Topological Flow Data Analysis Part 2- Implementation and Software Demonstration[1] TOMOKI UDA, Tohoku University, TOMOO YOKOYAMA, Kyoto University of Education, TAKASHI SAKAJO, Kyoto University — Topological data analysis attracts researchers in many fields and it also plays important roles in Topological Flow Data Analysis (TFDA). In the TFDA basis by Sakajo and Yokoyama, streamline patterns are identified by partially Cyclically Ordered rooted Trees (COTs) under topological classification. Since their theory is applicable to a wide range of physical phenomena, there is a rise in demand for an algorithm converting given flow data to COTs. A Reeb graph of a real-valued function, which consists of certain topological features, is a central key to the conversion. The author has proposed a new algorithm so that the Reeb graph with certain mathematical properties are obtained. Because our formulation is based on persistent homology in topological data analysis, a stability is ensured in our algorithm. We also establish a consistency theorem that bridges a gap between discrete data and continuous data. Furthermore, we do not assume any interpolation, and hence any mesh-like input data are accepted. Thanks to these nice properties we can effectively construct a COT-representation from discrete flow data. In the second part of our series presentations, we will provide quick explanations for the algorithm and demonstrate usage of a library "`psiclone`" for TFDA.

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