AYASDI

[ai-yaz-dee] means “to seek” in Cherokee

Feature Discovery Using Topological Data Analysis (TDA)

April 2013

CONFIDENTIAL

The Age of Big Data!

- Financial transactions, GPS coordinates, social media generate 2.5 Quintillion Bytes (exabytes) every day!
- Expected to grow by 100% annually through 2015.
- Huge Potential for user centric solutions

A Small Problem :-(

- How do we derive any insights from such big data?
- Traditional approach is to ask questions and query answers
- How do you ask question you didn't know to ask?

From data to insights?

Feature Selection

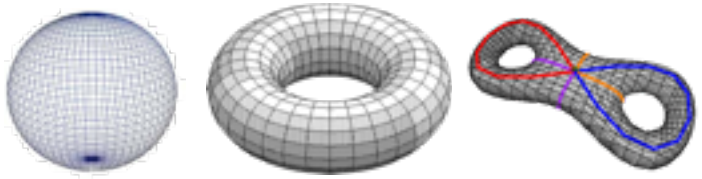
- Typical data sets have hundreds to thousands of features
- Feature selection decides which features to use for prediction and how they are related
- Key challenge especially in feature rich data sets such as DNA microarrays, etc.

The Curse of Combinatorics!

A Pioneering Approach

Topology is the study of shape

Topology is a branch of mathematics from the 1700's that studies continuity and connectivity of objects and spaces, utilizing the shape of data to derive meaning in data



Our Differentiation is TDA

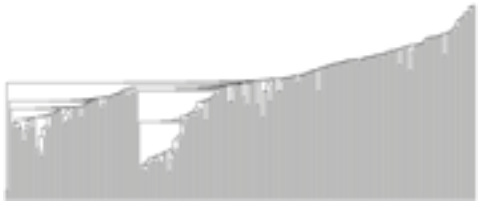
The combination of Topological Data Analysis (TDA) with machine-learning automatically creates topological networks revealing statistically significant patterns in complex data

"Ayasdi's approach is using Topological Data Analysis one of the **top 10 innovations** developed at DARPA in the last decade."

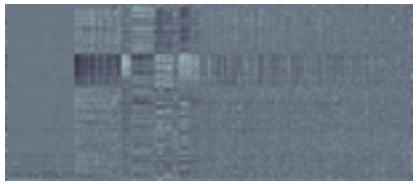
Tony Tether, Director
Defense Advanced Research Projects Agency (2001-2009)

