely identification and resolution of various ambiguities.

# Keywords

- formal information
- essential information
- ontological information
- information ecology

# 1. Introduction

- This paper aims to explore ecological characteristics of information and its scientific research from various aspects.
- Grammatical information<sup>[1]</sup>, semantic information<sup>[2]</sup> and pragmatic information<sup>[3]</sup> all can be further divided into content information<sup>[4]</sup> and formal information<sup>[5][6][7][8][9][10]</sup>. There is a very rich connotation<sup>[11]</sup> and extension<sup>[12]</sup> among them. It is not an exaggeration to call information ecology<sup>[13]</sup>. So how to recognize or to characterize them is the key to the ecological aspects of information. This paper uses the phenomenon of information<sup>[14]</sup>, the nature or essence of information<sup>[15]</sup> and the ontology of information<sup>[16]</sup> as three basic perspectives to understand or to operate the three series of information ecology systematically.

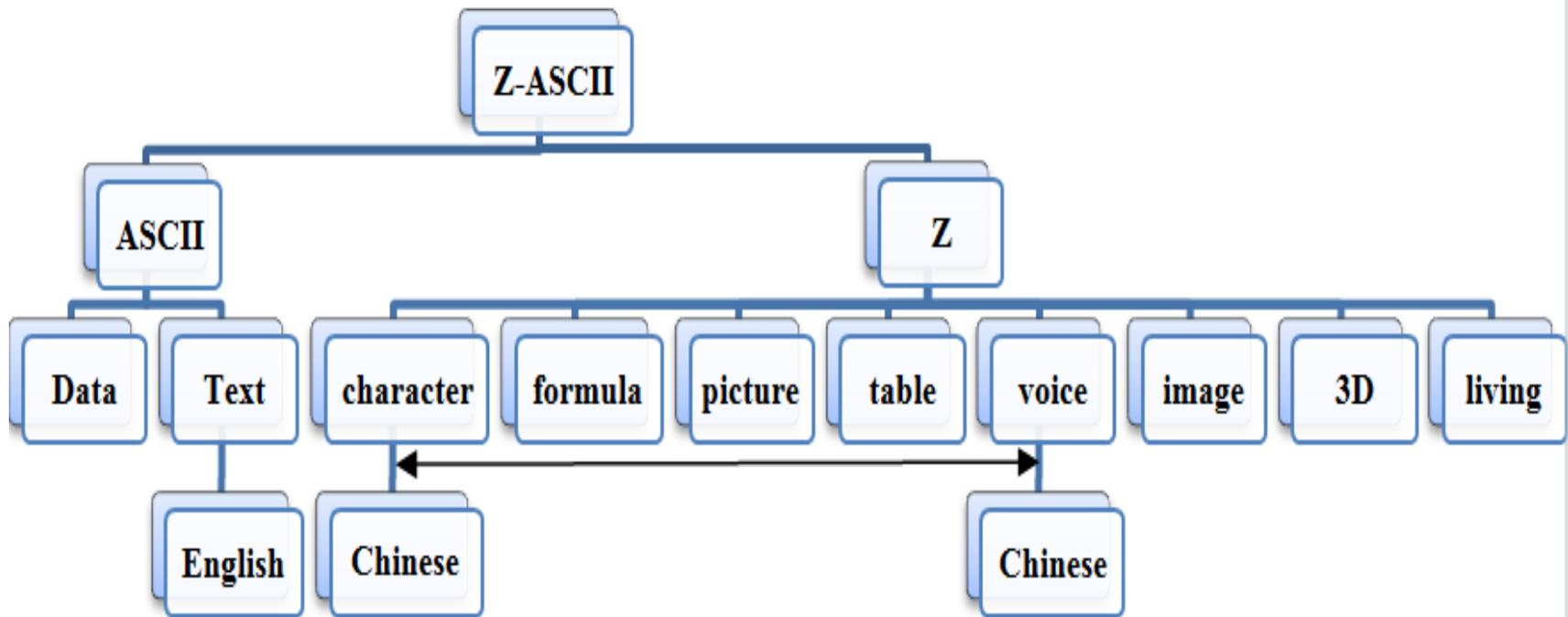
## 2. Materials or Knowledge Background

- **2.1. The prelude of formal informatics**
- If Tarski's division of object language and meta-language is the beginning of formal informatics, then Turing's calculation or computing of formal information with Shannon's Statistical Analysis of formal information is the sign of formal informatics.
- **2.2. The prelude of Content Informatics**
- If Feigenbaum's analysis or calculation of the content information is the beginning of content informatics as knowledge engineering, then Yixin Zhong's thinking systematically on the grammatical information, the semantic information and the pragmatic information is the content of information science to start. The question now is: how to resolve the ambiguities?

