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"Weight Function Model for Quantitative Analysis of Functional Resonance Analysis Method"

FRAM represent the functions and the coupling between functions in the system. In FRAM, the variability of the system is assessed by a qualitative method. Thus, the measurement of variability in FRAM is highly subjective.

In order to decrease the bias, the semi-quantitative approach was purposed that is the Monte Carlo simulation with FRAM. It enhances the safety analysis method in FRAM by using Monte Carlo to evaluate the probability of the variability of functions. The high probability of variability in the paths of the system that may lead to the failure can be defined by Monte Carlo. By using Monte Carlo, the variability of functions can be evaluated.

There are many approaches to evaluate the variability. Nevertheless, the significance of function has never been considered in any approaches. The functions in the system should not be evaluated in the same level of significance. Thus, the variability of the less significant function should be less effective than the most significant function. The significant of functions may obvious in many functions. On the other hand, it is obscure in some functions. The weigh function model should not represent only the importance of the functions. Another important factor is the weight of the coupling. The outputs from function may vary. Thus, each output should not be considered as the same level of significance. Moreover, even if it is the same output, the difference in downstream functions also the important factors. For example, the input for the core function such as operation and the same input for the interface function such as user interface. It is obvious that the coupling of core function is more important than the coupling of interface function.

Lastly, the challenge of weight function model is the accuracy of the weight model. The experience from the expert in the system could be the important information for construct the weight model. However, in the socio-tech system, the systems are complex and hard to describe every function in detail precisely. Thus, the statistical data are used to analyze the significance of functions, which is determined by considering the weight variables and the variability of the functions, together with the expert. This is the first attempt to purpose the quantitative analysis of FRAM model by considering the significance of the function and its variability.