

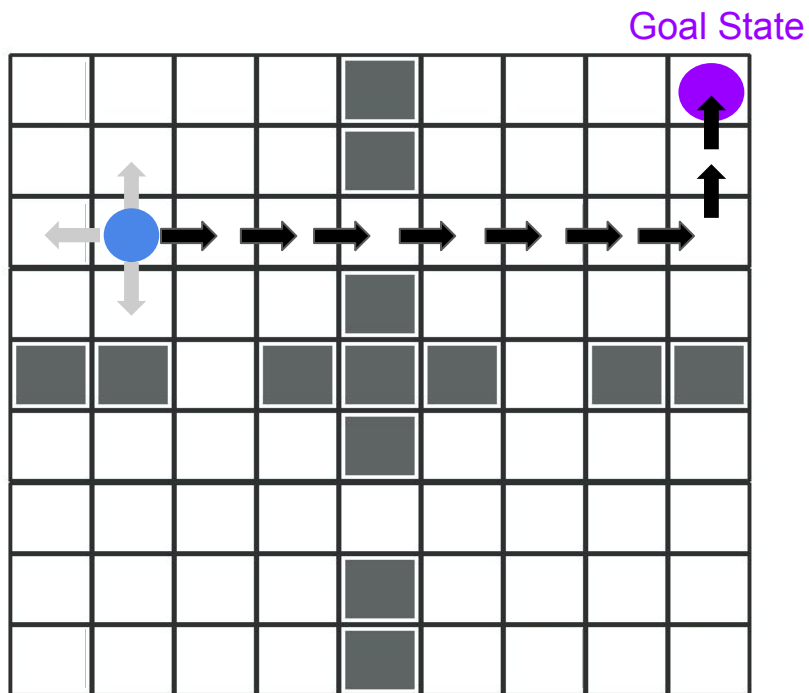
Discovering Options for Exploration by Minimizing Cover Time

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Brown University

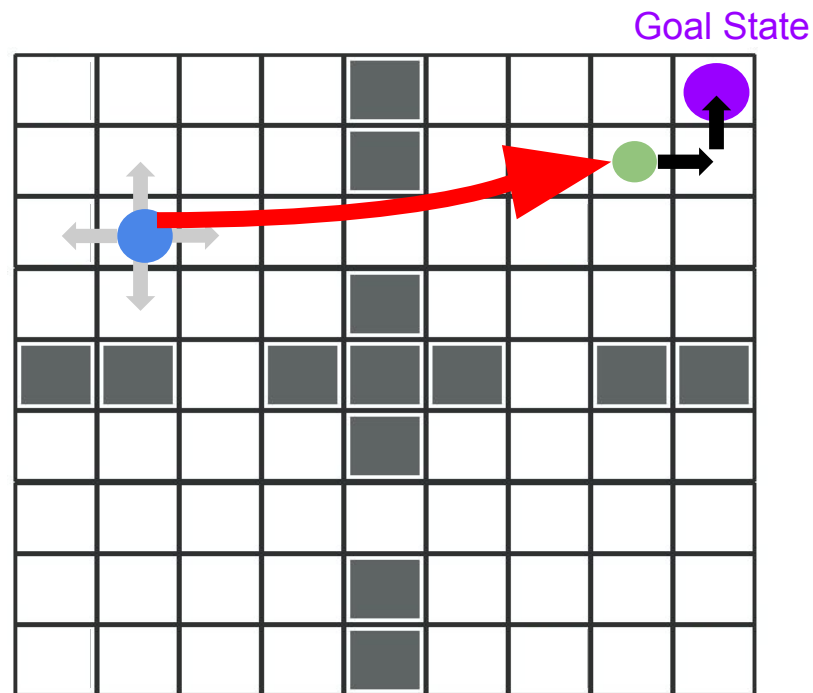
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Options (Sutton et al. 1999)

