Monte Carlo based Probabilistic Path Search in Random Graphs

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Summary

As part of an EU project in the field of computer security, we need to address certain consequences of actions taken in huge, widely spread computer networks, due to possible collateral damage.

To address a potential damage, we pursue a probabilistic approach, which shall be implemented in this Master’s thesis. The goal of thesis shall be to understand the mathematical principles, implement a highly scalable algorithm in Java and to research current state of art papers.

This Master’s thesis is open to all study fields. No special knowledge of computer security is needed. Computer scientists with medical background are highly welcome, as the underlying mathematical problem can be found in various medical areas.

Toy Example

A pirate (P) owns a treasure map, in which certain areas of interest are denoted. It is rumoured, that at those places (with a certain probability) a gold treasure is hidden. Sadly, the map of the pirate is very old, and it might be that certain paths are not existing or are unpassable anymore.

What is the probability that our pirate might get to at least one gold treasure?

Prerequisites

- Fundamentals of probability theory
- Bayesian Networks and Hidden Markov Models
- Profound mathematical understanding
- Well defined object oriented programming skills
- Depth-First and Breadth-First shouldn’t be Greek to you

Goals

- Excellent thesis
- Publication in a scientific journal or conference
- Use of your implementation in an EU project

Contact

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