Proceeding Paper

A Framework of "Quantitative ⊗ Fixed Image ⇒ Qualitative" Induced by Contradiction Generation and Meta Synthetic Wisdom Engineering †

Jiali Feng [1,*] **and Peizhuang Wang** [2]

1   Information Engineering College, Shanghai Maritime University, Shanghai 200236, China
2   College of Intelligence Engineering and Math, Technical University of Liaoning, Fuxin 123000, China; peizhuangw@126.com
*   Correspondence: jlfeng@shmtu.edu.cn
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Abstract: Due to the past t_P and the future t_F being divided into a pair of opposing times by the now t_N, the generation mechanism of the contradiction is attributed in this paper as the process in which the time increment Δt and $\Delta t'$ are transmitted from the past t_P and the future t_F to the present moment t_N, respectively, and then reverse each other. The category and topos of time contradictorily constructed by the mechanism is discussed. It is shown that not only can the laws of the "Unification of Opposites", "Mutual change of Quality and Quantity" and "Negation of negation" of the contradiction be represented in this form of category, but some of classic constructions appearing in the fields of mathematics, physics, logic, life, nerves, thinking, and intelligence can also be considered as morphosm- or pattern-induced and emerge via this mechanism as well. On the other hands, a series of concepts, models, and algorithms for noetic science, such as the attribute conjunctive monoid category (ACMC), attribute reasoning lattice category (ARLC), attribute coordinate system (ACS), attribute coordinate analysis method based on the learning of ACS for perception, cognition, and decision-making (ACAM), qualitative (conversion degree) mapping from quantity to quality (QM), attribute grid computer based on qualitative mapping, qualitative criteria transformation (AGC), etc., which have been verified through corresponding experiments, have been proposed, so that not only a set of attribute theory methods from perception to cognition and thinking have been constructed, but the synthetized framework of "Quantitative ⊗ Fixed Image ⇒ Qualitative", called "Framework of Syntenic Three Approaches" (FSTA) can also be induced. It is possible to provide an alternative reference path and technical solution for noetic science and open complex giant systems because FSTA is consistent with the framework of "Quantitative Intelligence ⊗ Fixed Image Intelligence ⇒ Qualitative Intelligence (Meta Synthetic Wisdom)", as proposed by Hsue-shen Tsien.

Keywords: noetic science; meta synthetic wisdom; generation mechanism of contradiction; time category; time topos; attribute coordinate system (ACS); attribute coordinate analysis method; qualitative conversion degree mapping; attribute grid computer; Quantitative ⊗ Fixed Image ⇒ Qualitative"; "Quantitative Intelligence ⊗ Fixed Image Intelligence ⇒ Qualitative Intelligence (Meta Synthetic Wisdom)"

1. Introduction

The question "Can Machines Think?" [1] not only involves the basic contradiction between "spirit" and "substance" in philosophy, but also a chain of secondary contradictions caused by it, as shown in Figure 1; not only this, but how should the contradiction be resolved? Additionally, "the law of unity of opposites and dialectic transformation" has become a key problem that need to be addressed in noetic science, intelligence science and the theory of meta synthetic wisdom, as does artificial intelligence itself, which is a fundamental problem in philosophy [2].
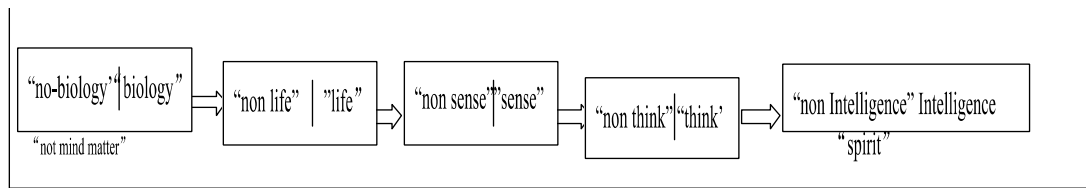
Figure 1. Basic contradiction between "matter" and "spirit" and a chain of secondary contradictions.

