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The Simulating of Systems with Discreet Events

The simulation of discreet events is one of construction ways of models, so that to be observed the dynamic behavior of systems. There is many conventional methods in realizing some simulated models. In experimental faze, those models are executed for a enough period of time that could generate results. The obtained results are used for studying the evolution of system and are base for the late decisions.

1. Introductive element.

The construction process of a simulated model always assume a adequate software. This could be a programming language of high level or a special driver in witch the model is specified using defined data by the user.

In the interior of the soft or the model that will be included a series of very important concepts named entities and logical contexts.

The entities are tangible elements taken from the environment witch can be temporary or permanent. They help to understand general objectives of using the simulation and, generally, it's observed the behavior of temporary entities when they cross through permanent entities.

Logical relation connects between them different entities. They are key parts of simulated models. They define the general behavior of the model. Each logical context is simple, but the big number, variety and the fact that they are positioned in the whole model bring up to growing of the complexity.

Other very important part of each simulation is the administrator of the simulation. This part is responsible with the advance of simulation in time and controls logical relationship between entities. The administrator is centrally placed and assures a dynamic behavior, function of time and model.

The simulation of discreet events is applied, generally, for studying the systems in witch is necessary the fallowing of the made way by different individual objects and in witch, at different moments of time, events took place and produces suddenly and not regular changes in the state of the system.

Because of the large diversity of real systems in witch interfere different events at different moments of time; there is a larger variety of simulated models of discreet events. Even so, they contain a series of commune elements, such as the state of the system, simulating clock, event, list of event, statistics indicators, initialization routine, event's routine, library type routine, rapports generator.

There is a series of problems connected to the simulated models of discreet events:

- Resolving the simulated models is made with the help of a computer and could be necessary a calculation time that is considerable for the results to be significant by the statistic point of view.
- The results for simulated models may be strongly correlated so that the estimation of the obtained indicators may be an error.
- In case that the simulated model is a simplified representation of a existing system may be difficult the validation of the model for sustaining that he is the correct real system.
- If the simulated model is very complex, then it could be vary hard to understand what is happening in the model and hard to tell the relationship between cause and effect.

After verifying and validating, the simulated model can be used for:

- Understanding the existing system so that it could be explained different behaviour of it.
- Exploring different possible changes of the existent system for making it better.
- Projecting new systems that it could be satisfied some demands at a minimal cost.

For the realizing of simulation, the simulated model will be made in a simulated program through using conventional languages, special languages of simulation, and a some interactive generators of simulating programs.

2. The simulating of waiting systems

The simulation of a waiting system represents a simulation example of discreet events.

Al waiting systems canal be decomposed in individual subsystems witch are made from entities that wait to be served from a serving station.

To analyze waiting systems can be used the theory of waiting fire or the theory of waiting.

Kendall made the terminology for waiting fire theory and a classification system witch today is universal.

If the coming are independent between them it could be used probability distribution Poison who has a single parameter λ = number of clients on time unit or average rhythm of coming.

If the serving times are independent between them it could be used probability distribution exponential who has one parameter : average time of serving a client = 1/μ, where μ is average rhythm of servings, the number of served clients on unit of time by a serving station.

In case of coming who can be described with Poison probability and of serving who can be described exponential distribution probability, the theory of waiting fire make analytic descriptive models who determines :

- average number of units in waiting system
- average number of units in waiting fire
- average time of waiting of a unit in waiting system
- average time of waiting of a unit in waiting fire
- using factor of serving system = ρ = λ/ μs = the fraction of function time in witch serving system is occupied
- probability that in this system to be no client = probability that this system to be free

Those indicators could be determined only for waiting systems that are in steady state.

The advantages of using simulation instead of waiting fire theory are:

- through simulation can be easily fallowed the behavior in time of the system
- mathematical theory of waiting fire is difficult and can be applied only for some kind of statistic distribution of probability, and mathematical theory of simulating is much simple and can be used in every statistic distribution of probability
- Simulation is much easy understood by the managers comparing with waiting fire theory.

One of the disadvantages of simulation is that through simulation is very hard to be obtained the optimal solution. Through simulation it could be tried only to make a change in simulated model and rules the program of simulation to see if through this change it has been obtained a improvement or not. This process can be a big consumer of calculating time.

3. Conclusion

Modeling and simulating can contribute to understand and improve a real system. Even so a system can be extremely complex, is better to be tried to build a much easy model. This could be obtained through defining the limits of analyzed system so that it could be taken in consideration only the essential characteristics by the point of view of analyze objective, and through defining a simplifying hypothesis. The model can be improved through redefining of the limits and through relaxing of hypothesis. On the other hand, if it is tried the including in model of any factors and relationship, the model could became too complicated to be solved. That's why it is necessary to be realized a compromise between the

necessity of building a simple model and easy to solve and necessity of obtaining through model a real representation for real problem.

The theory of waiting system can be used to analyze simple systems, complex systems affected by the waiting ways being analyzed by simulating, named "the simulation of systems with discreet events".

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