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Dialogue and Reflection: Cognitive Computation and System Analysis of Circular Logarithms

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Abstract. It aims to acquire expert knowledge across disciplines and consider how to make repeated or reused them in a targeted manner. The difficulty is the cognitive calculation and systematic analysis of the circular logarithms. The methods are: knowledge acquisition and standardized expression of the circular logarithmic experts of the type of free and divergent thinking innovation; coping strategies are established in the process of combining the eight major forms of characters, formulas, graphics, tables, sounds, images, 3D or three-dimensional, living/moving, with our re-creation; the combination of formal understanding, conceptual understanding and object understanding, in fact, it is an overall understanding of the three abstraction, intuition and imagery, and is characterized by the help of standard paradigms and popular interpretation of the knowledge background and comprehensive skills needed. The result is: one hypothesis, three principles, a series of expressions, several sets of graphs, and a new series of problems with circular logarithms and infinite construction sets. Its significance lies in: understand the characteristics of international frontier academic research, either to prove that this road is promising, or to falsify this road is not feasible, or to find another way, or to change the strategy, or...; distinguish between expert knowledge expression simplify, popularize, and standardize with human-computer interaction which belongs to three types; for the circular logarithmic mathematics expert team, the follow-up work has at least several aspects: theoretical comparative research on mathematics,especially for the design of AI cognitive computing and expert systems.

Keywords: expert knowledge expression, common sense acquisition, human -computer interaction, cognitive computing, system analysis.

1 Introduction

It aims to acquire expert knowledge across disciplines and consider how to make repeated or reused them in a targeted manner. The difficulty is the cognitive calculation and systematic analysis of the circular logarithms. So it aims to start from the interpersonal communication of expert knowledge and public common sense, and

then advance to the field of human-computer interaction to do cognitive computing and system analysis of circular logarithms.

Circles and logarithms are two concepts. Mathematical comprehension levels at the two stages of university and middle school can be made into the ontology of mathematical knowledge (including common sense) at these two stages. Know the relationship between circle (curve) and equation from analytical geometry, and further analyze the functional relationship of conic section from mathematical analysis. Here, the circular logarithm proposed by Professor Yiping Wang (as the first author of this paper) has rich connotations (it is not a simple addition of circle and logarithm), so even mathematical experts in other fields have to work hard to understand : What is a circular logarithm? What's the point of it? How is it portrayed and how does it function? The corresponding author will make a summary of the process of how to acquire expert knowledge, formalized expression and targeted reuse from the above three questions, not only in authentic and popular English, but also formalize them, so that both human and machine can understand logarithms, namely a more systematic elaboration, and formal processing is required to facilitate the understanding of circular logarithms by both human and machine.

2 Method

The methods are: knowledge acquisition and standardized expression of the circular logarithmic experts of the type of free and divergent thinking innovation; coping strategies are established in the process of combining the eight major forms of characters, formulas, graphics, tables, sounds, images, 3D or three- dimensional, living/moving, with the re-creation here; the combination of formal understanding, conceptual understanding and object understanding, in fact, it is an overall understanding of the three abstraction, intuition and imagery, and is characterized by the help of standard paradigms and popular interpretation of the knowledge background and comprehensive skills needed. The method also is as follows: First, from the perspective of expert knowledge acquisition, accurately understand the circular logarithm (Aimed at algorithm optimization, such as addition and multiplication, continuous addition and continuous multiplication, power and square root, exponent and logarithm, etc.) based on a circular function (such as the radius of a perfect circle, and the major and minor axes of an ellipse, etc.), for example, what is the logarithm? The original author clearly put forward: the logarithm is an irrelevant mathematical model, it has no specific element content, cognition and analysis between 0 and (1/2) to 1（Such a statement is difficult to understand if it is divorced from the actual application scenario. This is what the original creator of the circular logarithm must face. What should we do? On the one hand, show the application scenario; on the other hand, try to standardize our discoveries and inventions.）; How to understand and analyze this? Through recent readings and conversations, systematically paraphrase the expert knowledge initially acquired by the corresponding author, laying a foundation for the construction of term ontology; then, or furthermore, from the perspective of common sense acquisition, a preliminary

understanding of the circular logarithms, such as: What is the significance of it? Solve a series of mathematical problems through circular logarithm theory (this involves the popularization of corresponding mathematical frontier knowledge), and verify whether the circular logarithm can be used as a new mathematical theory, that is: the more powerful that everyone is actively looking for, a more complete, more stable, safer, and more efficient infinite construct set, which is expected to make great progress in mathematics; finally, from the perspective of human-computer interaction, the collaborative understanding of the circular logarithms is likely to make up for the simple of human cognition.[1-3]