Hsue-shen Tsien, a famous scientist from China, not only proposed noetic science and meta synthetic wisdom but also suggested an implementation scheme for MSW, notably, the Quantity Wisdom $\otimes$ Image Wisdom $\Rightarrow$ Quality Wisdom (MSW), as shown in Figure 2a,b [3]. A Quantitative Method $\otimes$ Fixation Image Method $\Rightarrow$ Qualitative Method (MSW) in which three arrows are added is proposed by attribute theory in this paper.
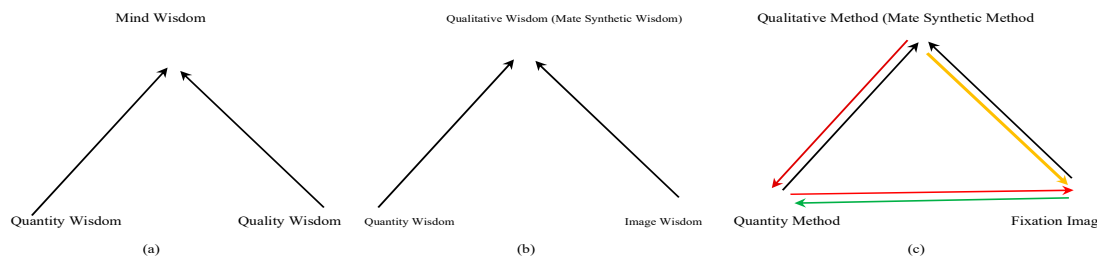

Figure 2. (**a**) Quantity Wisdom $\otimes$ Quality Wisdom $\Rightarrow$ Mind Wisdom (by Dai Ruwei); (**b**) Quantity Wisdom $\otimes$ Image Wisdom $\Rightarrow$ Qualitative Wisdom (Mate Synthetic Wisdom) (by Hsue-shen Tsien); (**c**) Three arrows added Quantity Method $\otimes$ Fixation Image $\Rightarrow$ Qualitative Method (Mate Synthetic Method (**c**) (by Jiali Feng).

Intrinsic Quality of Object u u $q_v(u)$ and Its Invariance

It is well-known that, in philosophy, an attribute is defined as follows [4]:

Definition 1. *An attribute is an expressing quality of an object when an interaction between the object and another object is happening.*

The spatial-time position of object u is the attribute that shows where u exists at the time t, if one lets $x(t,u)$ or $x_t(u)$ and $y_t(v)$ be the spatial-time position of object u and its contradicted object v, respectively, $d(x_t(u), y_t(v))$ be the distance between u and v, and $q_v(u)$ be the intrinsic quality of u distinguished from v, based on the following equivalence relation,

$$\text{"}q_v(u)\text{ is true"} \Leftrightarrow \text{ " } u \neq v \text{ " } \Leftrightarrow \text{ " } x_t(u) \neq y_t(v) \text{ " } \Leftrightarrow \text{ " } d(x_t, y_t) \neq 0 \text{ "} \qquad (1)$$

then the philosophy question "whether the quality $q_v(u)$ is true?" has been transformed into a physical problem.

2. The Category Induced by the Opposite Transmission of Past Time and Future Time

Due to the fact that past t_P and the future t_F are divided into a pair of opposing times by the now t_N, the generation mechanism of the contradiction is attributed as the time increment Δt and $\Delta t'$, which are transmitted from the past t_P and the future t_F to the present moment t_N, respectively, and then reverse each other. Additionally, the reasoning category $Lattice\left(\mathcal{T}, \overrightarrow{j,k}, \circ, \vee, \wedge\right)$ and topos $Lattice^{op}\left(\mathcal{T}, \overrightarrow{j,k}, \circ, \vee, \wedge\right)$, induced by contradictory time increments $\Delta_k t_j = t_k - t_j = (t_j, t_k) = \overrightarrow{j,k}$ from t_j to t_k, and $\Delta_{j'} t'_{k'} = t'_{k'} - t'_{j'} = \left(t'_{k'}, t'_{j'}\right) = \overleftarrow{k', j'}$ from $t'_j{}'$ to $t'_k{}'$, are the relationships, and the

