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Title: Geometric measure theory and notions of dimensionality in data science

Abstract: An important and highly effective tool in modern data science is Principal Component Analysis which uses linear algebra to determine the dimension of the space where a given multi-dimensional data set is concentrated. However, when the lower dimensionality of the data set is due to a fractal phenomenon, a different set of tools is needed. We are going to describe how some basic notions from geometric measure theory, such as energy integrals and their discrete analogs can be used to study such data sets. Some numerical experiments, coded in python, will be given to illustrate the results.