

General Specification for Simulating Universe

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Background: By identifying the universal attributes of basic attributes in an universe, scientific proposition of creating simulated universe could be derived.

Methods: By extending the Monty Hall Problem derived from the result of P vs NP Problem and Game Theory to the understanding of a single observation, the continuum of total observation events creates a distribution of probability which could be translated into distribution of possibility. And using from what has been defined in this universe, methods of utilizing simulation of reality could be described.

Results: Technical specification for creating axiomatic universe in existing universe could be described.

Conclusions: In generalized terms, simulated universe could exist with a customized reality.

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1 Introduction

How can we simulate a physical universe? Firstly, what is a physical reality? In a state-of-the-art physics, it's mainly about observations and interactions. So to speak, how observation affects among reality is a critical question in an entire physical simulation. And among the understandings, observations aggregate and constitute more than the total meaning of observations themselves before. These constitute the values of interactions.

Saying of interactions, Game Theory is about making interactive decisions in rational situations. And by that approach, it can be said that the premises of game theory can be expanded for broader application of observation.[1] It is well-known that every interaction in physics corresponds to each observation. And how observation correlates with an interaction would be explained in paper.

There has been a long-time belief among scientist that symmetry and its violation of CPT consists one of the basic rules in this universe.[2] And with observing (and consequently, interacting with) universe, possibilities of reality that could results in asymmetry in symmetric universe derived. And in a sense that universe could be in expressed of logical constituents, it could be understood as an expression of automata. So, by clarifying asymmetrical approach that could be placed in automata, the utilization its attribute could derived. And as a consequent, I would introduce a way of actualizing simulation.

2 Understanding of Interactions and Systems

2.1 Interactions

Monty Hall Problem is a problem based on a conditional probability. The problem goes like this:

The game player participated in a game which is about selecting one door among three doors and gets the prize behind the door. One door has a car behind the door and the others have a goat behind the doors. For example, if the player select the first door, the game show host(who knows where the car is) opens the third door and shows that a goat is behind the door, asking to the player whether to change the selection to the second door. What choice the player makes is a best choice?

There is an discussion between the probability of the choice. Assuming conditional probability, the answer is to change the choice is better by probability of $2/3$. And by simulation it forms a Gaussian distribution by Central Limit Theorem.

In a mean of observing reality[1], every interaction takes form of decision. And about reality, Monty Hall Problem could be corresponded to an example of every interaction[3].

2.2 Open and Closed Systems

To conserve the energy for what transaction offsets, physical energies between systems expand or condense.

Normally, there can be open and closed states of systems in terms of interaction. Exceptionally, if there can be isolated system, in period t mean that there can't any observation across observers except related to the system in period t .

There can be two conditions for energy to give a volume in regional geometry.

- By energy itself shaping regional geometry
- By regional geometry shaping the form of energy

There are two ways of energy itself shaping geometry.

- By transferring the energy to the other in regional geometry
- By receiving the energy to the other in regional geometry

These changes in regions in period t mean that there can be direct interactions between the systems in period t . So, by definition, any direct interactions involve in isolated system cannot be sustained. And the condition whether an interaction could be placed or not forms like this:

$$Isolated(t, AO_x, AO_y) = \begin{cases} 0 & \text{if } AO_x, AO_y \text{ in between isolation} \\ \infty & \text{if } \neg(AO_x, AO_y \text{ in between isolation}) \end{cases}$$

And by applying it to the energy existence condition, the equation would be formed like this:

$$\arg \max_t ((TEO_{AO,E} - CR_t + SR_t) \cdot (\sum_n^{N(\forall AO)} \sum_m^{N(\forall AO)} Isolated(t, AO_n, AO_m))) \approx 0 \Rightarrow \exists F$$

3 Understanding of Symmetry

From the understanding of observation, equation could be derived like this:

$$\begin{aligned} TEO_{AO,E} &= \sum_n^{N(AO)} LFO(AO, OG_n, F) \cdot TEO_{AO,E} \cdot POD_{AO,OG_n} \\ &\quad \cdot (1 - OE(E))(1 - ME(E))(1 - PE(E)) \\ Optimal \ t_{wanted}^* &= \arg \max_t TEO_{AO,E} \\ Optimal \ t_{actual}^* &= \arg \max_t (TEO_{AO,E} - CR_t + SR_t) \\ &\quad (CR_t \geq 0, SR_t \geq 0) \\ \exists E &\Leftrightarrow Optimal \ t_{actual}^* = \arg \max_t (TEO_{AO,E} - CR_t + SR_t) \approx 0 \end{aligned}$$