differences between themselves and classical mathematics, physics, logic, and artificial intelligence of the human brain are discussed [5], as shown in Figure 3.
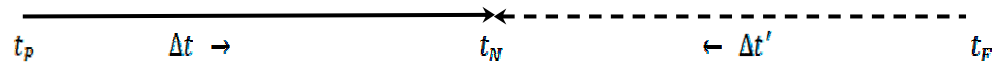

Figure 3. The generation of contradiction induced by opposite transmission of $\overrightarrow{j,k}$ and $\overleftarrow{k',j'}$.

3. Attribute Grid Computer for Pattern Recognition

In recent years, with the breakthrough of AlphaGO and the neural network based on convolution in pattern recognition, deep learning has become a hot topic in research. In fact, some of the most basic and very important problems in this area have not been resolved yet. The first one is the basic use of the neural unit as a classification; it is called a classifier in general textbooks. The recognition of the pattern is implemented in the neural network by an iterative algorithm, such that the function of pattern recognition of deep learning adjusts the connection weight parameters between different levels and different classifiers (neurons) and there is a lot of uncertainty, such as probability and fuzziness and so on. In [3], a new kind of computer, an attribute grid computer (AGC) based on qualitative mapping (QM) has been proposed, and it has been shown that some artificial methods, such as the expert system, artificial neural network, and support vector machine, can be fused and unified together and can be fused in the framework of qualitative criterion transformation of QM and AGC. The basic operation of QM coverage is its mechanism as the conversion from quantity of attribute into quality of attribute. What is the principle of pattern recognition? Why was the neural network and AGC able recognize a pattern? What is relation between classification and coverage? Is there any link between the probability and fuzziness in ANN and AGC, as shown in Figure 4?
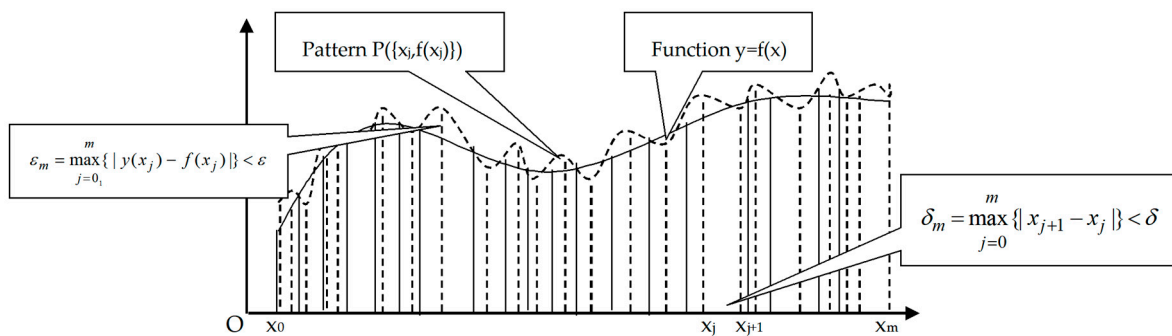

Figure 4. The competition between the pattern of compuing values of one variable function y = f(x) and graph of y = f(x).

An envelope of qualitative criteria is subdivided into more detail, so that the probability of each classified sample falling into the subdivision grid can be counted separately. In this way, not only can any classified samples be recognized by the grid-based GAC in detail, but an indication linking the probability and the degree of (fuzzy) conversion can also be given [3].