2.1 What is the circular logarithm or the logarithm of circle?

First, review how mathematicians discover mathematical objects and then discover mathematical relationships to construct mathematical categories? We know that the mathematical objects given by Euclidean geometry, Lobachevsky geometry and Riemann geometry are plane geometry (Euclidean geometry) and surface geometry (including Lobachevsky hyperbolic geometry and Riemann ellipse geometry). Therefore, we understand the circular logarithmic function (as the mathematical relationship) in this way, if it is limited to the three extreme values of *{0,1/2,1}* and the domain of discourse between them *{0,...,1/2,.. .,1}* and expand a series of concentric circles with the corresponding center points, in the real number range and then in the circular logarithmic function range, an infinite number of infinite construction sets can be constructed. Further construct the supercircular logarithmic function (this sequence goes on infinitely, in the infinite construction set theory, it can be said that there are logical and mathematical and scientific basis). If it is said that the inference calculation is based on the elements of the finite structural set, that is, the elements of the finite set of the real number system, and is characterized by numerical calculation and statistical analysis, then the elements of the infinite structural set are in the circular logarithmic with its circular logarithmic factor. The circular logarithmic function for inference calculation is characterized by position or place value calculation and statistical analysis. Combining the two types of inference calculation and statistical analysis of the numerical value of the sequential number and the position value of the positional number, this is the sequence-position logic and its linkage function (that is, the new mathematical relationship) of the intelligent system analysis and its generalized translation. (covering arithmetic calculation and statistical analysis, etc.) The structural form of human-computer collaborative verification (category of new mathematics).

The Circular Logarithmic Roots and Reforms

The circular logarithm team inherits the ancient Chinese and the advanced ideas of Western mathematics, continues to expand and innovate development, absorbs the essence of multiplication, division, interpolation, squares, positioning without a trace, and for the first time completely discovered the four arithmetic operations. "Multi-plication & Addition, Multiplication & Division, Subtraction & Addition Reciprocal Rules"; proposed the circular logarithm axioms assuming "integer division itself is not necessarily 1" and "three unitary {0 to 1} gauge invariance". Reform the traditional

infinite set into a "numerical-position value infinite structural set", the continuous compatibility "calculus equation" into a polynomial level dynamic control principle, the discrete completeness "pattern recognition" interface/ellipse into a perfect circle pattern, and after the reform they merged into one.

What is the circular logarithm or the logarithm of a circle?

The circular logarithm to the base as the unit quadratic circular function of variable combinations of infinite sets is called circular logarithm. In layman's terms: the circular logarithmic form obtained by dividing the continuous multiplication of uncertainty (arbitrary events, functions, equations) with the unit circle as the base turns the multiplication of uncertainty into an arithmetic calculation of deterministic addition. The circular logarithm describes two (multiple) asymmetry functions as relative symmetry functions, which are expanded in the form of jumps and continuous transitions of symmetry in the range of *{0, (1/2), 1}* with the central zero point as the central boundary. The reverse calculation also holds. The metaphor of the image is infinitely long "sugar gourd string" or infinitely large "concentric round cake".

What is the definition of the circular logarithm?

The elements of the infinite set do not repeat combinations and sets, and are converted into subsets of infinite program polynomials (called numerical eigenmodes, centered and inverse average value functions), which are mapped to the position value circular logarithm of "irrelevant mathematical models, no specific element content", taking into account the fusion of two forms *{ 0 or (1/2) or 1}* complete jump transition form, *{0 to (1/2) to 1}* compatible continuous transition form, in the controllable scope *{0 or[0 to (1/2) to 1]or1}* for zero-error logical arithmetic calculations.

2.2 What is the significance of the circular logarithm?

Depend on $(1-\eta^2)^K=[(1-\eta)(1+\eta)]^K=(1-\eta)^K(1+\eta)^K$ Conjecture & reasoning: A certain number $(1-\eta)$ within *1* is multiplied *K* times continuously, A number other than *1* $(1+\eta)$ is multiplied *K* times continuously, Then, $(1-\eta)^K(1+\eta)^K$ is multiplied with each other between them. Two circular logarithmic factors $(1-\eta)^K$ and $(1+\eta)^K$ are obtained, each of which is itself a circular logarithm of a certain property. Based on the same circular logarithm factor (η) (particle function) or (η^2) (wave function), the phenomenon of symmetrical circular logarithm (η, η^2) duality randomly appears, the torus network surface {XA}K(Z ±S±N+q)/t and radial network surface {XB}K(Z±S ±N-q)/t. Based on the consistency and covariance of the logarithm of the isomorphic circle, the net nodes can transmit synchronously and in multiple directions quickly.

$(1-v^2/C^2)^K$ is equivalent to $(1-\eta^2)^K$ in symbolic form.

Einstein's special theory of relativity, $(1-v^2/C^2)^K$(ratio of particle velocity to light speed) is equivalent to: circular logarithm $(1-\eta^2)^K$, with circular logarithm-relativity, mean function light and mass, Also get the mass-energy theorem.

Mathematical proof: The asymmetry function is converted into a circular logarithmic factor with the same symmetry through the circular logarithm. When the same circular logarithmic factor is reversely converted, "determinism and randomness", "wave-particle duality".Here comes the "linear and surface coordinate duality" of spatial coordinates.

Logically, the combination of multi-world-equivalent multi-variable phenomenon interpretation and the consistent historical interpretation seems to be the most perfect for explaining the measurement problem. It retains both the certainty of "God's perspective" and the "randomness" of single-world measurements. Zou summed it as the unity of macroscopic (wave) determinism and microscopic (particle) randomness.

