

1176-62-226

Austin Lawson* (alawso50@utk.edu), **Vasileios Maroulas**, **Farzana Nasrin** and **Theodore Papamarkou**. *Bayesian Inference with Random Persistence Diagrams*. Preliminary report.

Tools from Topological Data Analysis (TDA) make it possible for us to analyze shape information stored inside datasets. Persistent homology, a tool widely used in TDA, transforms data into a sequence of topological spaces and subsequently tracks changes in homological information of these spaces across the sequence and produces a summary known as a persistence diagram. Recently, the study of distributions of random diagrams has been of interest. In this paper, we propose a method for Bayesian parameter inference by sampling the posterior distribution of the parameters governing the distribution of random diagrams. For sampling the posterior, we propose a Pseudo-marginal Markov Chain Monte Carlo (PM-MCMC) algorithm. We use this algorithm to explore the parameter space and to generate random persistence diagrams. We explore an application to the Skin Cancer MNIST dataset. (Received January 24, 2022)