**Topological Data Analysis, Capacity Markets**

<https://learning-analytics.info/index.php/JLA/article/view/5196/6089>

<https://www.frontiersin.org/journals/artificial-intelligence/articles/10.3389/frai.2021.667963/full>

<https://docs.scikit-tda.org/en/latest/>

<https://www.google.com/search?q=topological+data+analysis&sca_esv=28f75805e8b7cfed&rlz=1C1VDKB_enUS1126US1130&sxsrf=ADLYWIKhnEu9qKY2eJZQw40QtmB6wnoH_A%3A1735191057735&ei=EepsZ4_LLNuHwbkPnuTxmQw&ved=0ahUKEwjPl_S02sSKAxXbQzABHR5yPMMQ4dUDCBA&uact=5&oq=topological+data+analysis&gs_lp=&sclient=gws-wiz-serp#fpstate=ive&vld=cid:90402fcc,vid:fpL5fMmJHqk,st:0>

Extraction of information from datasets that are high-dimensional, incomplete and noisy is generally challenging.

* **Dimensionality curse:**When dealing with high-dimensional data, the number of possible combinations and relationships between features grows exponentially, making it difficult to find relevant patterns without proper dimensionality reduction techniques.
* **Noise amplification:**Noise can become more prominent in high-dimensional data, obscuring the underlying signal and leading to unreliable analysis results.
* **Missing data issues:**Incomplete data can create challenges in accurately representing the underlying phenomenon, especially when missing values are not properly handled.

Number Theory:

* Exploring the distribution of prime numbers in specific sequences.
* Investigating the applications of elliptic curves in cryptography.
* Studying the properties of Diophantine equations.

Algebraic Geometry:

* Analyzing the geometry of algebraic varieties using modern techniques.
* Exploring connections between algebraic geometry and number theory.
* Investigating the applications of algebraic geometry in computational biology.

Topology:

* Studying topological invariants in high-dimensional spaces.
* Applying topological methods to analyze complex networks.
* Exploring the relationship between topology and data analysis.

Analysis:

* Investigating the properties of fractal sets and their applications.
* Studying the convergence of Fourier series in different function spaces.
* Developing new methods for solving partial differential equations.

Applied Mathematics:

* Mathematical modeling of epidemic spread
* Optimization algorithms for large-scale data analysis
* Numerical methods for solving complex fluid dynamics problems

Computational Mathematics:

* Designing efficient algorithms for solving large-scale linear systems.
* Developing new computational methods for solving inverse problems.
* Exploring the use of machine learning techniques in computational mathematics.