The circular logarithm and the Euler logarithm have some equivalent constants. However, the limit value of Euler's logarithm $e^x=2.718281828...$; the fixed value divided by the uncertain continuous multiplication combination value cannot satisfy the integer expansion of the power function, and it is still an "approximate calculation". The circular logarithm is based on the characteristic modulus and the logarithm of the element circle $(1-\eta^2)^{K(Z\pm S\pm N)=\{0\ to\ 1\}}$, which satisfies the integer expansion of the power function and ensures the expansion and calculation of zero error. In the exploration of the relationship between polynomial root elements and combination coefficients, we discovered the previously unknown "rule of reciprocity of multiplication and addition", and we discovered their rules, which were extended to circular logarithms.

Prove that Fermat's Last Theorem does not hold. Fermat's Last Theorem $(S \geq 3)$ does have asymmetry. In fact, it is the same dimension invariant condition, the "inequality gap" between a uniform perfect circular function and an uneven elliptic function. This gap can describe their reciprocity and compatibility by circular logarithms.

$A^n+B^n=\boldsymbol{(1-\eta^2)^{(K=\pm 1)}}C^n$ is obtained. Under the condition of $n\geq 3$, A^n,B^n,C^n all have invariant values, there is no artificial irrational number to interfere with rational numbers, and satisfy $(1-\eta^2)^{(K=\pm 1)}$dimensionless values with determinism.

2.3 How do the circular logarithm make up for the lack of human cognition?

2.3.1. Prove that the fusion of the continuum hypothesis (CH) and the circular logarithm (CL) satisfies the axiomatic choice, making the circular logarithm a new infinite construction set.[4]

2.3.2. Prove $P=NP$ problem: Solve simple to complex polynomials with isomorphic consistent "time calculation"; satisfy isomorphic consistent forms of the circular logarithms, polynomial infinite program subsets, all have isomorphically consistent circular logarithms algorithm. It lays the foundation for the unified calculation of cracking one-variable (multivariate) higher-order equations.[5-6]

2.3.3. Prove that Hodge's conjecture solves the problem of variable combinations dividing uncertain multi-element combinations, and satisfies the logarithmic integer expansion with the base logarithm of the unitary circle, and overcomes the drawbacks of approximation calculation caused by error accumulation.[7-9]

2.3.4. Prove Riemann conjecture solve the expansion of the circular logarithm with the decimal $\{5\}$ as the center, and calculate the level and prime value. The center zero point $\{1/2\}$ of the critical point of each level of the Riemann function, to solve the stable superposition of any higher-order function (geometry is a sphere, a ring) with the center zero point two-sided symmetry (figurative analogy: candied fruit string, concentric circles).[10-11]

2.3.5. Prove the reciprocity theorem, solve the existence of a pair of asymmetric functions in the subterms of the polynomial, and become a shared relative symmetry function through the circular logarithm.[12-13]

2.3.6. Prove Fermat's Last Theorem, among the three elements, under the condition of circular logarithm: the sum of two elements $n \geq 2$ power is equal to the third $n \geq 2$ power, and its elements and powers remain unchanged.[14-16]

2.3.7. Prove the Poincaré conjecture and solve any closed curve sphere (single connected) torus (double connected, donut). The circle is infinitely reduced from the boundary to the center, and infinitely enlarged (diffused) from the boundary to a circle of infinite radius; the circular logarithm is qualitatively and described and dynamically controlled by $\{0 \text{ to } 1\}^{K(Z)/t}$ and power function .[17-18]

2.3.8. Prove the BSD conjecture, solve the "triple generator" composed of any elliptic curve of rational numbers, satisfy the reciprocal symmetry relationship between the ellipse and the perfect circle, and the symmetry and asymmetry of the Abel group distribution of rational points on the curve relation.

2.3.9. Prove the four-color conjecture and solve the four-color unit expansion in which the tetrahedron is the smallest in the infinite graph, that is, the unary quartic equation is in the range of $\{0,1\}$, taking into account the block and the block, the block group and the graph Block groups, jump transitions and gapless continuous transitions between blocks.

2.3.10. Gauge field: solve the existence of entanglement calculation, and perform controllable dynamic principle calculation in the range of $\{0,(1/2),1\}$ without specific mass element content.

2.3.11. NS equation: solve the discrete asymmetry to calculate the existence, in the "constraint and unconstrained" fluid mechanics, unified "no specific space element content", in $\{0to(1/2)to1\}$ of controllable dynamic principle calculations.

2.3.12. The evolution of the universe described by applying the circular logarithmic positive (convergence) inverse (expansion) power function and center zero point (black hole, white hole) transformation.[19-20]

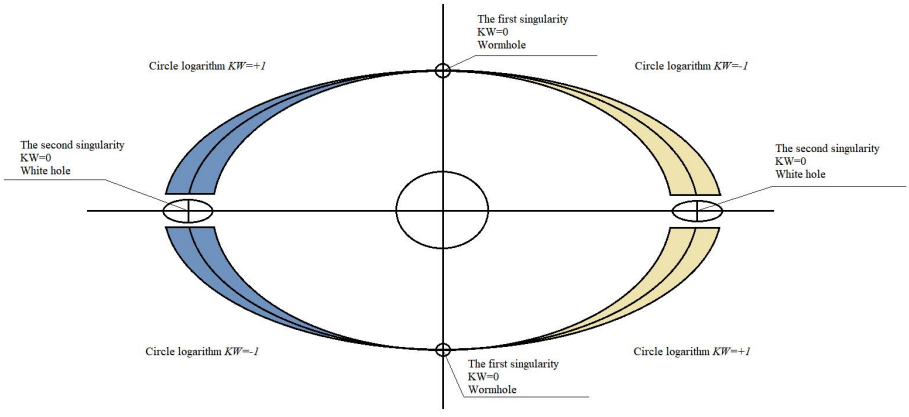


Fig. 1. How do the transformations of circular logarithms relate to the universe?

