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Functional Summaries of Persistence Diagrams.

The main object of study in applied algebraic topology is the persistence diagram. However, persistence diagrams do not lend themselves naturally to statistics, as common algebraic operations—such as addition, division, and multiplication—are challenging (e.g., the mean might not be unique). Thus, we extend our investigation to consider functional summaries of persistence diagrams such as Landscapes and Silhouettes. Functional summaries map a persistence diagram into a function. Then, the problem of analyzing a set of diagrams becomes the problem of analyzing a set of functions, which is a topic that has been studied for decades in statistics. We establish a generalized collection of functional summaries, and to analyze their statistical aspects.

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