# 3. Methods

## 3.1. *The Phenomenon of Information*

- Figure 1 is our view of generalized text and its two standard systems



## 3.2. *The Essence of Information*

- Figure 2 is English formal information processing namely micro-chessboards as an example

The screenshot shows a web application interface. At the top, there is a blue header with 'KB' and a menu icon on the left, and 'Administrator' on the right. Below the header, the main content area is titled 'Board' with the subtitle 'The method involves the following steps:'. To the right of the subtitle, there are navigation links: 'Index > Articles > Board'. Below the subtitle, there is a 'Totals: 69' label and two buttons: 'Group' (blue) and 'Sentence' (orange). The main text block contains a paragraph of text. Below the text block, there are two panels. The left panel is titled 'Board ID' and contains a grid of 44 numbered boxes (1 to 44) arranged in 4 rows and 11 columns. The right panel is titled 'Board' and contains a word cloud of text from the paragraph above, with the word 'logic' highlighted in a dark grey box. The bottom of the screenshot shows a Windows taskbar with various icons and a system tray with the time '7:00' and date '2017-04-16'.

KB Administrator

Board The method involves the following steps: Index > Articles > Board

Totals: 69 Group Sentence

The method involves the following steps: based on a digital and textual double matrix: First, the generalized bilingual **logic** of order and position is established on the basis of both Aristotle 's formal **logic** based on language and Frege' s mathematical **logic** based on arithmetic. At the same time, the function relation between digital and textual double matrices is established on the basis of both Turing's strong artificial intelligence view based on digital computation and Searle's weak artificial intelligence view based on natural language. Then, on the basis of both common knowledge and interdisciplinary, cross-field and cross-industry expert knowledge, on the basis of both Saussure's general linguistic view and Chomsky's formal linguistic view, The common reference between English and Chinese and its alternative bilingual is to establish the relation of translation on those knowledge ontologies.

Board ID

1	3	6	7	13	19	34	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61
62	63	64	65	66	67	68	69	70	71	72

Board

the is of its and to logic translation method involves following steps based on a digital textual double matrix first generalized bilingual order position established basis both aristotle s formal language

7:00 2017-04-16

# 3.2. The Essence of Information

- Figure 3 is Chinese formal information processing namely mini-chessboards as an example

The screenshot shows a web browser window with the address bar displaying <http://kb2.sloud.cn/article/51/board>. The page content includes a paragraph of text and two grids of Chinese characters.

明确了必须发展**中国**特色社会主义这一条主线之后，进一步就要明确其指向，两个百年实现**中**华民族伟大复兴的目标即实现**中国**梦，随之就必须明确实现它的价值导向，**国**家、社会和个人三个层面的价值引领即社会主义核心价值观，再进一步还要明确当前和今后一个时期的战略重点，即四个全面的战略布局--全面建成小康社会的战略目标，全面深化改革、全面依法治**国**、全面从严治党三大战略举措，实现这个战略布局，最终要靠创新、协调、绿色、开放、共享五大发展理念。

**汉字编码棋盘**

563	565	568	569	574	579	580	581	583	590	594
603	606	613	635	646	649	659	663	666	667	669
670	672	685	691	694	698	701	703	706	707	720
726	745	749	759	768	770	773	779	780	801	802
808	820	823	827	828	838	839	849	850	851	854
860	868	869	870	874	877	880	881	882	893	902
903	904	909	917	949	963	972	998	1003	1012	1015
1016	1035	1047	1063	1085	1097	1119	1165	1189	1190	1204

**汉字棋盘**

理	明	心	和	重	发	展	再	人	的	其
国	大	中	要	即	面	举	实	略	就	一
个	特	法	从	化	进	会	之	义	它	念
现	成	引	这	目	指	了	步	三	领	社
五	标	全	当	今	前	导	观	建	协	最
层	后	主	两	价	新	时	还	点	兴	开
共	享	调	条	随	向	放	小	局	确	必
须	康	四	依	复	创	布	值	年	期	梦

7:09  
2017-04-16

# 3. Methods

## 3.3. *The Ontology of Information*

- Figure 4 is English information processing namely micro-knowledge chess-menu as an example

