Mitsuo Ohta, Yoshifumi Fujita

Inter-subjective relationship of higher-order among spatial-temporal wavy environmental factors – a methodological trial based on a standpoint of "Relationism-First"

APPENDIX III

OUR GUIDING PRINCIPLE FOR ANALYSIS

[1] From a viewpoint of "Relationism-First" that there is latently the objective logos of the material in the bottom of the subjective formal logic, before introducing hierarchical distinction of the master and servant or a priori rule in our analyses, we first take attention to data assemblage itself of two variables x and y sampled simultaneously (for an example, like a scatter diagram at the same time and in the same ring). As is well-known, it may be some partial truth there is also a viewpoint of pure axiology, in which the individual substance (i.e., supporting mother's body) is once at least only formally disregarded as the first step of study and only the mutual objective relationship as its functional behavior is first considered including abstract style((sometimes, latent) with essential support of substance), and on the other hand there is some local viewpoint of operational side on the problem of the determination of sampled size and the reliability of sampled data in the actual stage.

[2] In case of analyzing the relationship between x and y, which of them is chosen as a criterion variable or a predictor variable and/or in case of searching causal relationship, which of them is chosen only in an operational side as an input or an output are not artificially decided at the first step of analyses. But, as such an inevitable target, any subjective sense matched to solve the problem is not introduced in advance in our study of "Relationism-First".

[3] In order to describe deeply the relationship itself between two variables as more universally as possible, first we take attention to the simultaneous probabilistic assembly expression for a whole set of x and y. In regard to the deep structure of the relationship, we'd like to take the position that multiple hierarchical correlative configurations from the lower order to the higher order correlations can necessarily be found. As a result, a hierarchical series expansion form is introduced for the above analysis from the viewpoint of "Relationism-First", without neglecting its (latent) substantial basis.

[4] In order not to loose the basic property (reflecting the mother's body substance supporting the functional relationship) related to the existence itself of fluctuations on actual data x and y, we have the basic substantial features reflect mainly in the measure of lower order correlation. In the structural form on the expression for the functional relationship itself, it is expressed in the abstract style once at least by positively introducing the dimensionless quantities (parameters reflecting its substance basis). We'd like to have the degree of the reflection on the above basic substance weaken as the order of this correlation becomes deeper and higher, so as not to make some specific function of the super-structure thin owing to too emphasis of the substructure (see Appendix V about the concrete content).

[5] Once after observing the original parallel form (such as, of the scatter diagram as it is), as the next stage of study, in order to introduce a standpoint of some subjectivity (i.e., inter-subjectivity) corresponding to the present problem in our study between x and y which may be stochastic variables, we decide the class order for these two stochastic variables such that,(as an example) we set y as a criterion (output) variable and x as a predictor (input) variable. Then, it is necessary to try to find any multiple regressive relationship information reflecting our artificially operational properties as slightly as possible for this mutual independence (even if any kind of artificial (abstractive?) analysis is inevitably necessary in terms of learning as Hegel [1] pointed out).

[6] In the data processing of the proposed extended regression analysis, we don't force one to use artificially a priori limited mathematical frame of the regressive structure such as the usual linear regression in advance but we first employ any of well known universal mathematical logic as the structure of mutual functional relationship between the above dimensionless quantities (which has some analytical precedence(only as a mathematical frame, e.g., especially in the super-structure side) more than physical law with higher reflection to the actual substance). As much as possible, on the analytical viewpoint, we want to introduce any of axiomatic (sometimes, normative) judge reflecting universality as high as possible (for example, Bayes' axiom satisfying the Coherence axiom by de Groot [2] directly connected to the conditional probability or the addition property of energy as a universal law (even if the physical basic law is actively applied at the first stage of study).

[7] Even though the concrete form of the relationship is regarded as operational fluctuation behavior of the actual substantial "material", the degree of its functional freedom is first restricted by the magnitude of the objective existing range (for example, $[0,\infty]$, $(-\infty,\infty)$, $[a,b]$) on the actual data x and y (as seen in the substructure side). As the first step of analysis (for example, even in application of axiomatic Bayes' principle), this information is positively reflected.

[8] Once after passing through the relationally mathematical (sometimes basic physical) formal logic, next, from the viewpoint of inter-subjectivity, as an example, as the present main object of study, we focus on selectively the form of subjective behavior of only x in the form of the probability distribution. However, first, we don't directly and fragmentally derive any statistics like mean, variance and individual higher order moments according to our need (notice that these individual moment type characteristic quantities can be easily calculated mathematically afterwards once after the corresponding probability distribution form has been obtained).

[9] In the case when we process the data of x, y causally as a time series of input and output, tentatively, we can formally regard that the data are sequential occurrences of static relational behavior appearing in the cross time section at the same time for active real time phase even in the evolution process. That is, we can successively employ the same analytical static method as stated above (like the well known Kalman filter), but some risk such that the figures of lively change (i.e., evolution) are replaced to a set of sequential dead ones may be occurred. On the other hand, as in our present paper, the application of the Bayes' principle in the dynamical state estimation theory (including the Kalman filter) can leads in some normative style even the first employment of a priori uncertain probability to some consistent objective probability along the recursive more stack of sampled data. It is an important logical necessity based on the assurance of the (normative) axiom (Conversely, it might be a good idea to search any method matched to finding reasonably the above a priori probability by use of experimental data). Thus, it seems so natural with help of its some normative property to employ this Bayes' principle as one of the mathematically basic concepts for preparation in employing one thing and another many kinds of signal processing method such as fuzzy, neural network and so on, since the Bayes' estimation is enough reasonable to be relied upon, just like as the physical fundamental law should be relied upon even though the evaluation based on the physical law is opposite for the present to our expected intuitive evaluation in the actual stage.

REFERENCES

1. B. Russel. A History of Western Philosophy. Simon and Shuster, New York, 1945.
2. M. H. de Groot. Optimal Statistical Decisions. McGraw-Hill, New York, 1970.