3.1 C Symmetry and its Violation

Assuming an interaction, behavior of concealing reality turns out to be a fallacy for the other side of an interaction. But in total, reality itself finds compensation for the fallacy. So an equation goes like this:

$$\begin{aligned} \sum_m^{\forall \exists t} CR_m &= \sum_m^{\forall \exists t} \sum_n^{N(AO_{\forall \exists m})} LFO(AO, OG_n, F) \cdot TEO_{AO,E} \cdot POD_{AO,OG_n} \cdot OE(E) \cdot ME(E) \cdot PE(E) \\ &\approx \sum_m^{\forall \exists t} SR_m \end{aligned}$$

Note that in concealment of reality, intersection (not union) of errors is addressed in equation. It's because concealment of reality is a result of an interaction. Intuitively, if some partial interaction goes underestimated, others go overestimated in order to conserve total energy interaction. And it causes overall distribution distorted. So it needs these three errors to be occur simultaneously in order to conceal reality.

3.2 P Symmetry and its Violation

Assuming there is a change in the concealing reality for a certain amount, then the amount distributes to the total equation like this:

$$\begin{aligned} \sum_m^{\forall \exists t} CR_m &= \sum_m^{\forall \exists t} \sum_n^{N(AO_{\forall \exists m})} LFO(AO, OG_n, F) \\ &\cdot TEO_{AO,E} \cdot POD_{AO,OG_n} \cdot (OE(E) + \alpha)(ME(E) + \beta)(PE(E) + \gamma) \\ &\approx \sum_m^{\forall \exists t} SR_m \\ &(0 \leq \alpha \leq (1 - OE(E)), 0 \leq \beta \leq (1 - ME(E)), 0 \leq \gamma \leq (1 - PE(E))) \end{aligned}$$

3.3 T Symmetry and its Violation

From the T symmetry attribute and its violation, equation could be derived like this:

$$\sum_m^{\forall \exists t} (CR_m - SR_m) \approx 0$$

3.4 Emergence of Dimensions and Self-Similarity

In mathematics, Hausdorff dimension is a measurement for reality that creates complexity by the target itself.

By preceding discussion, physical symmetry result in a self-similarity, so-called fractals could be drawn with assuming Hausdorff dimensionality D like this:

$$\begin{aligned} &Period\ S \neq Period\ N \\ (\forall (State) \in Energy\ E) \models D(N, S) &= \frac{\log(TEO_N - CR_N + SR_N)}{\log(TEO_S - CR_S + SR_S)} \end{aligned}$$

Keeping symmetry results in no change of dimensionality in self-similarity. But, by asymmetrical premises of the universe, initial dimensionality takes a form like this:

$$0 < D_0 \leq 3 \ (D \in \mathbb{R})$$

Note two considerations. One is that asymmetry is inevitable, the dimensionality must be larger than 0 in Hausdorff dimensionality measurement. Secondly, this dimensionality does not give the axiomatic existence of 3D space. Rather, what recognized as 3D space could be conceived of sets of frame that could be expressed specific space dimensionality less or equal than 3.

$$\{O \mid \forall (Observation\ O)\} = \bigcup_r^{\forall \mathbb{R}} \{O \mid Observation\ O\ in\ Dimensionality\ d = r\ (r \in D)\}$$

If observation in Hausdorff dimension takes a consistent form in some observations, a fractal is devised by definition. So the rule of uniqueness of existence in observation can be derived.

4 Understanding of Interaction

So the symmetry and asymmetry become the premise of an interaction. There are basic four forces in a nature. And by continued observation to the target of interaction, each force is derived. These four forces is about keeping symmetry and self-similarity.

1. Distribution and conservation of symmetry - Weak, Strong force
2. Convergence, divergence of similarity - Gravity, Electromagnetic force

4.1 Understanding of Distribution and conservation of symmetry

So distribution and conservation of symmetry happens in time and space. By expanding the result of symmetries and their violations, it can be derived that Total Energy Observation *TEO* itself is limited to the field(or system) but not its local coordinate. And Searching for Reality *SR* and Concealment of Reality *CR* should be limited to the finite observations themselves.