The screenshot shows a web interface for a KnowledgeBase. The top navigation bar is blue and contains the text 'KnowledgeBase' on the left and 'Administrator' on the right. Below the navigation bar, there is a sidebar on the left with a search box and a menu with items: 'Main', 'Overview', 'Articles', 'Boards', 'Groups', and 'Maps'. The main content area is titled 'Group' and contains the text 'The method involves the following steps:'. Below this text, there are two buttons: 'Board' and 'Sentence'. The text describes a method involving a digital and textual double matrix, mentioning Aristotle's formal logic, Frege's mathematical logic, Turing's artificial intelligence view, Searle's artificial intelligence view, Saussure's general linguistic view, and Chomsky's formal linguistic view. Below the text, there is a list of terms with counts in parentheses: 6(1), 8(3), 7(2), 10(2), 5(2), and 3(2). The term '7(2)' is highlighted. Below the list, there are two text boxes containing the terms 'aristotle s formal logic based on language' and 'frege s mathematical logic based on arithmetic'. At the bottom of the main content area, there is a text input field labeled 'Add New Group ...' and a green plus button.

### 3.3. The Ontology of Information

- Figure 5 is Chinese formal information processing namely micro-knowledge chess-menu as an example

文章知识库

管理员 在线

请输入搜索内容

主要导航条

- 总览
- 文章列表
- 查看棋盘
- 查看字组
- 查看映射

查看字组 邹晓辉指导邹顺鹏学习理解习总书记治国理政思想五个方面环环相扣的内在逻辑

首页 > 文章列表 > 查看字组

总共有字组9个

汉字 句子

明确了必须发展中国特色社会主义这一条主线之后，进一步就要明确其指向，两个百年实现中华民族伟大复兴的目标即实现**中国梦**，随之就必须明确实现它的价值导向，国家、社会和个人三个层面的价值引领即社会主义核心价值观，再进一步还要明确当前和今后一个时期的战略重点，即四个全面的战略布局--全面建成小康社会的战略目标，全面深化改革、全面依法治国、全面从严治党三大战略举措，实现这个战略布局，最终要靠创新、协调、绿色、开放、共享五大发展理念。

3字(1) 4字(8)

战略布局 小康社会 深化改革 四个全面 一条主线 两个百年 三个层面 五大发展

增加新术语...

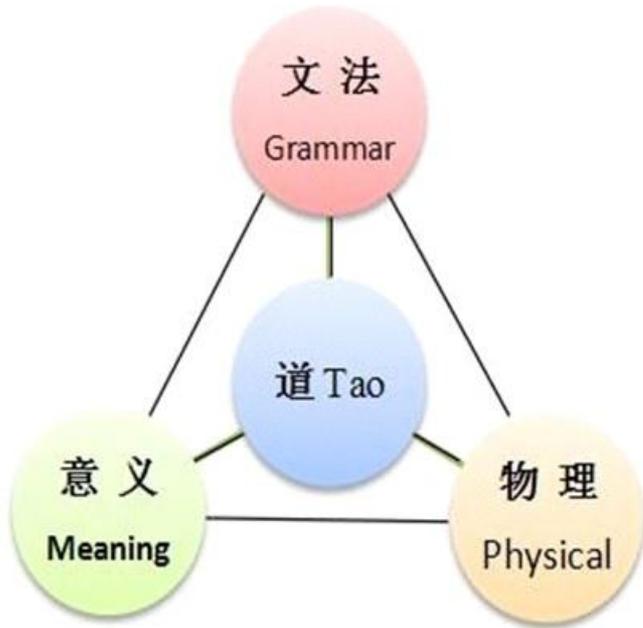
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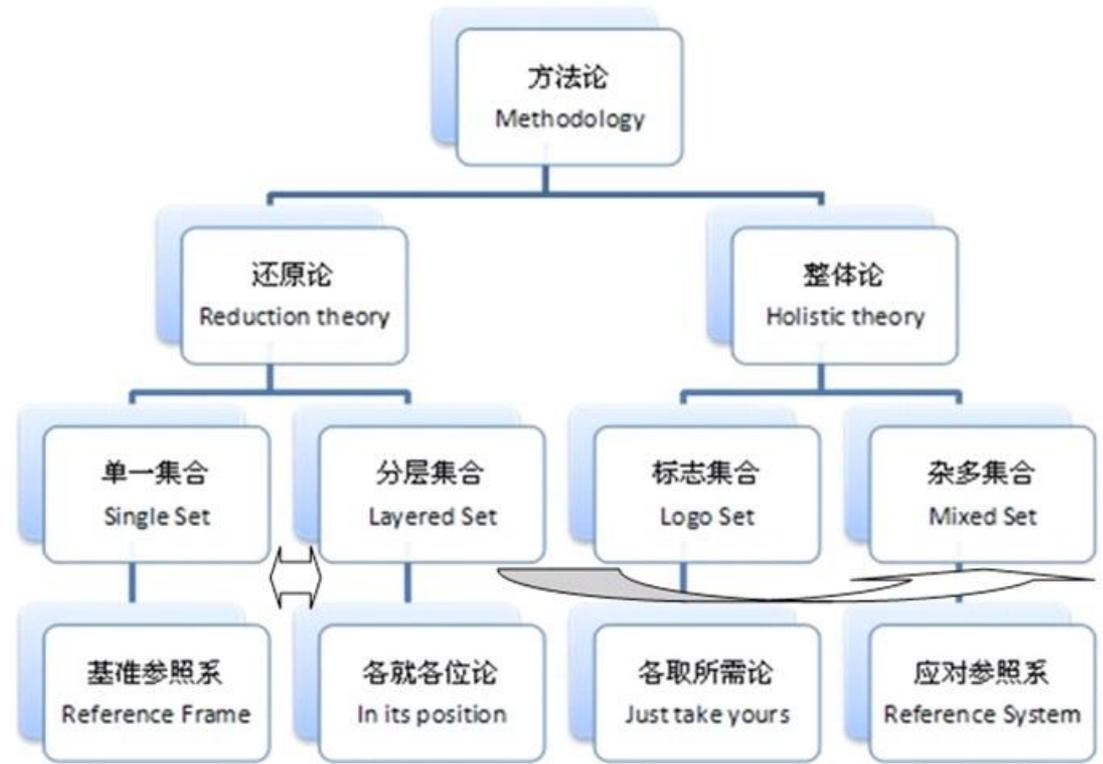
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# 4. Results

