Fusion and Inference from Multiple and Massive Disparate Data Sets

Carey E. Priebe
Department of Applied Mathematics & Statistics
Johns Hopkins University

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“The wealth of your practical experience with sane and interesting problems will give to mathematics a new direction and a new impetus.”

– Leopold Kronecker to Hermann von Helmholtz –
What is mathematics?

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With apologies to Richard Courant and Herbert Robbins

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universe

sensors

collection management / sensor deployment

bigdata

bigdata processing

bigdata inference

decisions / decision makers

(MMDDS)
universe

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universe
Fusion and Inference from Multiple and Massive Disparate Data Sets

$h: \text{Extract } \{V_i, x_i, t_i\}_{i \in I}$

Generate Time Series of Attributed Graphs
Fusion and Inference from Multiple and Massive Disparate Data Sets

\[ h : \Xi \times \Xi_1 \times \cdots \times \Xi_K \rightarrow \text{Extract } \{V_i, x_i, t_i\}_{i \in I} \]

Generate Time Series of Attributed Graphs
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$h: \Xi_1 \times \cdots \times \Xi_K \rightarrow \Xi_I$

Extract \(\{V_i, x_i, t_i\}_{i \in I}\)

- professor
- student
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Anomaly Detection in Time Series of Attributed Graphs
The Curse of Dimensionality
Connectome Example

- Synapse detection
- Computer vision tracking of axon & dendrite to neurons associated with synapse
- Graph construction

Flow diagram:
- Volume → Synapse detection → Synapses → Neurons → Graph construction
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