The recognition of some of patterns which vary with time t or variable x, such as the electrocardiographic, can be considered as the recognition of the graph of a function y = f(x). So, it is a basic problem as to whether a method or a model of the recognition of the graph of a function y = f(x) could be found out or not, as shown in Figure 5.
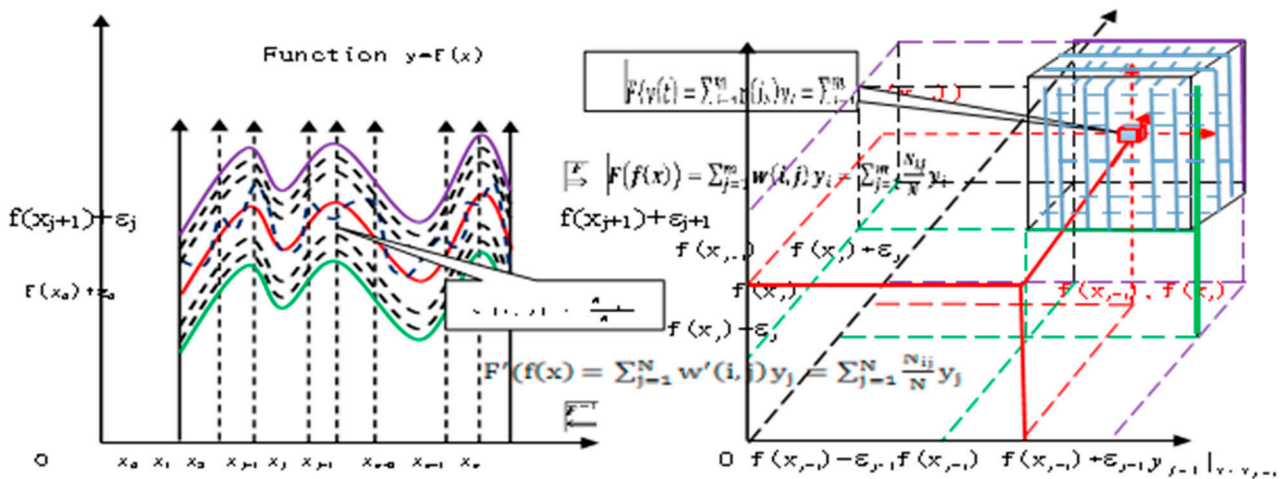
Figure 5. Classification of the normal electrocardiogram ECG by attribute grid computer.

On other hand, if the recognition problem for the complex patterns varies with two or more variables, it could be discomposed into some simple functions [6], as shown in Figures 6–8.
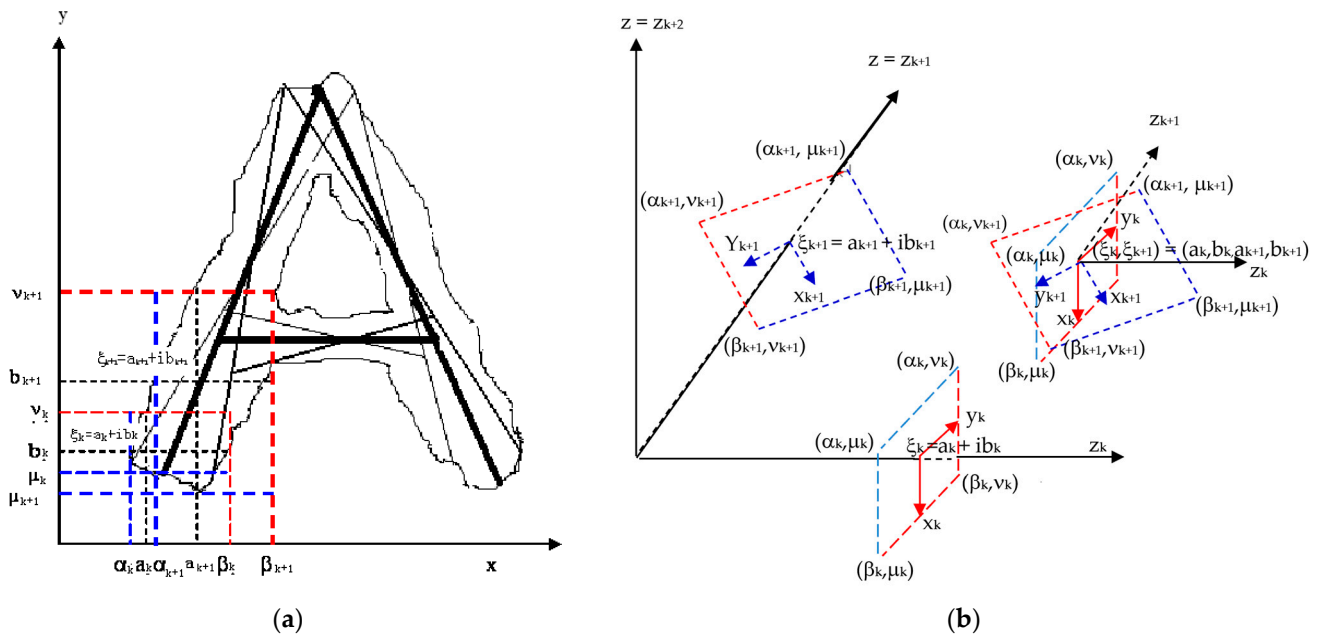