- Figure 6 are Basic models of ambiguity analysis:
- (a) model of basic views; (b) model of basic methods.



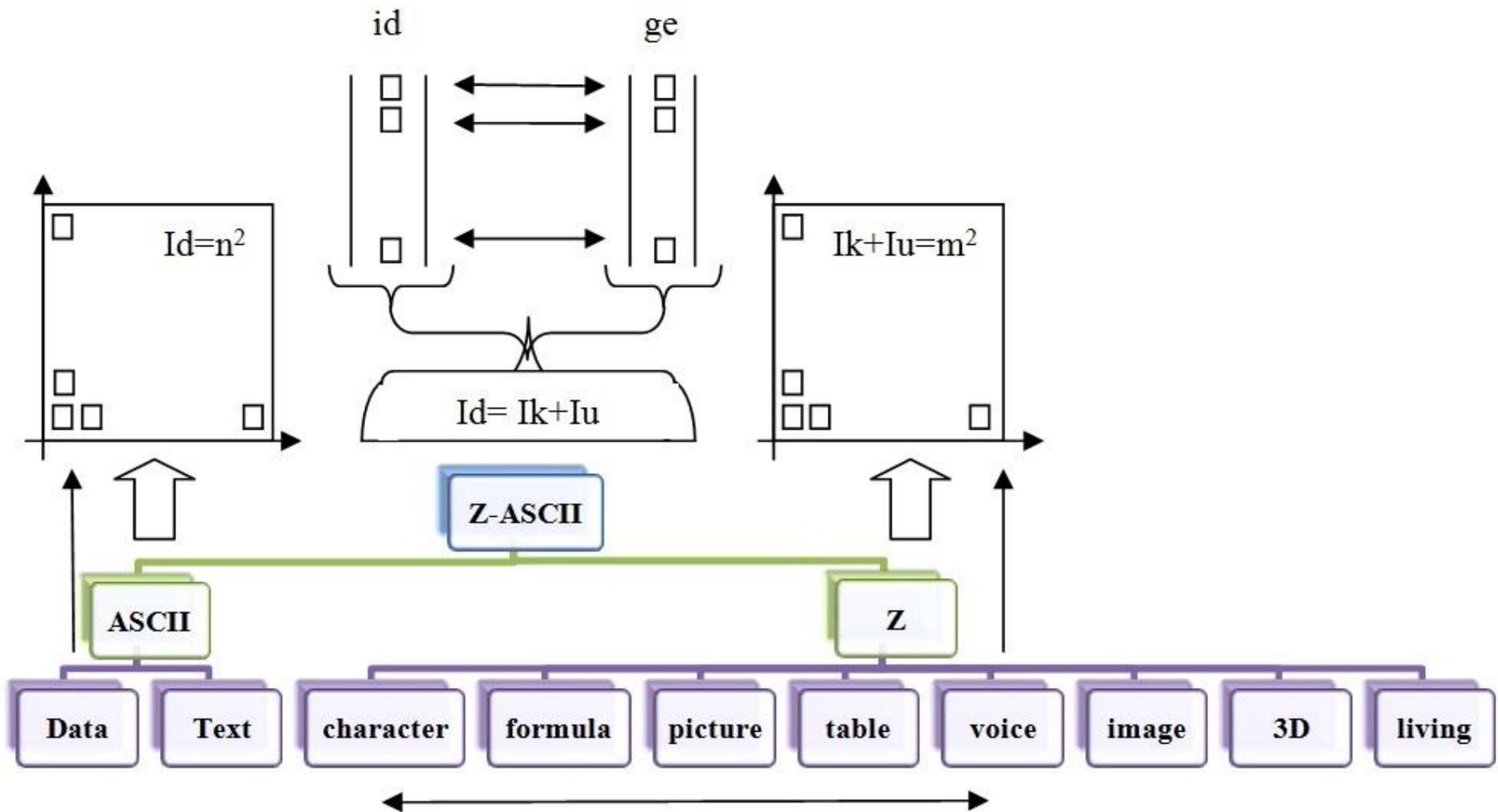
(a)



