On a linear Gromov–Wasserstein distance

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Gromov–Wasserstein (GW) distances [2] are a generalization of Wasserstein distances and allow for a comparison and coupling of metric measure (mm-) spaces. Moreover, GW is invariant under certain distance preserving transformations making them very appealing for applications such as shape matching and comparison. However, calculating GW distances can be computationally challenging and things become even worse when all pairwise distances of a set of mm-spaces are required such as e.g. for classification tasks. To alleviate computing all pairwise distances in the Wasserstein context, the authors in [3] proposed a framework referred to as linear optimal transport. This poster shows how to extend this approach to the Gromov–Wasserstein setting. The main idea is to fix a reference space from which the GW is computed to all input spaces. The obtained couplings can be used to define approximate couplings between the inputs. The resulting framework reduces the number of GW computations from $\binom{N}{2}$ to N when requiring the pairwise distances of N mm-spaces. We provide numerical experiments highlighting that linear GW can be successfully used in classification tasks of 2d and 3d shapes.

Joint work with: Robert Beinert, Gabriele Steidl

References

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