Therefore the observation in time and space in distance r in space in period t takes form like this:

$$\sum_m^{\forall \exists t} \left(\frac{CR_m}{r} - SR_m \cdot r \right) \approx 0$$

$$\sum_m^{\forall \exists t} \left(\frac{SR_m}{r} - CR_m \cdot r \right) \approx 0$$

According to the lattice gauge theory, confinement energy potential takes a form of this[4]:

$$(With \text{ using notation from citation}) \models V(r) = -\frac{\alpha_s}{r} + \beta r$$

In the sense that preceding equation and this confinement potential makes compatibility, deductive approach for explaining reality of energy potential well could be induced. This brightens a solution for one of the problems in the physics - Yang-Mill's Mass Gap Problem[5].

4.1.1 Distribution of symmetry

In reality, distribution by conserving symmetry occurs. In physics, this force is called as a weak force. It happens because concealment of reality takes in form of more concentrated field than searching for reality.

$$\begin{aligned} & \text{In observation period } t, \\ & \forall \left(\sum_n^{\exists t} CR_n > \sum_m^{\exists t} SR_m \right) \exists t \models \sum E_{Weak} \leq \sum_n^{\forall t} CR_n - \sum_m^{\forall t} SR_m \end{aligned}$$

4.1.2 Conservation of symmetry

In reality, conservation by distributing symmetry occurs. In physics, this force is called as a strong force. It happens because searching for reality takes in form of more concentrated field than concealment of reality.

$$\begin{aligned} & \text{In observation period } t, \\ & \forall \left(\sum_n^{\exists t} SR_n > \sum_m^{\exists t} CR_m \right) \exists t \models \sum E_{Strong} \leq \sum_n^{\forall t} SR_n - \sum_m^{\forall t} CR_m \end{aligned}$$

4.1.3 Bound limit for Strong and Weak force

Normally, concealment of reality doesn't take limit except lower bound greater or equal than 0. It's because distorted observation doesn't have limit of itself. And correction by searching for reality usually have a lower bound of greater or equal 0 and an upper bound of Total Energy Observed TEO .

So, each bound limit for strong and weak force can be described as like this:

$$\begin{aligned} 0 &\leq \left| \sum E_{Weak} \right| \\ 0 &\leq \left| \sum E_{Strong} \right| \leq TEO \end{aligned}$$

It may seem weak force can be ultimately limitless force, but it's just a boundary limit that equation shows. Generalized limit that regulates strong force and weak force is already addressed at the first when finding period t for minimizing error for observation.

4.2 Understanding of Convergence and divergence of similarity

Similarity could be set by clarifying difference in observation.

So, how could observation can be converged so that the differences could be clarified? By preceding discussion in dimensionality, if the dimensionality converges, observation could be set as converged. So, decision of convergence in dimensionality takes form like this:

$$\begin{aligned} \text{With period } k, D_k &= \lim_{\epsilon \rightarrow 0} \frac{\log TEO_k}{\log TEO_{k-\epsilon}} \\ \left(\lim_{x \rightarrow \infty} D_x \neq \infty \text{ and } \lim_{x \rightarrow \infty} D_x \neq -\infty \right) &\Leftrightarrow \exists D_x \end{aligned}$$

From upper discussion, it can be concluded that adjusting concealment of reality and searching for reality causes converging or diverging of energy.

Assuming period ϵ ,

$$0 < D_0 \leq 3 \quad (D \in \mathbb{R}) \Rightarrow Ind \quad \forall D \in \{0, 1, 2, 3\}$$

$$s.t. \quad 0 < \lim_{\epsilon \rightarrow 0} \frac{\log(TEO_\epsilon - CR_\epsilon + SR_\epsilon)}{\log(TEO_0 - CR_0 + SR_0)} < 3$$

By its definition, $TEO_\epsilon = TEO_0$

$$1 < \lim_{\epsilon \rightarrow 0} \frac{\log(TEO - CR_\epsilon + SR_\epsilon)}{\log TEO} \leq 3 \Rightarrow \lim_{\epsilon \rightarrow 0} \left(0 < 1 - \frac{CR_\epsilon - SR_\epsilon}{TEO} \leq TEO^2 \right)$$

$$\text{By using premise of maximizing observation, } -1 \leq \frac{SR_t - CR_t}{TEO^3} < \frac{1}{TEO^2}$$

And the potential of gravity and electromagnetic in each field can be derived. Note that by the $CR_t > SR_t$, it ensembles as Coulomb's force law. But by the opposite situation of $CR_t < SR_t$, it follows the form of gravity.

