



Incremental calculation for multivariate statistics of compositional data

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Compositional data, containing structure information, have a wide application in various fields. Many statistical models have been extended to compositional data in existed works. However, so far no research has been done for the incremental calculation of these models. With data collection becoming faster and easier through networks, incremental calculation algorithm for compositional data is necessary. In this paper, we give the online updating methods for basic operations of compositional-data vectors, including addition, scalar multiplication and inner production. Based on this, the incremental calculation for some frequently used sample statistics are proposed. Then, plenty of statistical methods that are based on these sample statistics can be calculated incrementally. We take ordinary least squares regression and principle component analysis as examples to design the online updating algorithms for compositional data. The simulation results demonstrate the efficiency of the incremental computing algorithms.

Keywords: Online updating; Simplex space; OLS regression; PCA.