(**a**)　　　　　　　　　　　　　　　　　　　(**b**)

Figure 6. Qualitative transformation functor conversion from two dimension pattern "A" into Hilbert space. (**a**) Envelopes E(A) of several handwritten A, the intersections of sampling points $x = a_k$ and $x = a_{k+1}$, $y = b_k$ and $y = b_{k+1}$ and a certain A $\xi_k = a_k + ib_k$, $\xi_{k+1} = a_{k+1} + ib_{k+1}$, and the intersection of $x = a_k$ and $y = b_k$ with E(A) $[\mu_k, \nu_k]$ and $[\alpha_k, \beta_k]$; (**b**) A Qualitative Criterion $[\alpha, \beta]$ for Recognizing Pattern A in 2D, and the Neighborhood $(\xi_k, \xi_{k+1}) = (a_k, b_k, a_{k+1}, b_{k+1})$ of Tensor $\{[\alpha_k, \beta_k] \times [\mu_k, \nu_k]\} \otimes \{[\alpha_{k+1}, \beta_{k+1}] \times [\mu_{k+1}, \nu_{k+1}]\}$.
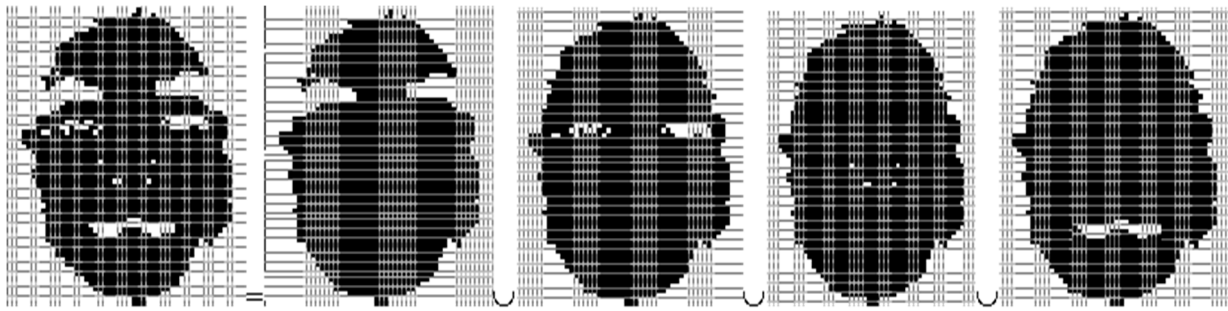
Figure 7. The decomposition of face Construction.

Figure 8. The decomposition of face construction.

