Original Research Paper

VOLUME-6 | ISSUE-3 | MARCH - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

A Comparative Study of Efficiency of Simulation in various fields

Mathematics

KEYWORDS: Optimal solution, Simulation software, steady state and random variables.

A.G.Rose Venish M.Sc.,M.Phil. ,Assistant Professor, SVS College of Engineering, Tamilnadu,India.

ABSTRACT

Simulation technique is efficient in many fields, it serves as an alternative technique when analytical methods fails. In some areas simulation works as the only possible way to find optimal solution to problems. In this paper a comparison is made among many areas where simulation is efficient. Though it is a time-consuming and costly simulation is efficiently used in various fields and this paper gives the concept to compare its efficiency in these fields.

INTRODUCTION

In this paper simulation technique used in inventory control, investment ,budgeting, queuing system, maintenance, transport, job sequencing, medicine and so on are discussed and a comparison is made between the effectiveness of simulation technique in each of the above mentioned fields .This technique is an alternative method in solving mathematical models formed out of random variables and constraints. In some cases this technique acts as the only method to predict the concept of the output of any project. Though it is used in many areas this becomes an important tool in 'Decision-making '."The verification and validation of simulation technique"[1] is helpful in finding the efficiency and comparison of simulation technique which is the aim of this article.

Inventory simulation

In this approach the past data is collected and the probability distribution of demand and supply are found and then simulation technique is used to run inventory problem artificially. If lead time and demand per unit time are random variables, then this technique may be used. When inventory storage problems cannot be solved analytically it can be solved using simulation.

Simulation technique in inventory control minimizes errors and minimizes time. It is easy to understand even by a non-technical person and also it can be easily explained to other field technicians.

Queuing simulation

Queuing theory is an operations research technique to find measures such as queue length Lq, waiting time Wq, Ws, Ls etc., In queuing system if cost is associated then simulation technique can be used to minimize cost and maximize profit. Although these kinds of problems are solved analytically some problems of complex natured are solved using Simulation technique. Simulating the expression gives us the possible optimal solution.

In queuing theory all types of mathematical models can be solved using simulation as it is costly analytical method is used in most cases where as in inventory control it is not so. Not only in inventory problems involving cost, it is used in problems involving time.

When simulating any system that evolves over time, the analyst must decide whether transient behaviour or steady state behaviour is to be noted. Though analytical methods with formulas are used estimating steady state performance measure using simulation generated data requires recognizing initial conditions on estimates steady state performance.

Simulation is used in some cases when analytical solution is possible. Especially in closed form queue models simulation of waiting time is found .In inventory no risk is taken to use simulation when analytical method is possible to solve problems.

Business simulation

In investment and budgeting simulation is used. to build business and to budget a huge cost is required for a big firm and it is highly risky. In order to get profit so many alternative actions are to be taken, it involves many factors, huge data etc., so in this case simulation is less used when compared to that of inventing and queuing.

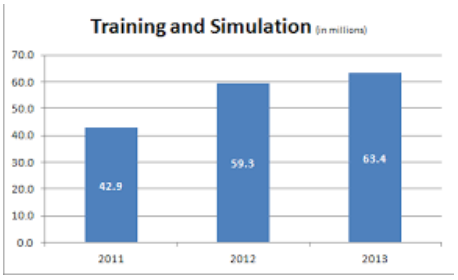
Healthcare Simulation

The diverse application of healthcare has many dimensions. Using simulation to improve safety will require full integration of its application into the practice of healthcare. The future simulation in healthcare depends on the commitment and proper practice of health care simulation .this community is to see that there is improved patient safety using this tool becomes reality. Some simulation is inexpensive for example; screen based or wide based simulation and part task trainers.

Though in some areas this tool is inexpensive patient's safety is to be considered. Comparing with other uses of this tool simulation in healthcare is highly risky.

Military simulation

Without real hostilities Military simulation can be used for testing warfare. There is recent development in this regard. Models of warfare shall be taken for a non-prescriptive attempt for decision making. Need of simulation is required only where there is war games between countries but this can be completely avoided as this may become the source and cause for dangers. The chart indicating the recent development in training and simulation is aro tech:



Maintenance simulation

Simulation is used in maintenance problems for this purpose the past data and observations are required. It is mainly used in problems such as hiring workmen; system maintenance etc., when compared to cost problems in investment budgeting, inventory simulation is much used.

Others

Simulation is used in transportation problems. One of the main limitations of aggregated models in assumption of uniform demand distribution over the service area, which can be overcome by simulation models. This is less risky but when a large network is considered, limitations are to be taken into account.

Conclusion

Simulation technique describes a process by develop a model, experiments and predict the behaviour over time. It simplifies real life situations. This is a trial and error approach and hence there is both advantage and disadvantage. This paper aims in comparing the efficiency of simulation in every field and despite its limitations while comparing the cost ,time, life risk and so on its approach in military and healthcare is to be taken into account as it has a high risk when

compared to that of other areas. Hence it has greater effectiveness in every field high risk in above said fields. Since simulation technique could not find optimal solution it stands.

REFERENCES

[1] Jack,P.C.,&Klijnein.(1995).Verification and validation of simulation models. European Journal of Operational Research 82 145-162.
[2] Reuven,Y.R .Optimisation of computer simulation models of rare events.Research supported by the fund for the promotion of research at technion.
[3] Furian,N., O'Sullivan,M.,Walker,C., Vössner,S., & Neubacher,N.(2015).A conceptual modeling framework for discrete event simulation using hierarchical control structures. Simulation Modelling Practice and Theory 56 82–96.
[4] Bogumił Kamin´ ski, Przemysław Szufel.On optimization of simulation execution on Amazon EC2 spot market. (2015).Simulation Modelling Practice and Theory 58 172–187.
[5] Josep Maria Salanova Grau a*, Miquel Angel Estrada Romeub. Agent based modelling for simulating taxi services.
(2015) Procedia Computer Science 52 902 – 907.
[6] Maia Lesosky, Allison McGeer, Andrew Simor, Karen Green, Don E. Low, Janet Raboud .Effect of Patterns of Transferring Patients among Healthcare Institutions on Rates of Nosocomial Methicillin-Resistant Staphylococcus aureus Transmission: A Monte Carlo Simulation. (2011).Infection control and hospital epidemiology, vol. 32, no. 2.