The Graphical Models Toolkit and Applications to Online Activity Recognition for ISTC

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Summary

- Graphical models are a powerful and flexible modeling framework for a wide array of problems (e.g., graphical decision models, hidden Markov models).
- Graphical models allow for efficient computation and reasoning about complex systems.

Using Graphical Models

- A graphical model is a visual, abstract, and mathematically formal description of a family of probability distributions.
- Graphical models are used in various fields, including speech recognition, computer vision, and natural language processing.

Activity Recognition Model

- Activity recognition models are used to identify and classify human activities from sensor data.
- These models can be used in health monitoring, security, and surveillance applications.

Graphical Program Graphs for Debugging/Teaching

- Graphical program graphs provide a visual representation of a program's control flow.
- These graphs can be used to teach debugging techniques and to improve program understanding.

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Dynamic Graphical Models

- Dynamic graphical models are used to model systems that change over time.
- These models can be used in applications such as financial forecasting and weather prediction.

Large Vocabulary Continuous Speech Recognition

- Large vocabulary continuous speech recognition is a challenging problem in natural language processing.
- These systems use graphical models to handle the variability in speech data.

Sub-Families of Probability Distributions

- The toolkit supports several sub-families of probability distributions, including Gaussian, tree-based, and factorized distributions.
- These sub-families allow for flexible modeling of complex systems.

Sensor Teams for Activity Recognition

- Sensor teams are used to collect data from multiple sensors in a coordinated manner.
- These teams can be used in applications such as surveillance and health monitoring.

Graphical Models Tool Features

- The toolkit provides features such as graphical program graphs, debugging tools, and performance metrics.
- These features aid in the development and analysis of graphical models.

SPA: multi-clients each with sensor over network

- SPA is a system that supports multi-clients with sensor over network.
- This system is designed to be scalable and efficient.

Deterministic Relationships Between Random Variables

- Graphical models can be used to model deterministic relationships between random variables.
- These relationships can be used to reason about the behavior of complex systems.

GMM Toolkit Design Workflow

- The toolkit design workflow involves several steps, including data collection, model selection, and evaluation.
- This workflow enables the development of effective graphical models.

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References