

1116-55-1165

Lori Beth Ziegelmeier* (lziegel1@macalester.edu), 1600 Grand Avenue, Saint Paul, MN
55104. *Persistence Images: An Alternative Persistent Homology Representation.*

Many datasets can be viewed as a noisy sampling of an underlying topological space. Topological data analysis aims to understand and exploit this underlying structure for the purpose of knowledge discovery. A fundamental tool of the discipline is persistent homology, which captures underlying data-driven, scale-dependent homological information. A representation in a persistence diagram concisely summarizes this information. By giving the space of persistence diagrams a metric structure, a class of effective machine learning techniques can be applied. We modify the persistence diagram to a persistence image in a manner that allows the use of a wider set of distance measures and extends the list of tools from machine learning which can be utilized. It is shown that several machine learning techniques, applied to persistence images for classification tasks, yield high accuracy rates on multiple data sets. Furthermore, these same machine learning techniques fare better when applied to persistence images than when applied to persistence diagrams. We discuss sensitivity of the classification accuracy to the parameters associated to the approach. An application of persistence image based classification to a data set arising from dynamical systems is presented to further illustrate. (Received September 17, 2015)