How TDA is Different

Traditional Statistics

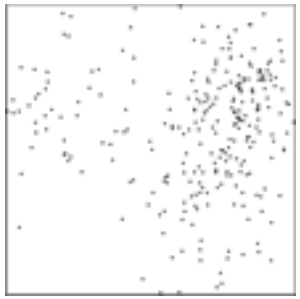


Algebraic models



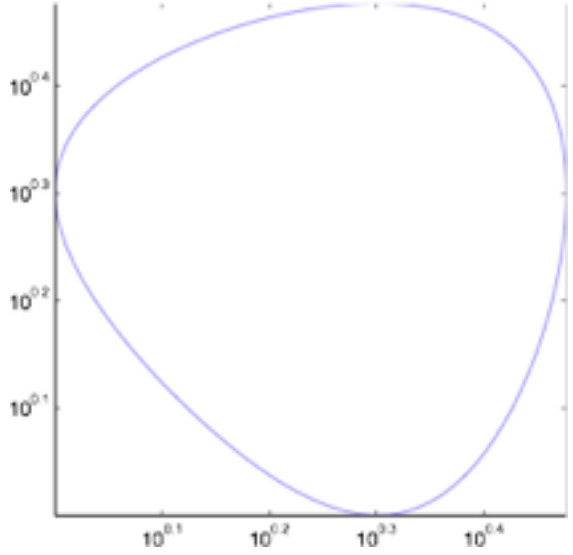
Visualization

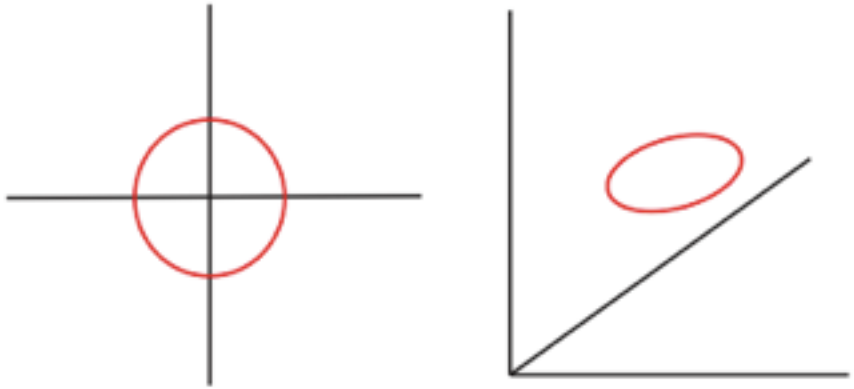
Scatterplots, Heatmaps, Dendrograms,



Property #1: Coordinate Freeness

Topology studies properties of geometric objects which are not dependent on the particular coordinate frame in which they are represented.



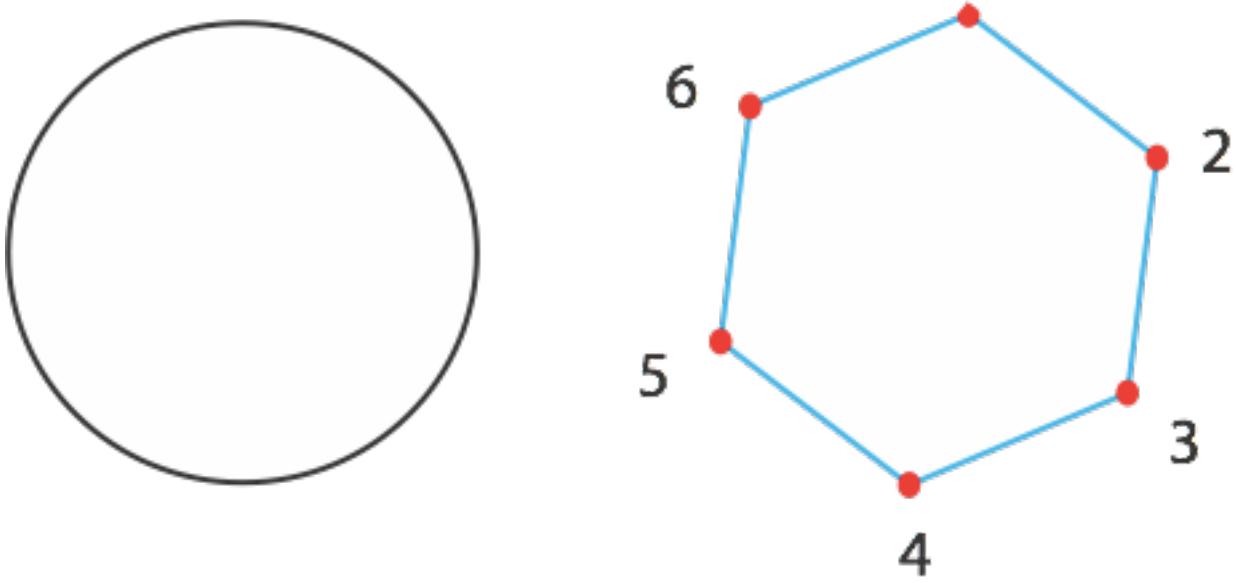


Property #2: Deformation Invariance

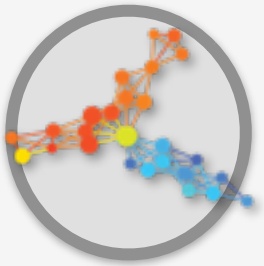
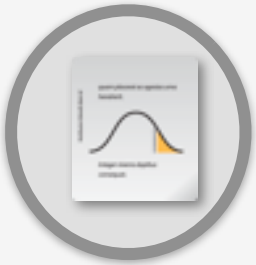
Topology studies properties of curves and surfaces which do not change when you stretch them.

Property #3: Compressed Representation

Topology constructs small, combinatorial representation of continuous objects.



