



# TOPOLOGY SEMINAR

## An Introduction to Topological Data Analysis

By

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**Abstract:** Topological Data Analysis is an emerging area of mathematics where topological methods are used to analyze data. One of the most important tools for TDA is Persistent Homology. The input of this process is a finite metric space (a data cloud) and the output is a barcode or a persistent diagram. Given a finite metric space, using closed balls of changing radius, we build a filtered simplicial complex. The homology modules of these filtered simplicial complexes are called persistent homology modules and they are expressed using barcodes or persistent diagrams. What makes this method very useful is that the persistent homology calculations can be done using a simple matrix algorithm, called the reduction algorithm. I will introduce basic ideas behind persistent homology and show how the reduction algorithm works. Most of the talk should be accessible to an undergraduate student who has taken a linear algebra course.

**Date:** Monday, February 5, 2024

**Time:** 13:30

**Place:** SA-141 & ZOOM

To request the event link, please send a message to [cihan.okay@bilkent.edu.tr](mailto:cihan.okay@bilkent.edu.tr)