3 Result

The result is from the above three perspectives, to achieve cross-disciplinary, large-scale cross-border academic exchanges, not only the circular logarithm itself but also the original innovation achievements in other related fields can be implemented cognitive computing and systematic analysis. The result also is: one hypothesis, three principles, a series of expressions, several sets of graphs, and a series of problems with the circular logarithms and the infinite construction sets.

The new mathematical system construction (following formalism) completed by the method described in this paper (following intuitionism) can be reconstructed (following logicalism) by mathematicians, teachers and students in mathematics classrooms, and mathematical expert systems.

Engineering Application Example

Successfully solved a series of projects in scientific fields, such as: applying circular logarithm theory and its Cartesian circular logarithm (linear and nonlinear) coordinates, reforming Maxwell's electromagnetic equations (described by applying circular logarithm negative power function); Einstein Gravitational equation (described by circular logarithmic positive power function, and the average speed of light becoming various particles as a comparative value), biomechanics (described by circular logarithmic positive (generating) inverse (decaying) power function and center zero point conversion form) information (Image) asymmetric transmission, conversion, restoration, etc., can be converted into the form of circular logarithm for unified representation.

3.1 Elementary and Its Verifiable Results (Why is circle?)

Table 1. Comparison list of Chinese and English expressions.

ID	Chinese Pinyin	Chinese expression	English expression
1	**Yuan**-dui-shu	**圆**对数	The circular logarithm
2	**Yuan**-de-dui-shu	**圆**的对数	The logarithm of circle
3	**Yuan**hanshu-de-duishu	**圆**函数的对数	The logarithm of circle function
4	Tuo**yuan**-duishu	椭**圆**对数	The ellipse logarithm
5	**Yuan**zhuiquxian-de-duishu	**圆**锥曲线的对数	The logarithm of conic

It can be seen from Table 1 that although the differences in expression between Chinese Pinyin and Chinese characters and English are negligible, they must be highly valued, because bilingual comparison can help readers better understand the language and characters we have established after discussion, by using the basic form of expression. The ID numbers in Table 1 can give readers a clear guide: *ID1&2* are literal meanings, *ID3* gives the basic meanings that three more specific words and their related basic concepts can bring to the reader, if *ID1-3* means circle that is mainly a perfect circle, then *ID4* has added an ellipse, and *ID5* has been extended to a conic section. So logarithm and circle (including perfect circle and ellipse and then the whole conic section) logarithmic function and its equations have entered the field

of vision of this paper. This is its most basic background knowledge. Then there is the background of the founder, namely there's the background of the creator with the help of re-creator trying to understand it and make it an expert system.

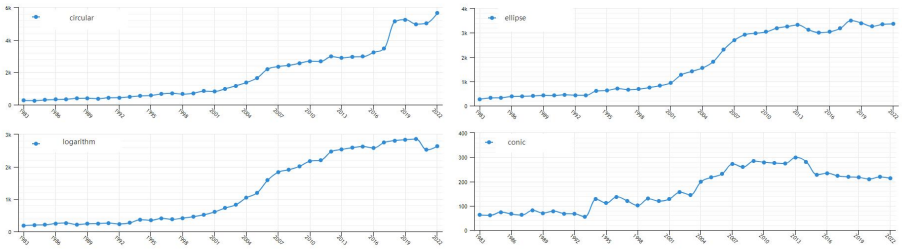


Fig. 2. Trend of the publication of circle, logarithm, ellipse and conic curve

It can be seen from Figure 2 that the academic and industrial attention to circles has increased significantly, ellipses are flat, conic curves even have a downward trend, and logarithms have increased significantly.The creative combination of circles and logarithms described in this paper is a new area of mathematical research. It deserves the attention of experts and is incorporated into the expert system for corresponding cognitive computing and system modeling.

3.2 Intermediate and Its Verifiable Results

The new mathematical category system of its corresponding mathematical objects and mathematical relations and its entire circular logarithmic function is expanded separately below. Next, briefly review the basic figures of the above three types of geometry, and feel the basic features, differences and connections of Riemannian geometry, Lobachevsky geometry and Euclidean geometry in mathematical objects.