The Ayasdi Platform™

Mathematical Algorithms	Topological Data Analysis	Advanced Statistics	User Experience
			
Data automatically processed through 100's of machine learning algorithms	Data transformed into topological networks revealing insights and hidden patterns	50+ statistical tests provide statistical relevance and integrity to the insights	Domain experts interface with data to validate insights and execute on results

"Ayasdi is one of the **real advances in data analysis** to have arrived in the last 10 years"

Bloomberg Businessweek

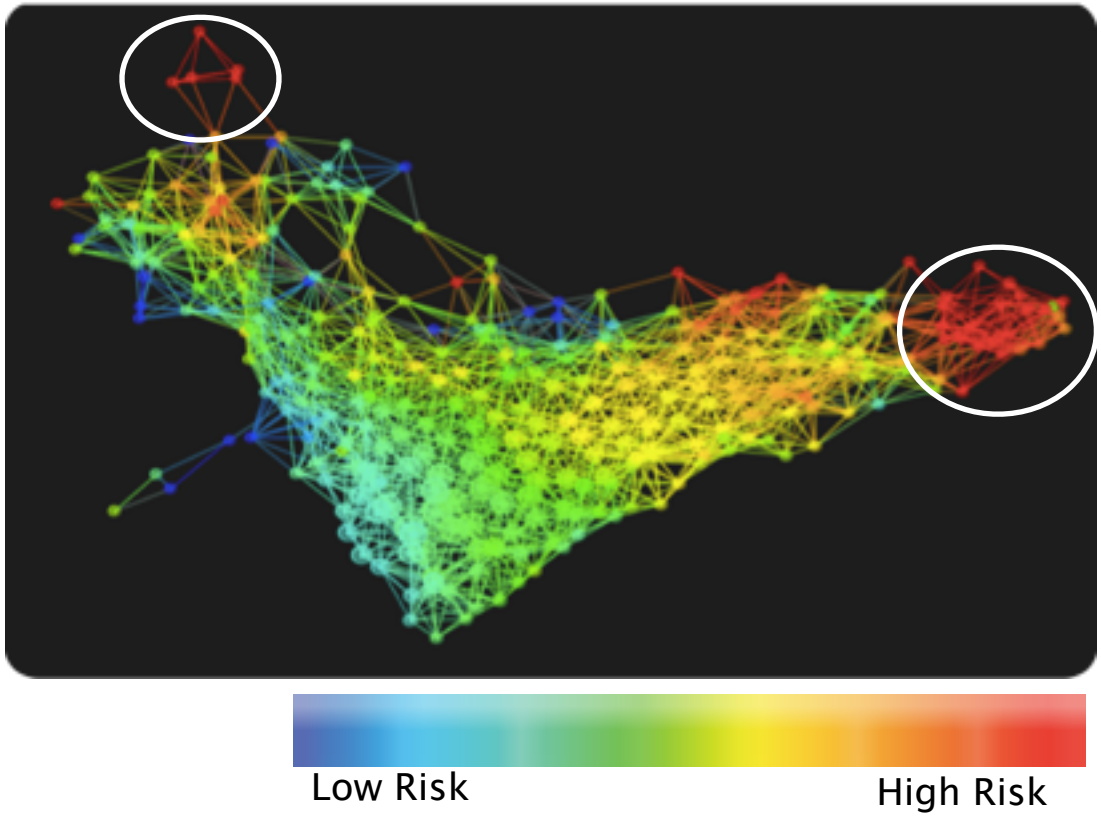
Eric Schadt
Director of the Institute for Genomics & Multiscale Biology
New York Mount Sinai Medical Center

Discovering Fraud

Finding fraudulent transactions.

This topological network automatically discovers transactions where fraud exists.