Primitive Actions

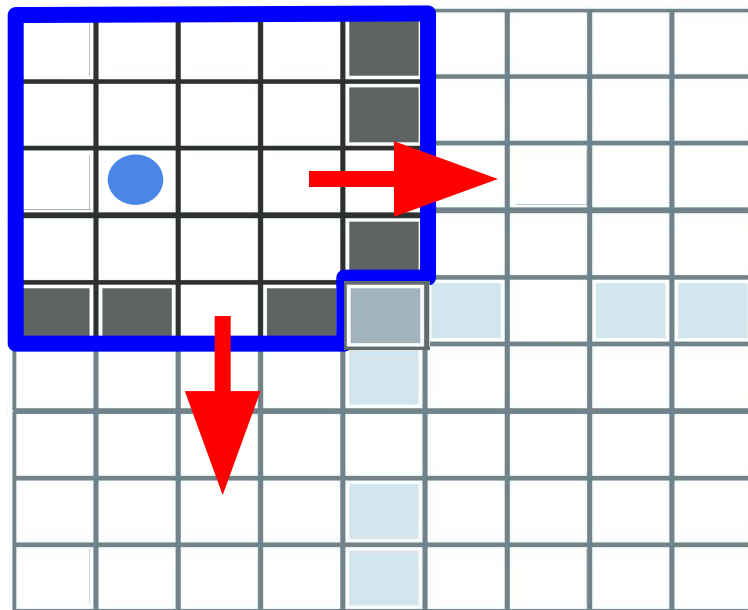


Using Options



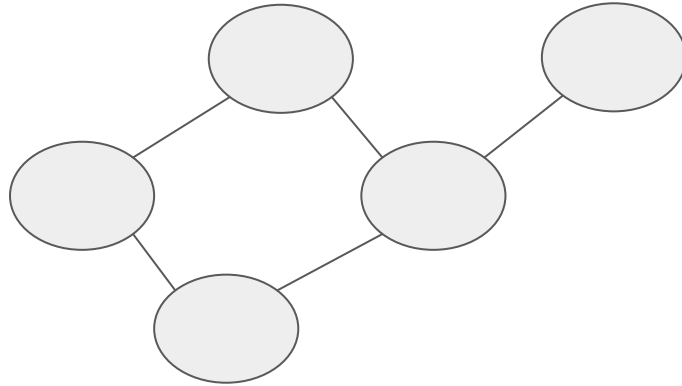
How can options help agents explore?

Explored states



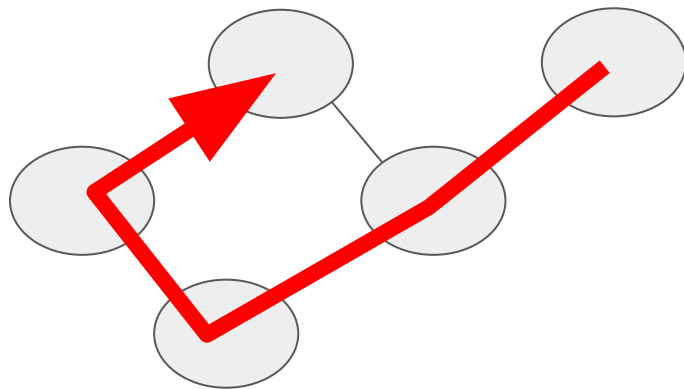
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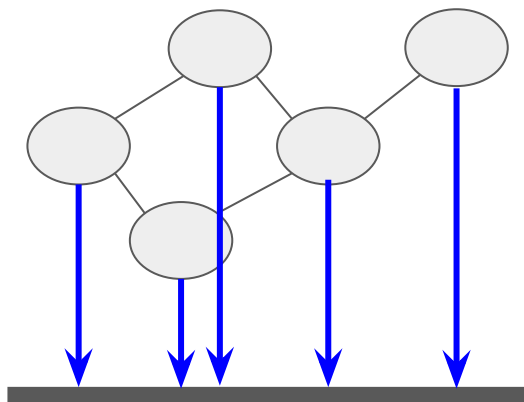
**Cover Time: #steps to visit every state
by a random walk**

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2. Proposed **an option discovery algorithm** which minimizes the upper bound of the cover time

Algorithm:

