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Multi-view Clustering on Unmapped Data via Constrained Non-negative Matrix Factorization

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Abstract

Existing multi-view clustering algorithms require that the data is completely or partially mapped between each pair of views. However, this requirement could not be satisfied in many practical settings. In this paper, we tackle the problem of multi-view clustering on unmapped data in the framework of NMF based clustering. With the help of inter-view constraints, we define the disagreement between each pair of views by the fact that the indicator vectors of two samples from two different views should be similar if they belong to the same cluster and dissimilar otherwise. The overall objective of our algorithm is to minimize the loss function of NMF in each view as well as the disagreement between each pair of views. Furthermore, we provide an active inter-view constraints selection strategy which tries to query the relationships between samples that are the most influential and samples that are the farthest from the existing constraint set. Experimental results show that, with a small number of (either randomly selected or actively selected) constraints, the proposed algorithm performs well on unmapped data, and outperforms the baseline algorithms on partially mapped data and completely mapped data.

Keywords: Non-negative matrix factorization, Constrained clustering,

[☆]A preliminary version of this paper was presented in proceedings of the 29th AAAI conference Zhang et al. (2015b)

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