



MIT Lincoln Laboratory Seminar Series at Northeastern University 2008



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"To promote strong collaboration and inspire new ideas"

15 January
3:00 PM

Dana Research Center 442
100 Forsyth Street

Bayesian Inference Approach to Learning Coordinated Traffic Behavior for Non-tracking Sensors

Abstract

MIT Lincoln Laboratory has developed a method for learning and detecting coordinated traffic behavior for situations in which tracking is infeasible. For example, tracking in large areas with dense traffic is very demanding of sensor resources, and maintaining track of interacting objects is extremely difficult. Therefore, non-tracking methods for interpreting intentional traffic coordination have been explored.

The approach is to statistically model different traffic behavior classes, at a particular location, in order to detect the activity of interest and then combine the results from multiple locations using a reasoning structure. The seminar will present a method for learning this reasoning structure from the data using a Bayesian Network structure search, then using the Bayesian Network to infer the overall situation across multiple sites. This approach emphasizes evidence accumulation and continuous learning, which lends strong support to the proposed multi-input computational framework.

MIT Lincoln Laboratory's research is applied to wide-area persistent surveillance using moving-target indication (MTI) radar data. MTI is a radar data-processing technique for detecting moving vehicles. The MIT Lincoln Laboratory approach was tested by collecting MTI data while running multiple experimental military ground scenarios, each involving coordinated activity over multiple sites. By using this approach, the overall behavior classes were reliably identified.

This talk will include a tutorial of the related statistical modeling process and Bayesian inference technique. This will be followed by an evaluation of the Laboratory's results, which demonstrate the ability of this technique to identify military activity.

About the Speaker

Lawrence Bush is an algorithm developer at MIT Lincoln Laboratory in the Intelligence and Decision Technologies group. His research involves advanced probabilistic control, sensing, data fusion and systems engineering applied to the development of autonomous sensing and decision support systems.

He has a B.S. degree in industrial engineering/operations research from the University at Buffalo and an M.S. degree in computer science from Rensselaer Polytechnic Institute. Mr. Bush is currently a Lincoln Scholar pursuing a PhD degree in robotic autonomy (MIT Department of Aeronautics & Astronautics). His prior employment includes work on expert systems at Cornell University, New York State Agricultural Research Station.



**Lawrence
Bush**

**Intelligence and
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