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Dr. Alfonso Valencia

Dr. Janet Kelso

Executive editors



*Bioinformatics*

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Dear Dr. Valencia and Dr. Kelso,

Attached please find the manuscript by Robin Tu, Alex Foss, and Sihai Zhao entitled, “Capturing patterns of variation unique to a specific dataset” for consideration in *Bioinformatics*.

Capturing patterns of variation present in a dataset is important in exploratory data analysis and unsupervised learning. Contrastive dimension reduction methods, such as contrastive principal component analysis (cPCA), find patterns unique to a target dataset of interest by contrasting with a carefully chosen background dataset representing unwanted or uninteresting variation. However, such methods typically require a tuning parameter that governs the level of contrast, and it is unclear how to choose this parameter objectively. Furthermore, it is frequently of interest to contrast against multiple backgrounds, which is difficult to accomplish with existing methods. We propose unique component analysis (UCA), a tuning-free method that identifies low-dimensional representations of a target dataset relative to one or more comparison datasets. It is computationally efficient even with large numbers of features. We show in several experiments that UCA with a single background dataset achieves similar results compared to cPCA with various tuning parameters, and that UCA with multiple individual background datasets is superior to both cPCA with any single background data and cPCA with a pooled background dataset.

We would like to have this manuscript considered for publication in *Bioinformatics* in the Gene Expression category. Thank you very much for your consideration, and we look forward to hearing from you soon.

Sincerely,

Robin Tu