International Seminar on
LIBRARIES OF THE WORLD: USERS AND LIBRARIANS EXPERIENCES
24.02.2020; Krakow, Poland

Preparation of Papers for LS 2020: Use Title Case for Paper Title

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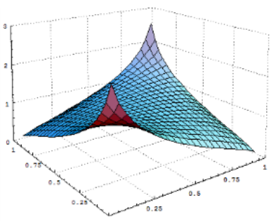
Keywords: there keywords

Introduction

A modern method, based on copulas, for constructing and dealing with inter-component dependencies in models for fault-tolerant systems was presented. What makes copulas a valuable modeling method for large reliability models is the separation of the component distributions (the marginals) and the dependencies. Therefore copulas can be used with arbitrary BDD-based algorithms. Copula methods can be applied in such cases, where model inputs …………………………………………… . ………………………………..

Research problem and research methodology

As an interesting approach to deal with inter-component dependencies, this paper proposes a method based on copulas [2]. Copulas are a way of specifying joint distributions if only the marginal distributions are known. In particular copulas are drawn up for the purposes of examining the reliability of systems with dependent elements.



The word Copula is a Latin noun that means "a link, tie, bond". In a two-dimensional case a copula C is a bivariate distribution on [0, 1] x [0, 1], whose marginal distributions are uniform. Copulas join (i.e. couple) univariate distribution functions to form multivariate distribution functions. This feature is encapsulated in the Sklar's theorem [3].

Results

Sklar's theorem enables us to generate copulas, and copulas can be used to characterize certain properties of dependent random variables. Specifically, if $F(t_1,t_2)=C(F_1(t_1),F_2(t_2))$, than it implies that for, $0\le u,v\le 1,\quad C(u,v)=F\left(F_1^{-1}(u),F_2^{-1}(v)\right)$, so that knowing unreliability functions F, F_1 and F_2, we are able to generate copula C. Alternatively, a survival copula C joins univariate survival functions to form a multivariate survival function. Thus in the bivariate case ……………..……., where it can be easily seen that, and.

Notice that C couples the join survival function to its univariate margins in a manner completely analogous to the way in which a copula connects the join unreliability function to its margins. The following theorem (Sklar's canonical representation) for survival distributions is equivalent as the one given by Sklar for distributions. Let S be an n-dimensional survival function with margins.

Conclusions

A modern method, based on copulas, for constructing and dealing with inter-component dependencies in models for fault-tolerant systems was presented. What makes copulas a valuable modeling method for large reliability models is the separation of the component distributions (the marginals) and the dependencies. Therefore copulas can be used with arbitrary BDD-based algorithms. Copula methods can be applied in such cases, where model inputs are known to be correlated by mechanisms that are not included elsewhere in the model.

Literature *(selected positions)*

1. Kaminov I. P., Li T., Willner A. E.: Optical Fiber Telecommunications V B, Elsevier, Amsterdam, 2008.
2. ……………..
3. Embrechts P., Lindskog F., McNeil, A.: Modelling Dependence with Copulas and Applications to Risk Management. W: Handbook of Heavy Tailed Distributions in Finance, ed. S. Rachev, Elsevier, rozdział 8, 2003, 329-384.

Note: The summary shall not exceed one page