4.2.1 Convergence of similarity

In reality, convergence happens while others diverging. It's generally about gravity force. By generalizing and adding constants to the asymmetrical result, equation in gravitational potential could be described like this:

$$\Phi = -\frac{GM}{r}$$

4.2.2 Divergence of similarity

In reality, divergence happens while others converging. It's generally about electromagnetic force. According to Coulomb's force law, electric field force F takes a form of this:

$$F = k_e \frac{q_1 q_2}{r^2}$$

As for opposite of gravity, but as for it follows a equal form of gravity, it can be also said that it's potential can be derived from the preceding discussion.

4.3 Understanding of Subatomic existence

So an energy is expressed in an unit of atom. But how could this conversion can be conducted? Firstly, let's assume that every energy is a mixture of upper four powers. And reversely, upper four energy conducts from a single source of energy. It's because basic asymmetric attributes of this universe. if one field of energy turns into power, the violated symmetry ultimately finds a match for itself. Even if it's not for the symmetry or convergence themselves, the basic Total Energy Observed equation assumes fluctuation by their attributes of conserving symmetry.

If assuming distance in space r and symmetry, trigonometry can be introduced.

$$\begin{aligned} \sin \theta \sum \frac{CR_n}{r} - \cos \left(\theta - \frac{\pi}{2} \right) \sum SR_m \cdot r &\approx 0 \\ \sin \theta \sum \frac{SR_n}{r} - \cos \left(\theta - \frac{\pi}{2} \right) \sum CR_m \cdot r &\approx 0 \end{aligned}$$

And by the mean of keeping symmetry,

$$1 = \frac{\sum CR_n}{\sum SR_n} \approx \frac{r^2 \cos \left(\theta - \frac{\pi}{2} \right)}{\sin \theta} \approx \frac{\sin \theta}{r^2 \cos \left(\theta - \frac{\pi}{2} \right)} \Rightarrow r = 1 \text{ or } i \text{ (s.t. } r \in \mathbb{C})$$

Normally θ refers to as color charge of what used to be called "quark" in strong force, and to as flavor charge of what used to be called "fermion" in weak force. In electromagnetic force, it becomes an electric charge. In gravity, it should be related with a "graviton". Consequently, it can be compared as a shooting angle from scene to scene in reality.

$$\begin{aligned} e^{i\pi} - 1 &= 0 \\ e^{i\pi} &= i \sin \theta + \cos \theta = 1 \\ &\Rightarrow Ei \sin \theta + E \cos \theta - E = \sum SR - \sum CR = 0 \\ -E \sin \theta + Ei \cos \theta - Ei &= 0 \Rightarrow E(i - 1) \sin \theta + E(i + 1) \cos \theta - E(i - 1) = 0 \\ &\Rightarrow -Ei \cos \theta + E \sin \theta + E = \sum SR - \sum CR = 0 \end{aligned}$$

So, by its basic mean, equation similar to Dirac equation by natural unit can be derived. Also, this suggest an existence of antimatter.

$$\begin{aligned} \text{Note that, Dirac equation(in Feynman notation)} &\Leftrightarrow (-i\partial + m)\psi = 0 \\ (\text{Max asymmetry}) &\Rightarrow (-i\partial \leq Ei \sin \theta \leq i\partial) \Rightarrow (|E - m| \leq \cos \theta) \end{aligned}$$

4.4 Understanding of Phase transformation between Energy and Matter

It comes from the discussion of photoelectric effect. But in now in 21st century, dimensionality of the space in this universe turned out to have more than it showed in early 20th century.

Rising notion of fractals has made scientist question the mechanism the way it forms a shape in this universe by recurring similarity. But one thing is to be clear that addressing the Hausdorff dimensionality in a way of explaining phase transition between energy and matter must be handled by.

So, if the way explaining a matter and energy is about dimensionality, do chemicals follow the phase transition by the dimensionality also? Even only with a minimal intuition, the answer seems precisely and easily true. This universe shows ice snowflake and other many beautiful chemical offsprings to be in a order of repeated similarity.

But answer to the question of how does this can be originated must be handled by at most scientific approach.

