Persistent homology and viral evolution
4th Workshop on Topological Methods in Data Analysis
Heidelberg, September 2023

Recommended reading

Overview

[Ca14] Carlsson: *Topological pattern recognition for point cloud data*
https://doi.org/10.1017/S0962492914000051

[Ca09] Carlsson: *Topology and data*
https://doi.org/10.1090/S0273-0979-09-01249-X

[Ed14] Edelsbrunner: *A short course in computational geometry and topology*

[RB20] Rabadan and Blumberg: *Topological data analysis for genomics and evolution*

[OPTGH17] Otter, Porter, Tillmann, Grindrod, Harrington: *A roadmap for the computation of persistent homology*
https://doi.org/10.1140/epjds/s13688-017-0109-5

[Gh08] Ghrist: *Barcodes: the persistent topology of data*
https://doi.org/10.1090/S0273-0979-07-01191-3

Mathematics

[Mu75] Munkres: *Topology*

[Mu84] Munkres: *Elements of algebraic topology*

[Ha02] Hatcher: *Algebraic topology*
https://pi.math.cornell.edu/~hatcher/AT/AT.pdf

[Gi81] Giblin: *Graphs, surfaces and homology*

[EH10] Edelsbrunner and Harer: *Computational topology*

[Ro92] Roman: *Advanced linear algebra*

[ZC05] Zomorodian and Carlsson: *Computing persistent homology*
https://doi.org/10.1007/s00454-004-1146-y

Applications

[CCR13] Chan, Carlsson, Rabadan: *Topology of viral evolution*
https://www.pnas.org/content/110/46/18566

Recommended reading by topic

Introduction
Carlsson [Ca14] and [Ca09]
Chan-Carlsson-Rabadan [CCR13]
Rabadan-Blumberg [RB20]

What algebraic topology is about
Munkres [Mu75] Ch. 2

Simplicial complexes
Munkres [Mu84] §1-3
Edelsbrunner-Harer [EH10] Sec. III.1

Homology
Munkres [Mu84] §5-12
Edelsbrunner-Harer [EH10] Sec. IV.1-2
Zomorodian-Carlsson [ZC05] §2

Persistent homology
Otter, Porter, Tillmann, Grindrod, Harrington [OPTGH17] §4-5
Carlsson [Ca14] §3
Ghrist [Gh08] §1-2
Edelsbrunner-Harer [EH10] Sec. VII.1
Zomorodian-Carlsson [ZC05] §2-3

Computing homology groups
Munkres [Mu84] §11 (and §4)
Otter, Porter, Tillmann, Grindrod, Harrington [OPTGH17]

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