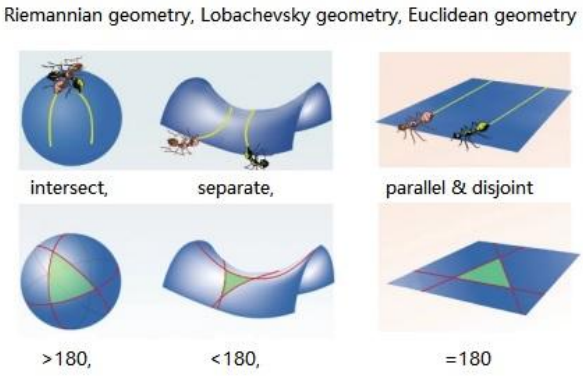


Fig. 3. Comparison of three kinds of geometry and its basic properties

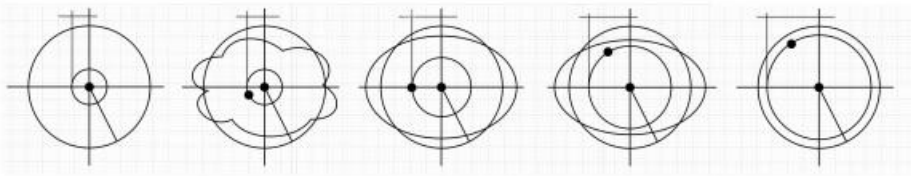
The Circular logarithmic function (perfect circular logarithmic function and elliptic logarithmic function). The circular logarithm is defined by Professor Yiping Wang using a mathematical notation such as $(1-\eta^2)^K$. where η refers to: the circular logarithmic factor, which represents the combined position (hence dimensionless) of the elements (potentials) . Since the circular logarithm $(1-\eta^2)^K$ is equivalent to Euler's natural logarithm e^x, the reader can completely relate the base $(1-\eta^2)$ of the circular logarithm to the base e of the natural logarithm for a pure-form understanding (formal understanding), therefore, the two variables K and x are located in the exponential position and then the logarithmic position here are also formally understandable. So, how to understand the combined positions of the elements (potentials) of the circular logarithm factor?

Table 2. Comparison list of Chinese and English expressions with symbolic forms.

ID	The symbolic form	English expression	Chinese expression
1	$(1-\eta)(1+\eta)$	The circular logarithm factor	圆对数因子
2	$(1-\eta^2)^K$	The circular logarithm	圆对数
0	$(1-\eta_0^2)^K$	Perfect circle starting point	正圆起点
1	$(1-\eta_1^2)^K$	Arbitrary curve logarithm	任意曲线对数
2	$(1-\eta_2^2)^K$	Eccentric ellipse logarithm	偏心椭圆对数
3	$(1-\eta_3^2)^K$	Center ellipse logarithm	中心椭圆对数
4	$(1-\eta_s^2)^K$	Perfect circular logarithm	正圆对数

Dynamic change and control of circular logarithm: reflect the dynamic relationship between any curve and a perfect circle. In the three elements of the polynomial, the circular logarithmic change is taken as an example.

Table 3. Dynamic change and control from any curve to a perfect circular logarithmic.

0	1	2	3	s
$(1-\eta_0^2)^K$	$(1-\eta_1^2)^K$	$(1-\eta_2^2)^K$	$(1-\eta_3^2)^K$	$(1-\eta_s^2)^K$
				

As can be seen from Table 2 and Table 3 with 5 pictures as the chart,the starting point of a perfect circle$(1-\eta_0^2)^K \rightarrow (1-\eta_1^2)^K$ arbitrary curve$\rightarrow (1-\eta_2^2)^K$ eccentric ellipse$\rightarrow (1-\eta_3^2)^K$ central ellipse$\rightarrow (1-\eta_s^2)^K$ a perfect circle

Logarithm of a perfect circle (Euclidean geometry).

(1) Logarithmic nonlinear factor of a perfect circle; (1 = perfect circle boundary)

$$(1-\eta^2)^K=[(1-\eta_0^2)^K+(1-\eta_1^2)^K+(1-\eta_2^2)^K+(1-\eta_3^2)^K+\ldots(1-\eta_s^2)^K]^K=1;$$

(3) Logarithmic linear factor of a perfect circle; (1 = perfect circle boundary)

$(\eta)^K=[(\eta_0)+(\eta_1)+(\eta_2)+(\eta_3)+\ldots(\eta_s)]^K=1$;

(2) Logarithmic angle factor of a perfect circle; (1=central angle of a perfect circle)

$(\eta_\theta)^K=[(\eta_\theta{}^0)+(\eta_\theta{}^1)+(\eta_\theta{}^2)+(\eta_\theta{}^3)+\ldots(\eta_\theta{}^s)]^K=1$;

When: θ_0 (central half angle) = $\pi/4$ (rectangular coordinates), $\pi/2$ (semi- circle coordinates), π (full circle coordinates), $(1/2)\,k\,n\,\pi$ Periodically rotate the coordinates. Satisfy the symmetry of the center half angle on both sides.

Elliptic logarithm (Riemannian geometry). .

Curve：$S=R^\theta=(1-\eta_{R\theta}{}^2)^K S_0=(1-\eta_R{}^2)^K R_0(1-\eta_\theta{}^2)^K\theta_0$;

Curved Surface：$S^2=R^{2\theta\Phi}=(1-\eta_{R\theta\Phi}{}^2)^K S_0{}^2=(1-\eta_R{}^2)^K R_0(1-\eta_{\theta\Phi}{}^2)^K\theta_0\Phi_0$

Circle log topology：$(1-\eta^2)^K=\{0\&[0\rightarrow(1/2)\rightarrow1]\&1\}^{K(Z)/t}$

3.3 Advanced and Its Verifiable Results

What is the circular logarithm?

