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Vladimir Itskov*, Department Of Mathematics, The Pennsylvania State University, University Park, PA 16802, and **Alexandra Yarosh**. *Directed complexes, sequence dimension and inverting a neural network*.

What is the embedding dimension, and more generally, the geometry of a set of sequences? This problem arises in the context of neural coding and neural networks. Here one would like to infer the geometry of a space that is measured by unknown quasiconvex functions. A natural object that captures all the inferable geometric information is the directed complexes (a.k.a. semi-simplicial sets). It turns out that the embedding dimension as well as some other geometric properties of data can be estimated from the homology of an associated directed complex. Moreover each such directed complex gives rise to a multi-parameter filtration that provides a dual topological description of the underlying space. I will also illustrate these methods in the neuroscience context of understanding the "olfactory space". This is a joint work with Philip Egger and Alexandra Yarosh. (Received September 25, 2018)