Copula Theory and Methods

Organizer and Chair: Ruodu Wang (University of Waterloo)

CLAUDIA CZADO, Technische Universität München
Vines: Building Multivariate Copulas Using Pair Copula Constructions

Standard multivariate copula classes such as the elliptical or Archimedean one are restricted in their tail and symmetry behavior, since they are closed under margins. These restrictions might not be satisfied in real data applications. In contrast vine copula models are very flexible. They are constructed using only bivariate copula building blocks called pair copulas. The full specification of a vine model requires the choice of vine tree structure, copula families for each pair copula term and their corresponding parameters. I will introduce this class of copulas and discuss their statistical inference including model selection. Approaches will be illustrated using financial data.

HAIJUN LI, Washington State University
Tail Densities of Copulas

The tail density of a copula, if exists, is a limiting density of the copula with proper scaling, and can be used to study multivariate extremes. In this talk, we will use tail densities to study mixtures of copulas, and show how tails of copulas can be changed from tail independence to tail dependence (and vice versa), via random mixture. The application to tail distortion is also discussed.

EMILIANO VALDEZ, Michigan State University
A Revisit of Hierarchical Insurance Claims Modeling

This work describes statistical modeling of detailed, microlevel auto insurance records to analyze experience at the individual vehicle level. We propose a hierarchical model for three components corresponding to the frequency, type, and severity of claims. The first is a negative binomial regression model for assessing claim frequency, with gender, age, and no claims discount as important predictors. The second is a multinomial logit model to predict the type of insurance claim. The third model is for the severity component where we use GB2 distribution for claim amounts and incorporate predictor variables. Using a t-copula, we show a significant dependence among different claim types. This integrated model allows a more efficient prediction of claims than traditional methods.