Observable fractals in reality always converge to a single shape. In physics, what has to be known as converging into a single shape is called as a matter. Oppositely, what has to be known as diverging into a space is called as a energy.

This approach is familiar in an art of chemistry. But expanding its chirality view to the physics with quarks, operator issue first came in considerations. And with preceding discussions, which expands its operator issue to the fractal cardinality of a real number $\mathbb{R}$, approach comes to be in a match.

Generally speaking, if every chain of logical expression could be in a form of fractal, then an automata universe could be explained in fractal. As for intuitive sense, expanding what has been discussed in P vs NP Problem continues by like this:

$$\begin{aligned}
& \text{Assuming Hausdorff dimensionality as } \dim, \text{ in Category } \forall C, \\
& \text{if } \exists(\cdot) = TRUE \Rightarrow NAND(\cdot) = NAND(TRUE) = FALSE \\
& \text{if } \exists(\cdot) = FALSE \Rightarrow NAND(\cdot) = NAND(FALSE) = TRUE \\
& \text{Assuming } \dim(NAND(\cdot) = \cdot) = \log 2 / \log 2 = 1, \\
& \dim(NAND(\cdot, \cdot) = \cdot) = \frac{\log 2^2}{\log 2} = 2 \\
& \dim(NAND(\cdot, \cdot, \cdot) = \cdot) = \frac{\log 2^3}{\log 2} = 3 \\
& \dim(NAND(NAND(\cdot, \cdot), \cdot) = \cdot) = \frac{\log \left(2 \cdot \left(\frac{\log 2^2}{\log 2} \right) \right)}{\log 2} = 2 \\
& \dim(NAND(NAND(\cdot, \cdot), NAND(\cdot, \cdot, \cdot)) = \cdot) = \frac{\log \left(\left(\frac{\log 2^3}{\log 2} \right) \cdot \left(\frac{\log 2^2}{\log 2} \right) \right)}{\log 2} \\
& = \log_2 6 \approx 2.5849625007
\end{aligned}$$

Note that, by analytic extension, complex value for dimensionality could be produced.

4.5 Understanding of Entanglement

This relation can be expressed like this:

$$\begin{aligned}
& \text{Assuming interaction by two asymmetric relations } \theta_\alpha, \theta_\beta \\
& \theta_\alpha + \theta_\beta = \pi \models \left(\frac{\sin \theta_\alpha + \sin \theta_\beta}{2} \right) \sum \frac{CR_n}{r} - \left(\frac{\cos(\theta_\alpha - \frac{\pi}{2}) + \cos(\theta_\beta - \frac{\pi}{2})}{2} \right) \sum SR_m \cdot r \approx 0 \\
& \left(\frac{\sin \theta_\alpha + \sin \theta_\beta}{2} \right) \sum \frac{SR_n}{r} - \left(\frac{\cos(\theta_\alpha - \frac{\pi}{2}) + \cos(\theta_\beta - \frac{\pi}{2})}{2} \right) \sum CR_m \cdot r \approx 0
\end{aligned}$$

So driven by this, if only sum of an angle that a force takes can be conserved, it's natural to say that splitting energy into different kind of forces is anyway available. Even more, if expanding a value of $\sin \theta \in \mathbb{C}$, whole new distinguished system space could be derived. This makes an entanglement between related form of energy or matter.

4.6 Understanding of Diffusion

Continuing preceding discussion, Understanding of Ideal Gas Law $PV = nRT$ in each cartesian can be drawn. Ideal Gas Law $PV = nRT$ has an original notation of Pressure P , Volume V , mol number n , gas constant R , Absolute temperature T . In a view of energy, product of n and R corresponds to mass. So, Ideal Gas Law implies pressure and volume correlates with multiplication of temperature and mass. This would create volume of energy in any given temperature in simulated universe.

5 Creating axiomatic universe

So how can the preceding discussions construct a form of automata? Automata can be defined as a continuous problem solving derived from each given initial value. Given by that an automata universe's problem would be given like this:

What would the most likely each state be turn out when specific configured interactions by observations are given at a state before?

So an automata universe is an automata which solves a problem of deciding a state followed by each state before until it is halted. So, what is a core attributes of axiomatic universe?