Any finite S times in infinity (including calculus and pattern recognition) can be analyzed by one method. It is called group combination-circular logarithm-neural network equation: any complex function is simplified here, reflecting a famous Chinese saying: "The great road/Tao leads to simplicity".

$$W=(1-\eta^2)^K W_0{}^{K(Z)/t} \tag{1}$$

$$(1-\eta^2)^K=\{(\sqrt[KS]{D})/D_0\}^{K(Z)/t}=\{0\&[0\ldots(1/2)\ldots1]\&1\} \tag{2}$$

Table 4. the meaning or purpose of this string of symbols.

ID	Formula	What is the meaning or purpose of this string of symbols here below?	
1	$(1-\eta^2)^K$	perfect circle mode	Controllable circular logarithm
2	$\{0\&[0\ldots(1/2)\ldots1]\&1\}$	$\{0\&1\}$(real infinite) jump transition	*[0 to (1/2) to 1]* mode (potential infinity) continuous transition
3	$\{(\sqrt[KS]{D})/D_0\}^{K(Z)/t}$	$(\sqrt[KS]{D})$ multiplication function	D_0 continuous addition function
4	$W/W_0{}^{K(Z)/t}$	Unknown function (network node) W	Known function (network node) W_0
5	$[(1-\eta)(1+\eta)]^K$	$(1-\eta)$ the minor axis of the ellipse	$(1+\eta)$ the major axis of the ellipse

The power function is the superscript $K(Z)/t=K\{Z\pm[S\pm Q\pm M]\pm m\pm(N=0,1,2)\pm q\}/t$, reflecting area, hierarchy, calculus, dynamic control, combination form: functional properties $(K=+1,\pm1\pm0,-1)$; infinite arbitrary finite elements $(Z\pm S)$; area $[S\pm Q\pm M]$; dynamic mode $(N=0,1,2)$: 0 order: static; first order: momentum, velocity, linear combination, probability; second order: kinetic energy, force, acceleration, curved surface, binary combination, topology; $(\pm m)$ upper and lower bounds of element combination and circular logarithm Clock arithmetic calculation range, element $(q=0,1,2,3\ldots)$ combined form; $(/t)$ one-dimensional time and order synchronous change.What is the meaning or purpose of this string of symbols here above?

Why do circular logarithms have such powerful magical properties?

In the basic theory of mathematics, the axiomatic assumption of circular logarithm, "it is not necessary *1* to divide itself by itself " and the theorem, which become an independent and powerful infinite set of constructions. Establish the probability topology center zero symmetry expansion. The traditional infinite set is reformed into

a novel infinite structural set of "numerical-place value analysis integration", which satisfies the "characteristic modulus-circular logarithm-neural network and shared power function for controllable dynamic principle calculation". The traditional calculus is reformed into polynomial level dynamic control; the concept of "derivative, limit" and the calculus symbol as level power function control are abolished. It avoids the "difficulty in the description of complex analysis in asymmetric functions", and expands the concept of calculus single variable to multi-variable (group combination), which satisfies the analysis of specific real numbers closely combined with many macro-micro science and engineering.

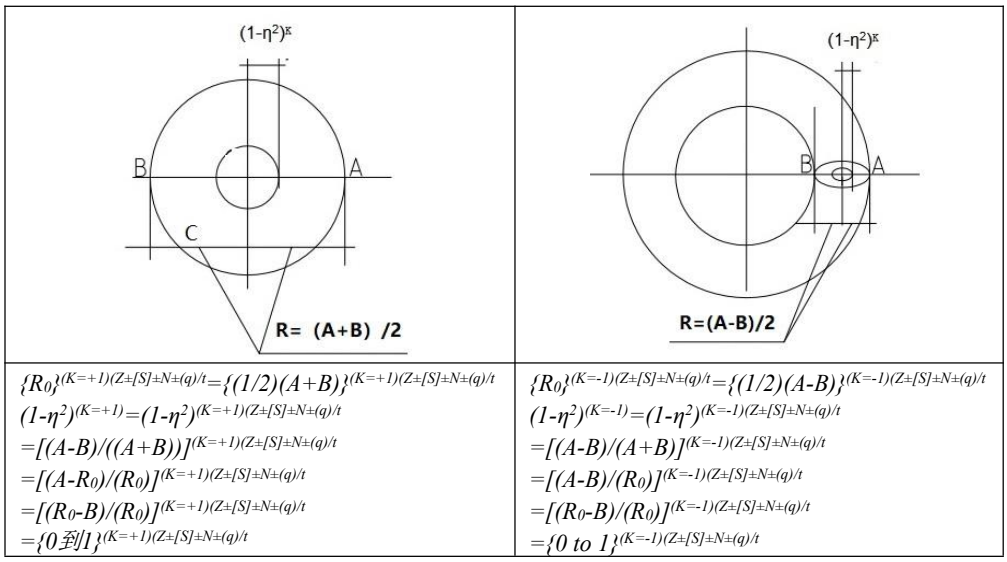
Reform the traditional pattern recognition interface/ellipse into a perfect circle mode; avoid the difficulty that the center angle function of the ellipse function is out of synchronization with the boundary curve, and enclose the ellipse function with a unitary perfect circle, and any function that satisfies can be converted into a perfect circle function. And the symmetrical transmission and conversion between the proposed asymmetric information transmission, realize the symmetrical transmission and expansion of synchronization, multi-azimuth, heterogeneity and multi-parameter.

