The Journal of Open Source Software

UMAP: Uniform Manifold Approximation and Projection

Leland McInnes[1], **John Healy**[1], **Nathaniel Saul**[2], **and Lukas Großberger**[3, 4]

1 Tutte Institute for Mathematics and Computing **2** Department of Mathematics and Statistics, Washington State University **3** Ernst Strüngmann Institute for Neuroscience in cooperation with Max Planck Society **4** Donders Institute for Brain, Cognition and Behaviour, Radboud Universiteit

DOI: 10.21105/joss.00861

Software

- Review
- Repository
- Archive

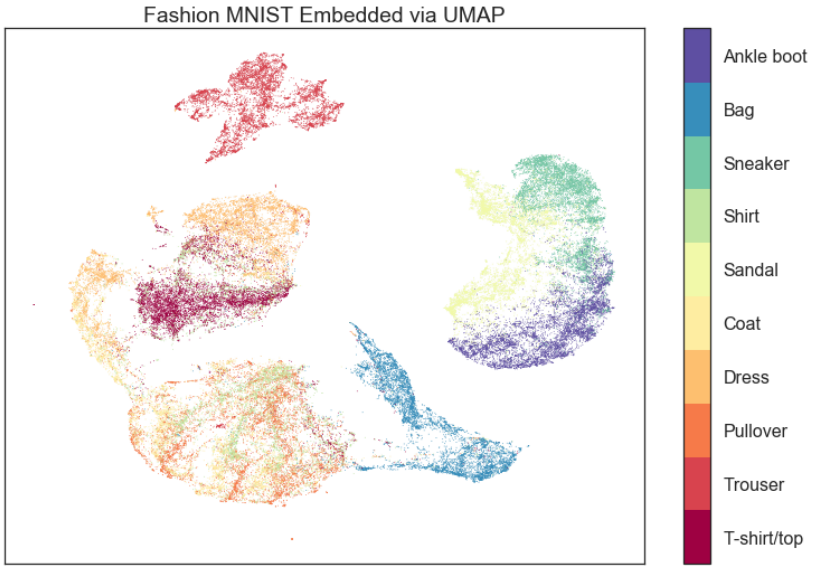
Submitted: 19 July 2018
Published: 02 September 2018

Summary

Uniform Manifold Approximation and Projection (UMAP) is a dimension reduction technique that can be used for visualisation similarly to t-SNE, but also for general non-linear dimension reduction. UMAP has a rigorous mathematical foundation, but is simple to use, with a scikit-learn compatible API. UMAP is among the fastest manifold learning implementations available – significantly faster than most t-SNE implementations.

UMAP supports a number of useful features, including the ability to use labels (or partial labels) for supervised (or semi-supervised) dimension reduction, and the ability to transform new unseen data into a pretrained embedding space.

For details of the mathematical underpinnings see (McInnes & Healy, 2018). The implementation can be found at (McInnes, Healy, Saul, & Grossberger, 2018).



-

References

McInnes, L., & Healy, J. (2018). UMAP: Uniform Manifold Approximation and Projection for Dimension Reduction. *ArXiv e-prints*.

McInnes, L., Healy, J., Saul, N., & Grossberger, L. (2018). UMAP. Retrieved July 22, 2018, from https://github.com/lmcinnes/umap