Novel Sensor Scheduling Scheme for Intruder Tracking in Energy Efficient Sensor Networks

ABSTRACT

We consider the problem of tracking an intruder using a network of wireless sensors. For tracking the intruder at each instant, the optimal number and the right configuration of sensors has to be powered. As powering the sensors consumes energy, there is a trade off between accurately tracking the position of the intruder at each instant and the energy consumption of sensors. This problem has been formulated in the framework of Partially Observable Markov Decision Process (POMDP). Even for the state-of-the-art algorithm in the literature, the curse of dimensionality renders the problem intractable. In this paper, we formulate the Intrusion Detection (ID) problem with a suitable state-action space in the framework of POMDP and develop a Reinforcement Learning (RL) algorithm utilizing the Upper Confidence Tree Search (UCT) method to solve the ID problem. Through simulations, we show that our algorithm performs and scales well with the increasing state and action spaces.

EXISTING SYSTEM

- In existing system, two time-scale Q-Learning algorithm with function approximation has been developed to mitigate the curse of dimensionality problem.
- In their algorithm, policy gradient update is carried out on the faster timescale and Q-values are updated on slower timescale.
- The algorithms mitigate the problem of state explosion, the problem of action explosion needs to be handled to obtain scalable solutions.

PROPOSED SYSTEM

- We propose an RL algorithm for the problem of intruder detection under energy budget constraints. .
- This is a greedy algorithm in which the top probable sensor positions the intruder might move to will be turned ON for tracking during each time period..
- This algorithm solves the problem of state explosion. However, the algorithm requires all the (exponential) number of actions to be tried out a sufficient number of times before timeout.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

- •Processor Intel core i3
- •RAM 2B
- •Hard Disk 20 GB

SOFTWARE REQUIREMENTS

- •Operating System : LINUX
- •Tool : Network Simulator-2
- •Front End : OTCL (Object Oriented Tool Command Language)

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