Discrete signature tensors for persistence landscapes

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Signature tensors of paths are a versatile tool for data analysis and machine learning. Recently, they have been applied to persistent homology, by embedding barcodes into spaces of paths. Among the different path embeddings, the persistence landscape embedding is injective and stable, however it loses injectivity when composed with the signature map. Here we address this by proposing a discrete alternative. The critical points of a persistence landscape form a time-series, of which we compute the discrete signature. We call this association the discrete landscape feature map (DLFM). We give results on the injectivity, stability and computability of the DLFM. We apply it to a knotted protein dataset, capturing sequence similarity and knot depth with statistical significance. This is based on a joint work with Heather Harrington and Daniel Tolosa.