(b)

# 5. Discussion & 6. Conclusions

- Figure 7 Shows three equations with twin chess-board based on Z-ASCII system



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# Appendix

- Appendix A

<http://kben.koderx.com/article/3/board>

<http://kben.koderx.com/article/3/group>

## Appendix B

<http://kb2.sloud.cn/article/51/board>

<http://kb2.sloud.cn/article/51/group>

FUNDAMENTAL LAW OF INFORMATION: PROVED BY DOUBLE MATRICES ON NUMBERS AND CHARACTERS

AAAS Member: XiaoHui Zou, China University of Geosciences (Beijing)

The **purpose** of this paper is to prove the **basic law of information** in three verifiable ways: logic, mathematics and translation.



Aristotle



Frege



Turing



Searle Zou



Saussure



Zou Chomsky

The **method** involves the following steps: based on a digital and textual double matrix:

First, the generalized bilingual logic of order and position is established on the basis of both **Aristotle**'s formal logic based on language and **Frege**'s mathematical logic based on arithmetic. At the same time, the function relation between digital and textual double matrices is established on the basis of both **Turing**'s strong artificial intelligence view based on digital computation and **Searle**'s weak artificial intelligence view based on natural language. Then, on the basis of both common knowledge and interdisciplinary, cross-field and cross-industry expert knowledge, on the basis of both **Saussure**'s general linguistic view and **Chomsky**'s formal linguistic view, the common reference between English and Chinese and its alternative bilingual is to establish the relation of translation on those knowledge ontologies.

The **result** is that the three basic laws can be proved by digital and textual double matrix. Its **significance** lies in: quality, energy, information, three kinds of fundamental laws would be described systematically.

**FORMAL BILINGUAL CHESSBOARD SPECTRUM: SHOW THE OVERLAPPING BETWEEN LANGUAGE AND MIND**

AAAS Member: Shunpeng Zou, Advisor: XiaoHui Zou, China University of Geosciences (Beijing)

The purpose of this paper is to realize the human - computer interaction by using the Chinese character chessboard and Chinese language chessboard spectrum, to optimize the interpersonal communication, and to further reveal the formalized hub of human intelligence and artificial intelligence as well as its scientific principles.



The formal pivot was clearly combed out into dual approaches, five levels and seven milestones, in "Two Major Categories of Formalized Strategy", which has paved the road for the construction of human-computer interactive "digital bilingual chessboard spectrum,"the specific double matrix constructed by numbers and characters, it contained deep-seated scientific principles.

The result is:the basic implementation of its specific application will allow the teachers and students of liberal arts, science and engineering to understand and participate in the corresponding activities.

The significance is that from point to surface we can not only understand certain information, but can also put into action.The specific manifestations include a series of pilot projects and all aspects of application.