- Customizable operating system(automata)
 - Time definition of start and end
 - Complete system control by rule definition
- Customizable field system
 - The number of fields
 - Rules for constant and variable field
- Customizable interaction system
 - The number of interactions
 - Rules for constant and variable interaction
- Customizable interface system(observations)
 - Limit of observations
 - Limit and control of fallacies
 - Access control for complex dimensions

There can be two options that can be considered in creation of axiomatic universe. One is to simulate it in cyberspace. And the other is to realize it in part of this universe. Of course, there can be hybrid approach. It is matter of technical difficulties but already sufficiently possible as for in science already.

As discussed above, asymmetry happens with a priority of dimensionality. When asymmetry happens, the probability of matching the other side of asymmetry prioritize for achieving integer charge. But, as experimental physics revealed, there is always a small amount of perturbation between measurement and reality. And between that gap another possibility of asymmetry drills in.

With this assumption, a quark combination can be reorganized if environmental options for asymmetry can be controlled. And for the possibility for the new particle which would fill in this new universe could be infinite.

Even more, if the fallacies could be controlled with limited observation, what could be told as only possible in imaginations like teleport and mind reading would be actualized within a context of conceiving perturbation.

And as for a dimensionality, if the calculated dimensionality of the energy in space diverges to $-\infty$ or ∞ , the system should automatically correct the space to non-dimensional output(e.g. black hole). So, operating system for calculating and controlling dimensionality must be sturdy.

So, for the specification for creating axiomatic universe, it would be needed:

- Asymmetry measurement device: Interface system
- Asymmetry sustaining device: Field and Interaction system
- Energy-matter dimension convergence device: Operating system

So, how can an asymmetry be achieved? There can be four ways of actualizing this.

- Make distribution among asymmetry
- Make conservation among asymmetry

- Make convergence among similarity
- Make divergence among similarity

Firstly, about making distribution among symmetry, normally it is about weak force. By far, state-of-art experimental physics revealed that not only strong force is derived but electromagnetic force also turned out to be in an asymmetrical transformation in weak force. And in general, gravitational force should be in consideration also. Intuitively, what has been known X-rays are the most apparent evidence for this phenomenon. This relation is derived from an expression in a preceding discussion:

$$\begin{aligned}
& \text{Assuming interaction by two asymmetric relations } \theta_\alpha, \theta_\beta \\
& \theta_\alpha + \theta_\beta = \pi \models \left(\frac{\sin \theta_\alpha + \sin \theta_\beta}{2} \right) \sum \frac{CR_n}{r} - \left(\frac{\cos(\theta_\alpha - \frac{\pi}{2}) + \cos(\theta_\beta - \frac{\pi}{2})}{2} \right) \sum SR_m \cdot r \approx 0 \\
& \left(\frac{\sin \theta_\alpha + \sin \theta_\beta}{2} \right) \sum \frac{SR_n}{r} - \left(\frac{\cos(\theta_\alpha - \frac{\pi}{2}) + \cos(\theta_\beta - \frac{\pi}{2})}{2} \right) \sum CR_m \cdot r \approx 0 \\
& \text{Note that, Dirac equation(in Feynman notation)} \Leftrightarrow (-i\partial + m)\psi = 0 \\
& (\text{Max asymmetry}) \Rightarrow \left(-i\partial \leq Ei \left(\frac{\sin \theta_\alpha + \sin \theta_\beta}{2} \right) \leq i\partial \right) \\
& \Rightarrow \left(|E - m| \leq \left(\frac{\cos \theta_\alpha + \cos \theta_\beta}{2} \right) \right)
\end{aligned}$$

Generally for now as experimental physics, phase split can be actualized by particle acclerator, (especially, polariscopic device). And beyond, it's perturbation attributes could be in control. This perturbation control can be obtained by dimensional operator expansion. If value of separated $\sin \theta$ could be corrected by each other, perturbation itself can be offset by their additional operator term(e.g. imaginary number i or quaternion). And by meaning of making perturbation, vice versa. Lagrangian method could be applied in their relations.

Secondly, about making conservation among symmetry, it's possible to expand its view as an infinite series of force angles. That is, not only a single force gives direction to their symmetric conversion, but the angle it self creates a dimensional possibility.