For example, Li Wenpei wrote a program to generate memory models of leaves and the Chinese Character "Ma" written by hand (The word means horse in English), based on the pattern–vector conversion φ, QM, and inverse mapping $\varphi^{-1}(\xi) = P_{\alpha \times \beta} \in P(P_{\alpha \times \beta})$, as shown in Figure 9. The experiment showed that, although there exist some differences between the memory image generated by AGC and its learning patterns, they are very similar to each other. On the other hand, the fuzzy membership between the memorizing image of AGC learning and example patterns can be adjusted by conversion degree function η, such that it can be regarded as a fuzzy η-cut set [7].

Figure 9. Emergence of memory pattern and fuzzy cut set induced by conversion degree function $\eta(x)$.

4. Artificial Intelligent Neural Network Defined by General Inner Product

We know that an artificial neural network can be defined as a hyper plane as follows:

$$
y(x) = f\left(\sum_{j=1}^{m} w_i x_j - \theta\right) = \begin{cases} 1 & \sum_{j=1}^{m} w_i x_j - \theta \geq 0 \\ 0 & \sum_{j=1}^{m} w_i x_j - \theta < 0 \end{cases} \tag{2}
$$

If the threshold θ of (2) can be rewritten as $w_{m+1} x_{m+1} = -1 \times \theta$, then (6.1) can be rewritten to be an inner product, as follows:

$$
\begin{cases} y(x) = f\left(\sum_{j=1}^{m} w_i x_j\right) = \begin{cases} 1 & \sum_{j=1}^{m} w_i x_j \geq 0 \\ 0 & \sum_{j=1}^{m} w_i x_j < 0 \end{cases} \\ here\ w_{m+1} = -1, x_{m+1} = \theta \end{cases} \tag{3}
$$

Thus,

$$
H = G \circ F(y(t)) = \sum_{j=1}^{m} p_k(j) y_j = \sum_{j=1}^{m} \frac{N_{jk}}{N} y_j \tag{4}
$$

is an artificial neuron.

This shows us that the artificial neuron and its network can actually be deduced by qualitative mapping.

If we let

$$
H^{-1} = F^{-1} \circ G^{-1}\left(\sum_{j=1}^{m} \frac{N_{jk}}{N} y_j\right) = F^{-1}\left(\sum_{j=1}^{m} p_k(j) y_j\right) \tag{5}
$$

be the converse function (5), since (5) can be considered to be a morphism generator of an electrocardiogram from its imager in the criterion of a qualitative grid computer, thereby becoming a morphological generator or an image generator [5].

Therefore, the attribute theory method is not only integrated with the factor space theory proposed by Peizhuang Wang [8] and morphogenetic system [9], but this form is also based on the weight distribution of the image of an external thing in its image family, transformed into a memory (pattern) point in the computer or human brain, and then a pattern or image reconstructed by inverse functors based on the memory point.

From the view of noetic science, because H of (4) and H^{-1} of (5) are mutually reversible, this system can be considered to constitute an image generator of external things.

Therefore, the qualitative grid computers based on entangled manifolds can not only describe the basic laws of dialectics, i.e., the law of the unity of opposites, the law of qualitative and quantitative mutual change, and the law of the negation of negation, but it can also be a fundamental principle and implementation model which can provide the integration of physics, mathematics, logic, and artificial intelligence.

5. Conclusions

From above discussion, we show that a framework of "Quantitative $\otimes$ Fixed Image $\Rightarrow$ Qualitative", also known as the synthesized "Framework of Synthetic Three Approaches" (FSTA), can be induced by the opposite transmission between a pair of $\Delta_k t_j = \overrightarrow{j, k}$ and $\Delta_{j'} t'_{k'} = \overleftarrow{k', j'}$. It is possible for it to provide an alternative reference path and technical solution for noetic science and open complex giant systems, because FSTA is consistent with the framework of "Quantitative Intelligence $\otimes$ Fixed Image Intelligence $\Rightarrow$ Qualitative Intelligence (Meta Synthetic Wisdom)", as proposed by Hsue-shen Tsien.

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