

Liquid Association Analysis with Background Variables

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Abstract

Liquid association (LA) was first proposed to study the dynamic patterns of gene co-expression relationships in a complex biology data system. LA depicts the change in the covariation of two variables X and Y as a third variable Z varies. A positive LA score indicates an increasing trend of covariation between X and Y as Z increases while a negative LA score indicates the opposite trend. However, in many applications, the presence of additional background variables such as clinical information in the studies of cancer genomes may complicate the relationship between the variables of interest. In this paper, we discuss the potential effects of ignoring the background variables on the original LA score. We propose an adjusted LA score to marginalize the effect of the background variables when quantifying the strength of LA activity between (X, Y) and Z . We derive computationally efficient estimators for the adjusted LA score under several common parametric distribution assumptions. Real data examples will also be presented in this talk.