2 Peter 3:8 - Dominus videt in die, ut a mille annis, mille anni sicut dies.

Tua sublimitas tua asset, et minimum distantia nobis est curva sed recta linea.

HyperSpacetime: Complex Algebro-Geometric Analysis of Intelligence Quantum Entanglement Convergent Evolution

(Dated: 1 April 2020)

Nature is structural instead of random, correlation is just approximation of causality, and data is not science: the more we reveal the more we revere nature on our voyage of unprecedented discovery. We argue that the soul(s) or exotic soul(s) of quotient Hypercomplex arbifold multiscale Spacetime (HyperSpacetime)'s corresponding manifold(s)/general (quotient or non-quotient) HyperSpacetime is the origin of super/general intelligence, and the metric of super/general intelligence is the complexity of quotient/general HyperSpacetime's corresponding generic polynomial. We also argue that the intersecting soul(s) and/or exotic soul(s) of quotient HyperSpacetime's corresponding manifold(s), when their maximal/minimum sectional curvatures approaching positive infinity and/or negative infinity as singularities, is the origin of quantum entanglement. We further argue that the maximal/minimum sectional curvatures of the same intersecting soul(s) and/or exotic soul(s), is the origin of convergent evolution through conformal transformation. We derive even N-dimensional HyperSpacetime, a M-open ($M = C^{I}_{I+N}$, $I, N, M \to \infty$) arbifold as generalized orbifold with the structure of a algebraic variety A, without or with loop group action as $A = [\mathcal{M}/\mathcal{LG}]$ ($\mathcal{M}$ as complex manifold, $\mathcal{LG}$ as loop group), it arises from I-degree (power of 2) hypercomplex even N-degree generic polynomial continuous/discrete function/functor as nonlinear action functional in hypercomplex $\mathbb{HC}^{\infty}$ useful for generic neural networks: $\mathcal{F}(S_j, T_j) = \prod_{n=1}^{N} \sum_{n=1}^{N} (w_n Sn(T_n) + b_n + \gamma w_n \mathcal{F}(S_{j-1}, T_{j-1}))$ where $j = 1, \ldots, N$, $S_i = S_0 e_0 + \sum_{i=1}^{I-1} s_i e_i$ $T_i = T_0 e_0 + \sum_{i=1}^{I-1} t_i e_i$ over (in the worst case as noncommutative nonassociative) loop group. Its sectional curvature is $\kappa = \frac{|\mathcal{F}''(X)|}{(1+[\mathcal{F}'(X)]^2)^{\frac{3}{2}}}$ if $\mathcal{F}(X)$ is smooth, or $\kappa = \kappa_{max}\kappa_{min}$ if nonsmooth, by correlating general relativity with quantum mechanics via extension from 3+1 dimensional spacetime $\mathbb{R}^4$ to even N-dimensional HyperSpacetime $\mathbb{HC}^{\infty}$. By directly addressing multiscale, singularities, statefulness, nonlinearity instead of via activation function and backpropagation. HyperSpacetime with its corresponding generic polynomial determining the complexity of ANN, rigorously models curvature-based 2^{nd} order optimization in arbifold-equivalent neural networks beyond gradient-based 1^{st} order optimization in manifold-approximated adopted in AI. We establish HyperSpacetime generic equivalence theory by synthesizing Generalized Poincaré conjecture, soul theorem, Galois theory, Fermat's last theorem, Riemann hypothesis, Hodge conjecture, Euler's theorem, Euclid theorem and universal approximation theorem. We compare the intelligence of existing deep complex and hypercomplex networks based on our theory. Our theory qualitatively and quantitatively tackles the black box puzzle in AI, quantum entanglement and convergent evolution.

Keywords: Multiscale, Arbifold, Hypercomplex, Spacetime, Relativity, Quantum mechanics, Evolution, Deep reinforcement learning, Complex analysis, Noncommutative, Nonassociative, Algebraic geometry, Geometric algebra, Singularity, Standard model, Wormhole, Exotic matter, Number theory, Orbifold, Manifold, Tensor, Gradient, Sectional curvature, Polynomial, Loop group, Variety, Functor, Poincaré conjecture, Soul theorem, Universal approximation, Riemann hypothesis, Hodge conjecture, Galois theory, Fermat's theorem, Eulers theorem, Euclid theorem