In addition, a series of century-old mathematical problems are solved through the circular logarithm set, and it has become a powerful novel, complete, stable and safe infinite circular logarithm construction set. The "numerical" called eigenmode (multi-variable median and inverse mean function) (including multi-parameter, heterogeneity, multi-level, multi-dimension) and the "place value" "independent mathematical model, without specific element content" of the infinite program are established by the establishment of infinite construction sets, a controllable, stable group combination-circular logarithm-neural network, in the closed *{0 or [0 to (1/2) to 1] or 1}*, implementing the center of the place value. The relative symmetry expansion of the zero point, as well as the transition form of jumping and continuous, satisfy the logical cognition and analysis of zero-error arithmetic.

Specifically, mathematically, a multivariate element *{X}* of an arbitrary function (group combination), when the function of resolution *2* decomposes two asymmetric functions (group combination) $\{X_A\}\neq\{X_B\}$, is determined. From the perspective of circular logarithm, deal with them: two functions of asymmetry, through the center zero point circular logarithm, satisfy them as relative symmetry, namely $\{X_A\} = (1-\eta^2)\{X_0\}$ and $\{X_B\}=(1-\eta^2)\{X_0\}$, because the circular logarithm factor is the same, the "duality" of $\{\eta\}\rightarrow[\{XA\}$ *or* $\{\eta\}\rightarrow\{XB\}]$ is randomly generated by the same circular logarithm in the measurement, which is called covariance.

Group Combinations and Perfect Circle Patterns

The group combination is defined as the gap $(1-\eta^2)^K R_0=\underline{(OC)}$ between the multi-element asymmetric distribution set and the symmetrical distribution set, and this gap is called circular logarithm.



$\{R_0\}^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}=\{(1/2)(A+B)\}^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}$ $(1-\eta^2)^{(K=+1)}=(1-\eta^2)^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}$ $=[(A-B)/((A+B))]^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}$ $=[(A-R_0)/(R_0)]^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}$ $=[(R_0-B)/(R_0)]^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}$ $=\{0到1\}^{(K=+1)(Z\pm[S]\pm N\pm(q)/t}$	$\{R_0\}^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}=\{(1/2)(A-B)\}^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}$ $(1-\eta^2)^{(K=-1)}=(1-\eta^2)^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}$ $=[(A-B)/(A+B)]^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}$ $=[(A-B)/(R_0)]^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}$ $=[(R_0-B)/(R_0)]^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}$ $=\{0\ to\ 1\}^{(K=-1)(Z\pm[S]\pm N\pm(q)/t}$

Fig. 4. How to understand circular logarithms? Combined with geometric figures, the geometric meaning of the algebraic expression of the logarithm of the circle can be better understood. A sphere, body, and multiple objects *W* within circle. The algebraic difference of the ratio of *(OC)* to the radius R_0 of a circular plate (line, surface, body, multibody), called the logarithm of the circle.

Circular logarithm "addition theorem" :

The theorem of logarithmic addition of circles consists of: circular plane, spherical surface, convex function, neural network toroidal grid

Let: an asymmetric circular logarithm with a resolution of *2* for any function, and the group combinations are *A* and *B*, respectively. The circular logarithm converts asymmetry into a relative symmetry function.

Circular logarithm "subtraction theorem":

The circular logarithm subtraction theorem consists of: torus plane, curved surface (doughnut), concave function, neural network radial grid.

Circular logarithm "subtraction and addition" reciprocity theorem

$$\{R_0\}^{K(Z\pm[S]\pm N\pm(q)/t}=\{(1/2)(A\pm B)\}^{K(Z\pm[S]\pm N\pm(q)/t} \quad (3)$$

It shows the compatibility and reciprocity of the perfect circle and the ring.

3.4 Summary List

Please note that three is everything (Tao creates one, one creates two, two creates three, and three creates all). The ancient Greek Euclidean geometry and subsequent development have made the geometry and text description of the conic section clear. After the development of modern analytic geometry, the corresponding mathematical formulas and functional relation tables were extracted. Now we only need to formalize the distinction between numerical and positional calculations, by category.

Table 5. There are three forms of circular logarithms.

