

چهارمین کارگاه نظریه مفصل و کاربردهای آن

The 4th Workshop on Copula Theory and Its Applications

دانشگاه یزد، دانشکده علوم ریاضی، گروه آمار

۲۰ و ۲۱ بهمن ماه ۱۳۹۵



محورها:

- ◀ روش های ساخت توابع مفصل
- ◀ توابع مفصل و مفاهیم وابستگی
- ◀ مدل سازی با استفاده از توابع مفصل
- ◀ کاربردهای توابع مفصل
- ◀ توابع مفصل و آمار فضایی
- ◀ استنباط آماری بر اساس توابع مفصل

زمان های مهم:

- ◀ آخرین مهلت ارسال مقالات : ۱۳۹۵/۱۱/۰۵
- ◀ اعلام نتایج ارزیابی مقالات : ۱۳۹۵/۱۱/۱۳
- ◀ آخرین مهلت ثبت نام نهایی : ۱۳۹۵/۱۱/۱۶

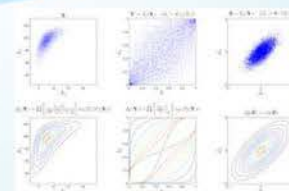
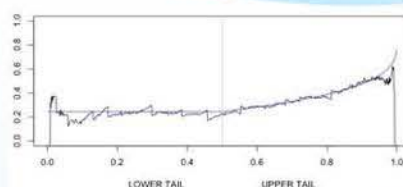
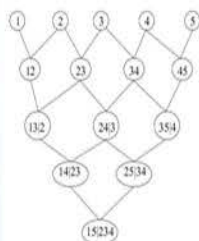
نشانی محل برگزاری:

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- ◀ تلفن: ۰۳۵-۳۱۲۳۲۷۱۵
- ◀ دورنگار: ۰۳۵-۳۸۲۱۰۶۹۵
- ◀ پایگاه اطلاعاتی: <http://osdce.um.ac.ir>
- ◀ رایانامه: cw4@confs.yazd.ac.ir



D-vine, n=5





4th Workshop on
Copula Theory and its Applications
8-9, Feb 2017



Abstracts of

4th Workshop on

Copula Theory and its Applications

Department of Statistics, School of Mathematical Sciences
University of Yazd, Yazd, Iran

Ordered and Spatial Data Center of Excellence
Ferdowsi University of Mashhad, Iran and

Iranian Statistical Society

8-9 Feb, 2017

Preface

On behalf of the organizing and scientific committees, we would like to extend a very warm welcome to all the participants of the 4th Workshop on “**Copula Theory and its Applications**”.

Hope that this workshop provides an environment of useful discussions and would also exchange scientific ideas through opinions. We wish to express our gratitude to the numerous individuals and organizations that have contributed to the success of this workshop, in which around 50 colleagues, researchers, and postgraduate students have participated.

Finally, we would like to extend our sincere gratitude to the head of the College of Mathematical Sciences and the head of the Department of Statistics at Yazd University and the head of OSDCE at Ferdowsi University of Mashhad for their kind cooperation. We wish them all the best.

S.M. Mirhosseini

Topics of the Workshop:

- Methods of Constructing Copulas
- Copulas and Dependence Concepts
- Modelling using Copula
- Applications of Copula Functions
- Copula and Spatial Statistics
- Statistical Inference using Copula

Scientific Committee:

- Amini, M. Ferdowsi University of Mashhad
- Dolati, A. Yazd University
- Jabbari Nooghabi, H. Ferdowsi University of Mashhad
- Mirhosseini, M. Yazd University (**Chairman**)
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Copula: Properties and constructing methods

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Abstract

Copulas are useful for generating joint distributions with a variety of dependence structures. Because, using copulas allow us to separate the study of dependence from the study of the marginals, since one is then reduced to study of the relation between two uniform variables. In this lecture, we will study some basic properties and constructing methods of copulas.