1. Embed the state-space graph to a real value (i.e. Fiedler vector)

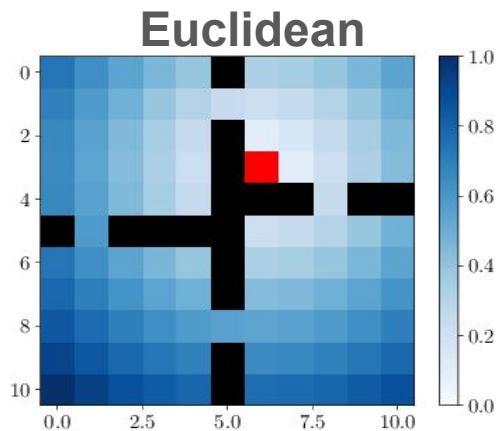
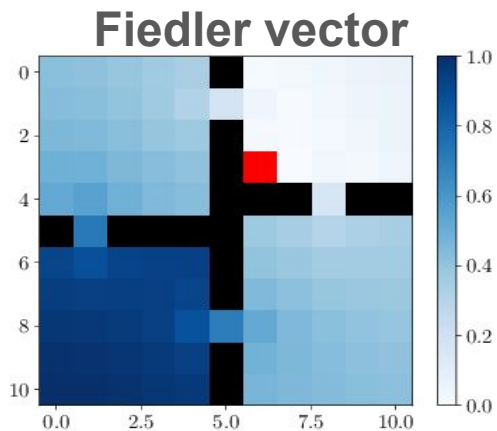
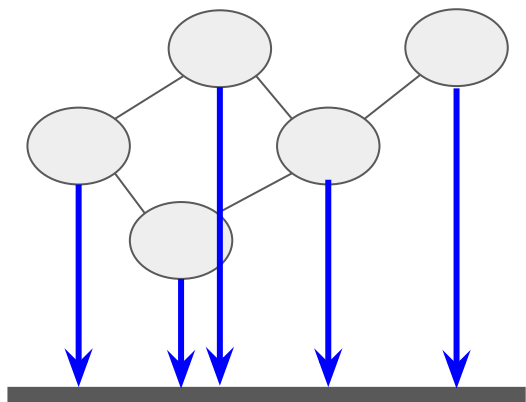


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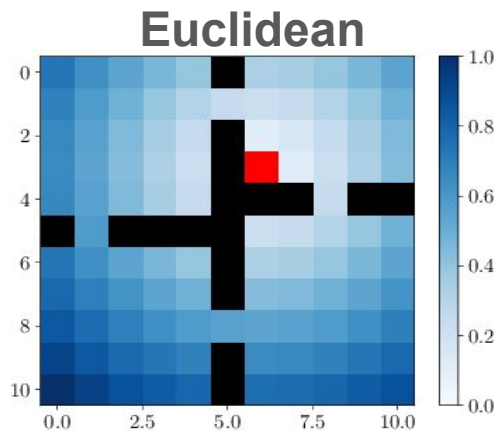
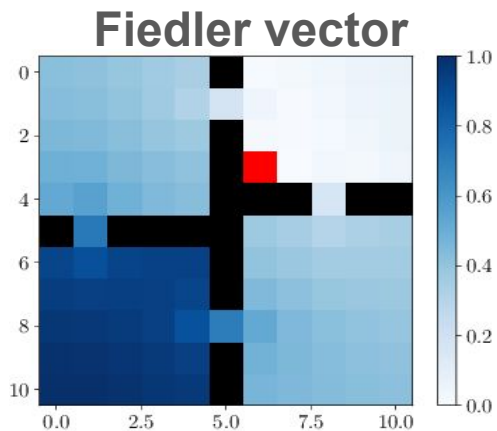
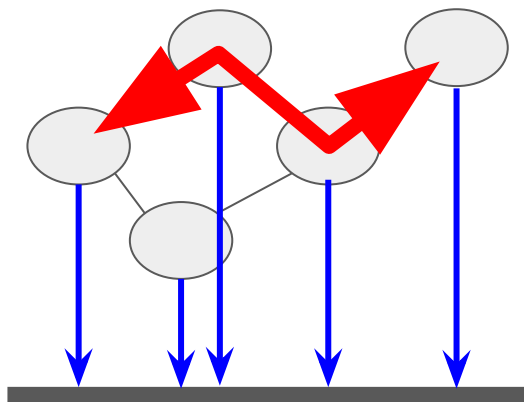