Thirdly, about making convergence in similarity, what is known as isomorphic function can be considered. Further from preceding discussion, what is in isomorphic relation could be set in a form in like this:

$$\begin{aligned}
& \text{Assuming } \dim(NAND(\cdot) = \cdot) = \log 2 / \log 2 = 1, \\
& \dim(NAND(\cdot, \cdot) = \cdot) = \frac{\log 2^2}{\log 2} = 2 \\
& \dim(NAND(\cdot, \cdot, \cdot) = \cdot) = \frac{\log 2^3}{\log 2} = 3 \\
& \dim(NAND(NAND(\cdot, \cdot), \cdot) = \cdot) = \frac{\log \left(2 \cdot \left(\frac{\log 2^2}{\log 2} \right) \right)}{\log 2} = 2 \\
& \dim(NAND(NAND(\cdot, \cdot), NAND(\cdot, \cdot, \cdot)) = \cdot) = \frac{\log \left(\left(\frac{\log 2^3}{\log 2} \right) \cdot \left(\frac{\log 2^2}{\log 2} \right) \right)}{\log 2} \\
& = \log_2 6 \approx 2.5849625007 \\
& \dots \\
& \dim(f_a) = \dim(f_b) \Rightarrow f_a \cong f_b \text{ (} f_a \text{ and } f_b \text{ is isomorphic)}
\end{aligned}$$

Lastly, about making divergence among similarity, this isomorphism can be generalized in asymmetric relations of energy and phase of matter. Assuming Lebesgue integral:

$$\begin{aligned}
E &= \int \left(\left| \frac{SR - CR}{SR} - \frac{SR - CR}{CR} \right| \right) dt \\
E &= \sum_t (SR - CR) = \int (SR - CR) dt \\
&\Rightarrow 1 = \int \left(\left| \frac{1}{dSR} - \frac{1}{dCR} \right| \right) dt = \int \left(\frac{|dCR - dSR|}{dSR \cdot dCR} \right) dt \\
&= \int \left(\frac{dE_{Weak} + dE_{Strong}}{dE_{Gravity} \cdot dE_{Electromagnetic}} \right) dt \\
&= \int \left(\frac{dE - dE_{Gravity} - dE_{Electromagnetic}}{dE_{Gravity} \cdot dE_{Electromagnetic}} \right) dt \\
&\Rightarrow \int dE_{Gravity} \cdot dE_{Electromagnetic} dt = \int (dE - dE_{Gravity} - dE_{Electromagnetic}) dt \\
&\Rightarrow E = E_{Gravity} \cdot E_{Electromagnetic} + E_{Gravity} + E_{Electromagnetic} \\
&\Rightarrow E_{Weak} + E_{Strong} = E_{Gravity} \cdot E_{Electromagnetic}
\end{aligned}$$

By preceding Dirac equation,

$$|E_{Gravity} \cdot E_{Electromagnetic}| \leq \cos \theta$$

So, Gravitational force and electromagnetic force restrict an angle of their heading together by limit of given angle θ . This implies the result of Theory of General Relativity. And by its dimensional meaning, application of Hausdorff dimension can be realized.

6 Conclusions

By the given understandings, the premises for simulating an axiom-based automata universe could be given. There are a quite technical difficulties to realize it in a real space for now though, but it's not out of probability in scientific realization. And it's sure already possible for now to simulate it by using a computational approach.

References

- [1] J. Yoon, "Intuitive Understanding of Observing Reality: With Extension of the Game Theory," Aug. 2022. [Online]. Available: https://www.techrxiv.org/articles/preprint/Intuitive_Understanding_of_Observing_Reality_With_Extension_of_the_Game_Theory/20485623/1
- [2] D. Colladay and V. A. Kostelecký, "\$\mathrm{CPT}\$ violation and the standard model," *Physical Review D*, vol. 55, no. 11, pp. 6760–6774, Jun. 1997, publisher: American Physical Society. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevD.55.6760>
- [3] S. Ishikawa, "Monty Hall Problem and the Principle of Equal Probability in Measurement Theory," *Applied Mathematics*, vol. 3, no. 7, pp. 788–794, Jul. 2012, number: 7 Publisher: Scientific Research Publishing. [Online]. Available: <http://www.scirp.org/Journal/Paperabs.aspx?paperid=19884>
- [4] J. D. Stack, "Heavy-quark potential in SU(3) lattice gauge theory," *Physical Review D*, vol. 29, no. 6, pp. 1213–1218, Mar. 1984, publisher: American Physical Society. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevD.29.1213>
- [5] A. Jaffe and E. Witten, "Quantum Yang-Mills Theory, Clay Mathematics Institute," *Millennium Problems*, 2000.