Oral Qualifying Exam Proposal

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Contents

Abstract

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Research Questions

Goal: Time-adaptive Multiple-Instance Manifold Learning

1. **Manifold learning from imprecise data**
    - Multiple instance learning for manifold construction
    - Extend supervised manifold learning methods to MIL framework
    - Best way to construct the manifold (AE, SOM, classical methods, graph-based)
    - Outlier/ adversarial robustness
    - Time series embedding
2. **Multi-sensor fusion using manifolds**
    - Can we intelligently combine manifolds for classifier/ sensor fusion?
    - Incorporation of context-dependent information
    - Fusion using manifolds
    - General fusion approaches (HME, Choquet integral, HMM)
    - Dissimilarity metrics (Measure similarity of manifolds/ How to determine placement of sample in test)
3. **Time-adaptive fusion**
    - Merging/ stitching (How to merge/when to merge)
    - System growing/ pruning
    - Model manifolds as Markov states? (Combination of states/ state estimation/ prediction)
    - Reinforcement learning for parameter adaptation