SHOFIQUL ISLAM, McMaster University

A Copula-based Method to Classify Individuals into Different Disease Categories Using Correlated Biomarkers

We developed a new method of classifying patients into disease categories. Our method is flexible and allows classification based on broad classes of bivariate distributions that takes correlation into account and leads to a unique classification. We consider Frank, Clayton and Gumbel’s copula with Gamma marginal’s to construct joint probability distribution for this purpose. Comparing the association parameter in copula with Kendal’s Tau, we observe that a given value of the parameter represent higher levels of association in Gumbel followed by Clayton and Frank. Optimal threshold for disease classification converges to a stationary distribution regardless of the choices of copula. Furthermore, the simulation result indicates that Frank’s copula perform better than Clayton followed by Gumbel in terms of predictive ability.