

TECHNOLOGY BRIEF

TOPOLOGICAL DATA ANALYSIS MACHINE LEARNING ALGORITHM (TDAML)

Patent Pending:
US 18645545

Integrating TDA with Artificial Intelligence/Machine Learning (AI/ML) for Data Fusion and Target Recognition

Problem:



Autonomous systems often struggle to integrate data from diverse sensors due to complexity, interference, and the limitations of slow, resource-intensive methods.



Solution:



The TDAML method transforms diverse data types into compact features, enabling more efficient fusion for target recognition and autonomy with less data.

Benefits:

- **Creates** compact “topological fingerprints” for data samples.
- **Transforms** raw sensor data into deep learning-friendly formats.
- **Uses** TDA to encode and fuse data for AI/ML systems.
- **Enhances** resilience against interference and adversarial threats.
- **Reduces** data size while preserving detection accuracy.



Escape Data Collection: 30TB of sensor data from 10 modalities across 4 UAVs, 7 ground vehicles, and 5 dismounts at Griffiss Airfield & Stockbridge Test Site.

Applications:



Collision Mitigation in Autonomous Vehicles



Autonomous Target Recognition (ATR)



Deployable Autonomy



Data Fusion in Contested Environments



Intelligence, Surveillance, and Reconnaissance (ISR)

Interested in licensing this technology?

Contact the Griffiss Institute Innovation & Partnerships Team to Learn More!



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