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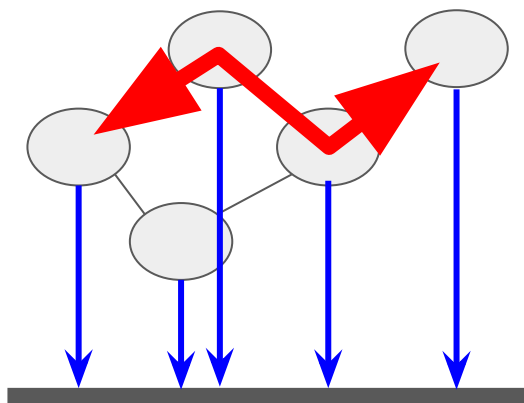


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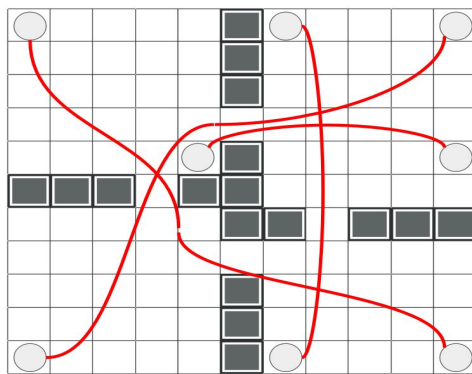
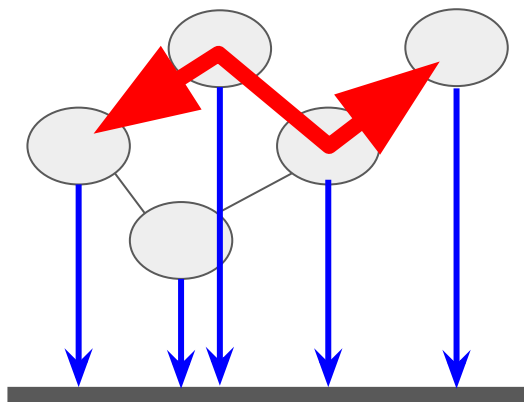
Theorem:

The upper bound on the cover time $C(G')$ is improved:

$$\mathbb{E}[C(G')] \leq \frac{n^2 \ln n}{\lambda_2(\mathcal{L}) + F} (1 + o(1))$$

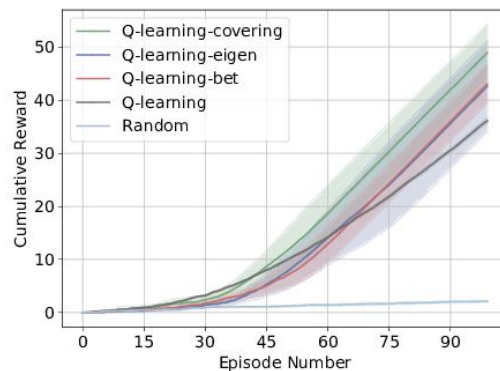
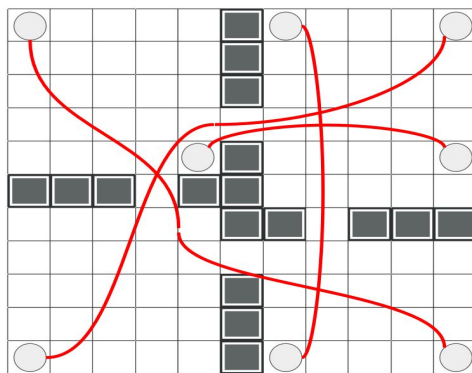
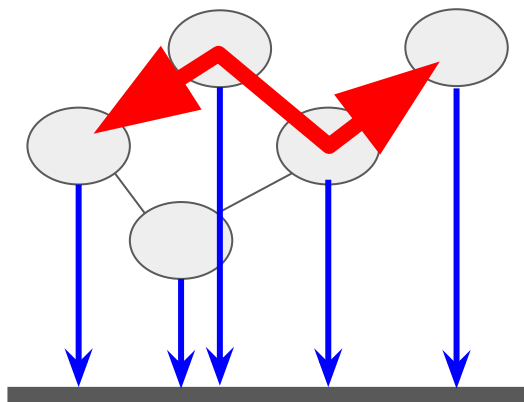
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