ID	Three types of circular logarithms + a summary expression
（1）	the logarithm of probability circle $(1-\eta^2)^K=\{(\underline{OC})/R_0\}^{KS}=\{\sum(x_i)/X\}^{KS}=\{1\}^{KS}$
（2）	the logarithm of the center zero point circle $(1-\eta^2)^K=\{(\underline{OC})/R_0\}^{KS}=\{\sum(x_i)/X\}^{KS}=\{0\}^{KS}$
（3）	the logarithm of the topological circle $(1-\eta^2)^K=\{(\underline{OC})/R_0\}^{KS}=\{\sum(x_i)/X\}^{KS}=\{0->1\}^{KS}$
（4）	the relationship between the logarithm of the circle and the eigenmode is written as a general formula $W=(1-\eta^2)^{KS}W_0$

In the formula: W, W_0 represent unknown and known events, $(1-\eta^2)^{KS}$ circular logarithm, which represents the difference between unevenly distributed weights or arbitrary functions W and uniformly distributed state W_0, which has a quadratic relationship (distance). K forward and reverse rotation represents properties $(K=+1,\pm0\pm1,-1)$, (S) dimension, number.

The logarithm of the circle introduced in this paper is the extreme value framed by a series of concentric circles with 1/2 as the center point in the universe of {0,...,1/2,...,1} as the base the idea of constructing a number of infinite structural sets within the scope of the circle is developed. Among them, the geometry of a perfect circle is Euclidean geometry, the ellipse geometry inscribed inside and outside the circle (according to the major and minor axes of the ellipse as extreme values) is Riemannian geometry, and the hyperbolic geometry is Lobachevsky geometry, thus, not only the geometric objects of mathematics are determined, but also the function relationship of the circle function and the logarithm of the circle is determined, which further clarifies the mathematical category discussed in this paper (such as a number of infinite structures within the range of extremum circles framed by a series of concentric circles, with infinite constructing set). Such geometric algebra's discussion of infinite construction sets in a specific domain involves almost all mathematical categories. This is unexpected and reasonable.

4 Conclusion

The significance of this is that the popularization of research results across the border in this way clearly distinguishes the three efficient basic knowledge of the advanced science popularization form of expert knowledge expression, the primary popular science popularization form of public common sense, and AI cognitive computing and system analysis of human-computer interaction. Knowing the way has the same effect. It also lies in: understand the characteristics of international frontier academic research, either to prove that this road is promising, or to falsify this road is not feasible, or to find another way, or to change the strategy, or...; distinguish between expert knowledge expression simplify, popularize, and standardize with

human-computer interaction which belongs to three types of cognitive computing and systems; for the circular logarithmic mathematics expert team, the follow-up work has at least several aspects: theoretical comparative research on the basis of mathematics at home and abroad, and no less than ten top-level circular logarithm discovered and revealed by the original author who said that the comparative analysis of ideas for solving mathematical problems, regardless of success or failure, that can be used as a good teaching material for interdisciplinary thinking training, especially for the design of AI cognitive computing and systems, especially super expert systems.

The previous discussions on the geometry, algebra, analysis, topology and category of perfect circles and ellipses in mathematics are the basis for this paper to further explore the logarithmic function of circles. Among them, Mathematical Thought from Ancient to Modern Times gives us a relatively comprehensive and efficient reference for review, comparison and systematic thinking.

Circular logarithms solve a series of century-old math problems

At present, there are a large number of mathematical problems left in the mathematics community. These problems restrict each other, involve each other, depend on each other, and coexist with each other, and it is difficult to solve them one by one. These century-old mathematical problems have one thing in common: they all contain the reciprocal theorems of "multiplication and addition, multiplication and division, subtraction and addition" of subterms of infinite program polynomials; in particular, the breakthrough solution of "multiplication and addition reciprocity" occupies As a key position, the infinite set is decomposed into "numerical eigenmodes (mean function of the inverse power function in the middle)" and "position value circular logarithm (irrelevant to the mathematical model, no specific element content)", in the controllable {0 or [0 to (1/2) to 1] or 1} zero error logical arithmetic calculation. Almost any function can be cracked with circular logarithms, thus unifying the algebraic-geometric-group combinatorial-arithmetic description into a single formula.

Our suggestion is that: Divide "a series of century-old mathematical problems" into two parts. On the one hand, there are clear solutions in the international mathematics community - right or wrong - all can be re-examined from the perspective of circular logarithm; on the other hand, there is still no answer or solution in the international mathematical community - list it out separately - can also use the method of circular logarithm to give our own exploratory solution - we do not comment on whether it is true or not, let the international and domestic mathematicians and interdisciplinary experts who are really willing to think independently verify it. If we adopt this attitude, and every step of the argument is well-founded, not only rigorous reasoning and calculation, but also corresponding comparative analysis, citing scriptures.That is the social cognition,with the cognitive computing of human-computer interaction, and the two aspects belong to two cognitive systems. This paper emphasizes two aspects of AI cognitive computing system combined with expert knowledge ontology.

Its significance lies in understand the characteristics of frontier academic research, either to prove that this road is promising, or to falsify this road is not feasible, or to find another way, or...; distinguish between expert knowledge expression simplify, popularize, and standardize with human-computer interaction which belongs to three

types of cognitive computing and systems; for the circular logarithmic mathematics expert team, the follow-up work has at least several aspects: theoretical comparative research on the basis of mathematics at home and abroad, and no less than ten top-level circular logarithm discovered and revealed by the original author who said that the comparative analysis of ideas for solving mathematical problems, regardless of success or failure, that can be used as a good teaching material for interdisciplinary thinking training, especially for the design of AI cognitive computing and systems, especially super expert systems.

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