



Reinforcement Learning in Graph Theory

Imagine travelling to a city but unfortunately, you do not have access to its map. You would like to explore the city as efficiently as possible, i.e., minimizing your time or money or some other function of your resources.

The above problem is an instance of *Online Graph Exploration* problem, where an agent has to explore a graph – unknown to the agent – from a starting point. At any given moment, the agent only knows the connections from the nodes it has already visited. These connections lead to already visited nodes or possibly new ones. The task is to visit all the nodes in the graph quickly and return to the starting point.

It is interesting that despite a long history of theoretical research on this problem, the final word on the best algorithm to explore any graph is not out yet. Moreover, the graphs that are hard to explore are also not understood well. In this thesis, we want to take a different approach and use deep reinforcement learning to solve this mathematical problem since it is emerging out to be a successful method to learn complex strategies – unsupervised. We already have a some ideas and a basic implementation to start with but a lot remains unexplored.

Requirements: Interest in graph algorithms and prior knowledge in deep learning and reinforcement learning.



Interested? Please contact us for more details!

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