

# dml: Distance Metric Learning in R

Yuan Tang<sup>1</sup>, Tao Gao<sup>2</sup>, and Nan Xiao<sup>3</sup>

**1** Ant Financial Services Group, San Mateo, CA 94402, USA **2** Minghong Investment Management, Shanghai 200122, China **3** Seven Bridges Genomics, Inc., Cambridge, MA 02142, USA

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## Software

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## Summary

Distance metric is widely used in the machine learning literature. We used to choose a distance metric according to a priori (e.g. Euclidean Distance, L1 Distance, etc.) or according to the result of cross validation within small class of functions (e.g. choosing order of polynomial for a kernel). Actually, with priori knowledge of the data, we could learn a more suitable distance metric with (semi-)supervised distance metric learning techniques. `dml` (Tang, Gao, & Xiao, 2015) is such an R package aims to implement a collection of algorithms for (semi-)supervised distance metric learning.

The `dml` package provides native R implementations for a collection of *Distance Metric Learning* algorithms, including both global and local methods such as *Relevant Component Analysis* (Shental, Hertz, Weinshall, & Pavel, 2002), *Discriminative Component Analysis* (Peltonen, Goldberger, & Kaski, 2007), and *Local Fisher Discriminant Analysis* (Sugiyama, 2006). A list of all the implemented algorithms can be found in the `dml` [package reference manual](#). These methods are widely applied in feature extraction, dimensionality reduction, clustering, information retrieval, and computer vision problems.

Additionally, implementations for the variants of the methods are also available in `dml` package. For example, since it was built on top of the `lfda` (Tang, 2017; Tang & Li, 2016) package, users also have access to the family of *Local Fisher Discriminant Analysis* methods, which includes *Local Fisher Discriminant Analysis*, *Kernel Local Fisher Discriminant Analysis*, and *Semi-supervised Local Fisher Discriminant Analysis* (Sugiyama, Idé, Nakajima, & Sese, 2010). To make the results of these methods easy for users to interpret and analyze, both static and interactive visualizations for the results are available through `ggfortify` (Horikoshi & Tang, 2018; Tang, Horikoshi, & Li, 2016) and `autoplotly` (Tang, 2018a, 2018b) packages respectively.

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