Keywords: Archimedean copula, Constructing copula, Copula, Sklar's theorem

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Introduction to vine copulas

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Abstract

In many practical areas multivariate distributions are needed for modelling purposes. Multivariate normal distribution has some limitation and cannot account for properties like asymmetry and heavy tails behaviour. Dependence modelling using copulas is very common to account for such cases. Standard multivariate copulas in higher dimensions are not flexible structures. Vine copula structures by using the bivariate copulas as building blocks, solve such limitations and are able to model complex dependency problems. In this talk we review the construction process of the C-vine and D-vine copulas. The R packages 'CDVine' and 'VineCopula' which provide functions and tools for statistical inference of vine copulas are discussed.

Keywords: Bivariate copula, Canonical vine, D-vine, Maximum likelihood estimation, Multivariate copula, R software, Statistical inference

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Copula approach for analyzing extreme values

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Abstract

The classical univariate theory of extreme values shows that the largest or smallest value from a set of independently distributed random variables tends to an asymptotic distribution. The mathematical theory of multivariate extremes is a relatively novel field. The notion of extreme event in a multidimensional case is closely related to the failure region in structural design. By using copula, as a fundamental tool to describe the structure of multivariate distributions, the result of classical multivariate extreme value theory is translated. Furthermore it is usually assumed that the sequence of observations comes from a sequence of independent random variables, however in real applications this is an unrealistic assumption, because it is observed some dependence over time. In this research, regarding the dependent structure of the observations, the Extreme Values Copula (EVC) is discussed and it is applied for analyzing two main measures of earthquake, named, Magnitude and Peak Ground Acceleration in Kerman and Isfahan.

Keywords: Copula, Extreme values, Generalized extreme value distribution, Generalized Pareto distribution.

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An extension of bivariate Marshall-Olkin distribution

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Abstract

A new method to construct an extension of Marshall-Olkin distributions has been proposed, with extending their dependence structure and tail dependence, making it more flexible for modelling, followed by a statistical interpretation resulting stochastic comparison. Some properties of this model such as association measures, tail dependence, Kendall distribution and invariancy followed by an applicable example has been presented. finally, the multivariate extension of the Marshall-Olkin model has been proposed.

Keywords: Copula, Copula transformation, Dependence measures, Marshall-Olkin model, Stochastic orders

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Spatial copula function for modelling the correlation structure of data

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Abstract

Copula functions are powerful tools for construction the correlation structure of two or more random variables. The flexibility of copula families drew high attention to their application in describing the non-Gaussian spatial dependent data. In this paper, the spatial copulas, which require to have particular properties are reviewed. Next, based on the Max-id copulas family, a new type of spatial copula function is introduced that can be used to provide a fairly of valid spatial covariance functions.

Keywords: Copula families, Non-Gaussian spatial dependence, Spatial copula,

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Test of independence for Bairamov and Bayramoglu's bivariate distributions

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Abstract

Bairamov and Bayramoglu (2013) introduced a class of new bivariate distributions based on Bakera's system (2008) of bivariate distributions. This class of bivariate distributions is constructed based on bivariate order statistics from a bivariate distribution. In this paper, we propose a test of independence for testing the hypothesis that two variables X and Y are independent versus the alternative that X and Y are positively quadrant dependent. Also, the powers of the proposed test computed asymptotically and empirically via a simulation study.

Keywords: Bairamov and Bayramoglu's bivariate distributions, Order statistics, Quadrant dependence, Test of independence

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Multivariate Archimedean copulas based on Kendall distribution

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Abstract

Modelling the dependence structure between components of a system has become an active line of research in reliability field in recent years. A general methodology, which enables us to study the whole structure of dependency of a set of random variables, is copula modelling. In this paper, we consider dependence structure described by Archimedean copulas and provide some bounds for Kendall's τ measures of concordance. Moreover, we attempt to extend the Positive K-Dependence (PKD) notion and the Kendall dependence ordering. We shall provide new conditions for vectors obeying Archimedean copulas to be PKD and to be ordered in Kendall's sense.

Keywords: Archimedean copulas, Kendall's tau, Kendall distribution function, dependence notions, dependence orders

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Some result on squared-loss mutual information

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Abstract

This paper deals with estimation of a variant of mutual information called the squared-loss mutual information (SMI) measure based on copula density for detecting statistical independence between random variables. Some analytical properties and explicit values of SMI index for several copulas are obtained and discussed a method of nonparametric estimation of copula densities and hence of the SMI index from a sample.

Keywords: Measure of dependence, Copula, Squared-Loss mutual information

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