About the Data:
~6M transactions across ~300 attributes

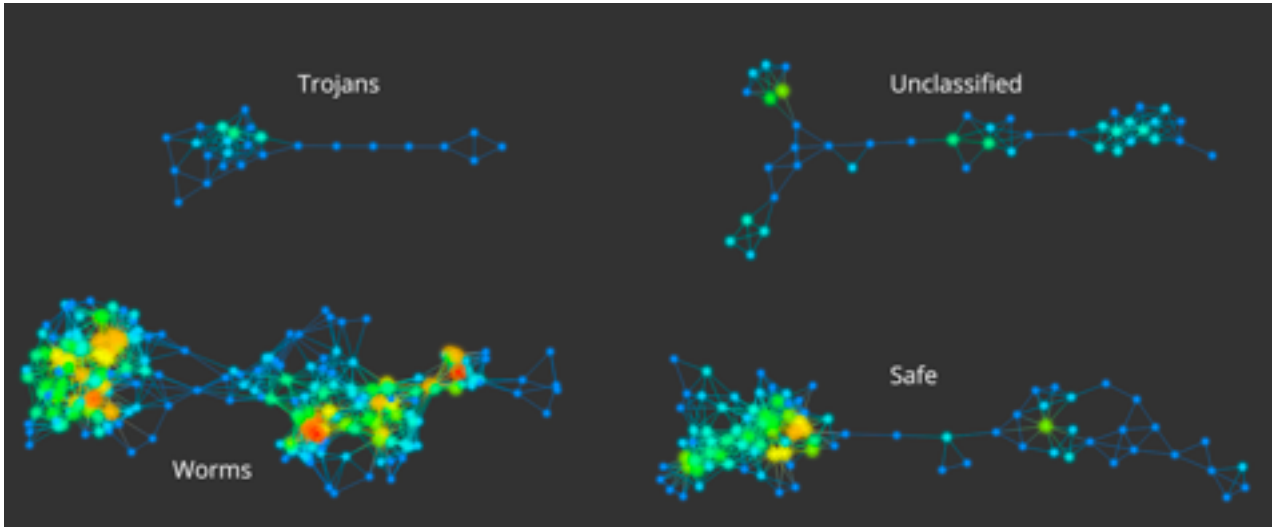


Detecting Malware Attacks

Finding new patterns of malware.

This topological network automatically discovers program types highlighting malware.

About the Data:
~30K system calls
~Hundreds of programs

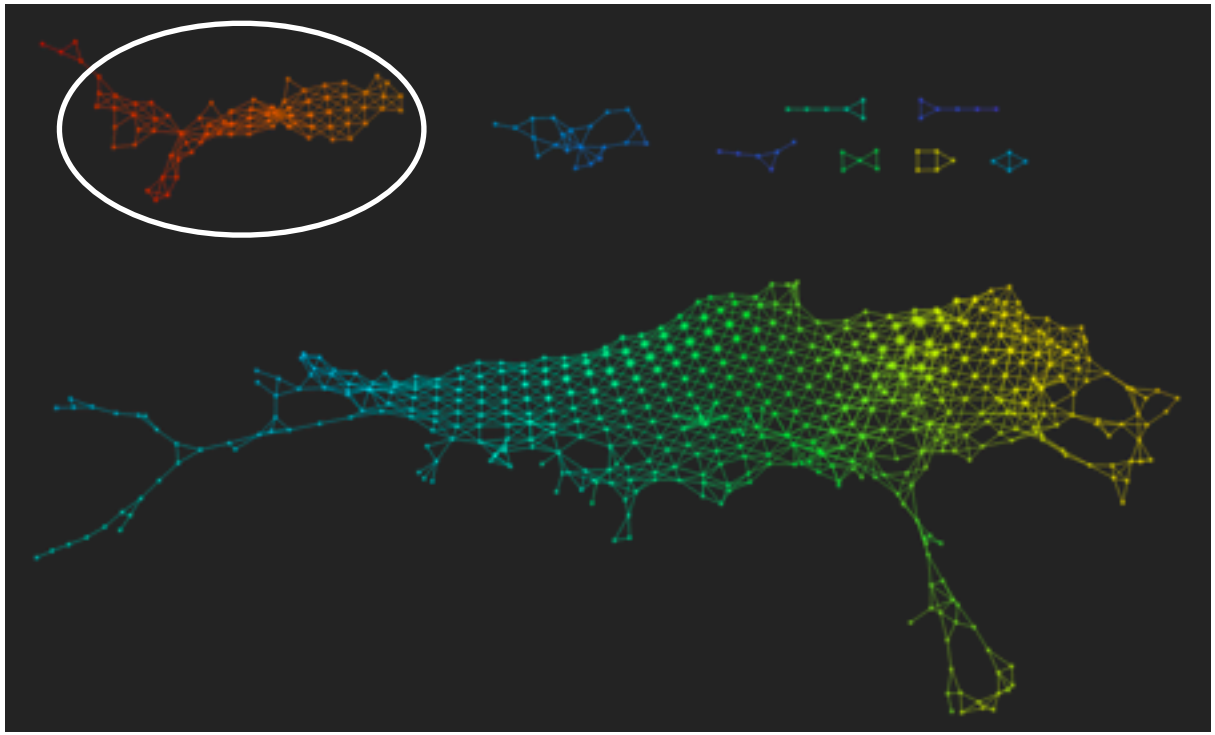


Optimizing Yield Performance

Predicting yield performance across manufacturing lines.

This topological network automatically classifies manufacturing lines and to help formulate a strategy for yield optimization.

About the Data:
~ 1,000+ MFG lines
~ 500+ attributes/line

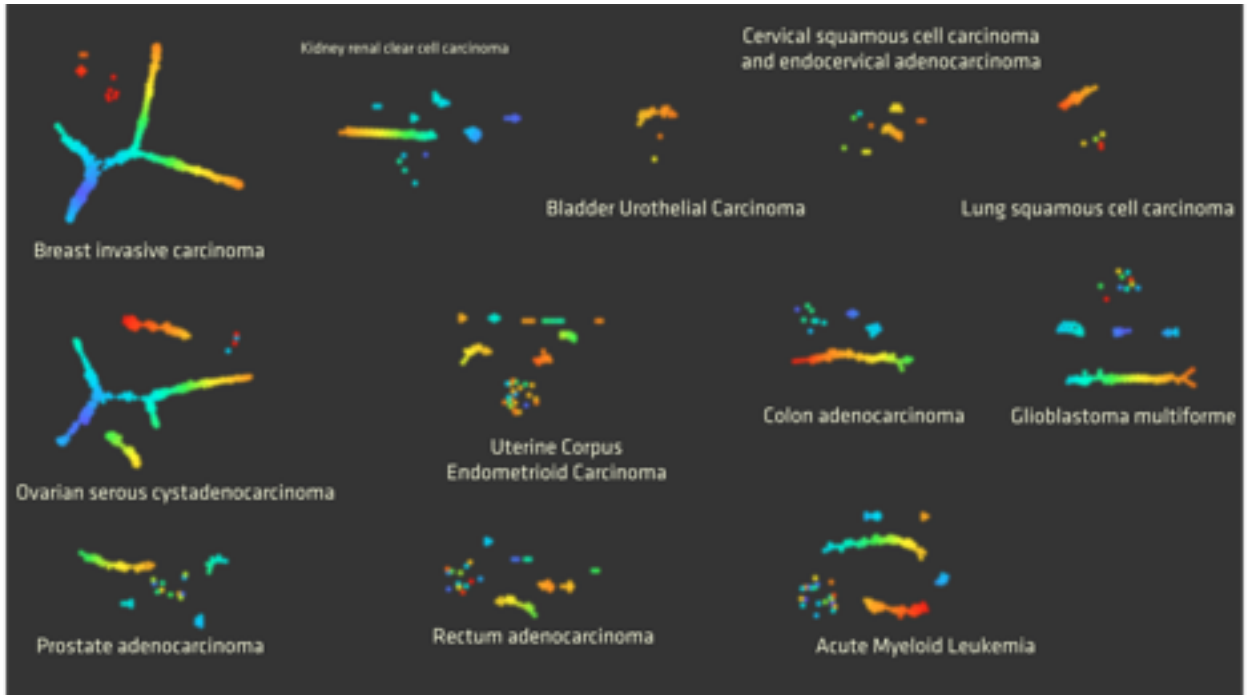


Developing Targeted Drugs

Finding patient sub-populations to develop targeted drugs.

This topological network automatically grouped patients into sub-categories based on genetic characteristics.

About the Data:
~ 3M genetic markers
~ 14K patients



Vision

Transform how the world uses data to solve problems

The new shape of big data

Ayasdi: A Big Data Startup with a Long History

Ayasdi: Stanford Math Begets a Data Company

New big data firm to pioneer topological data analysis

A New Company Uses Big Data to Fight Cancer (And Rethink Basketball)

Has Ayasdi turned machine learning into a magic bullet

Questions?

AYASDI