MANU2480

AUTONOMOUS SYSTEM

Path Planning – Part 2

School of Science and Technology, RMIT Vietnam

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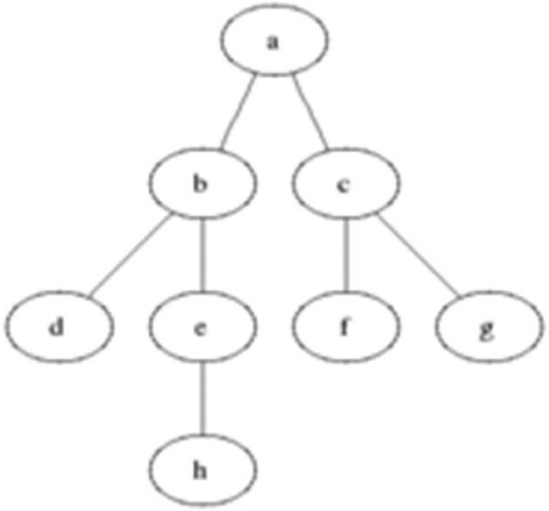
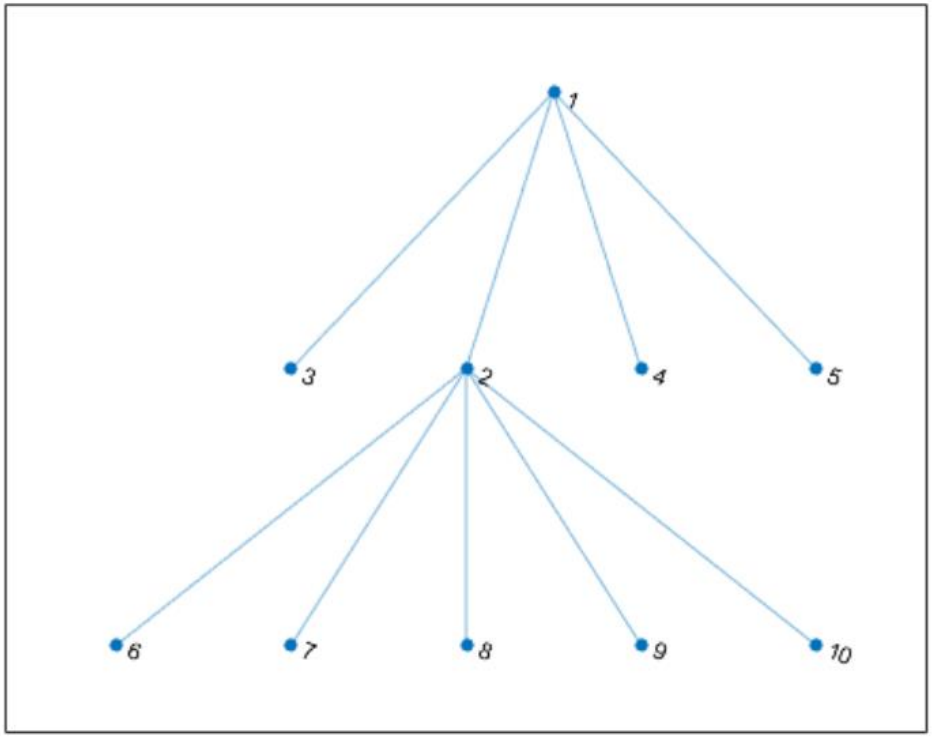
Graph Search Algorithm



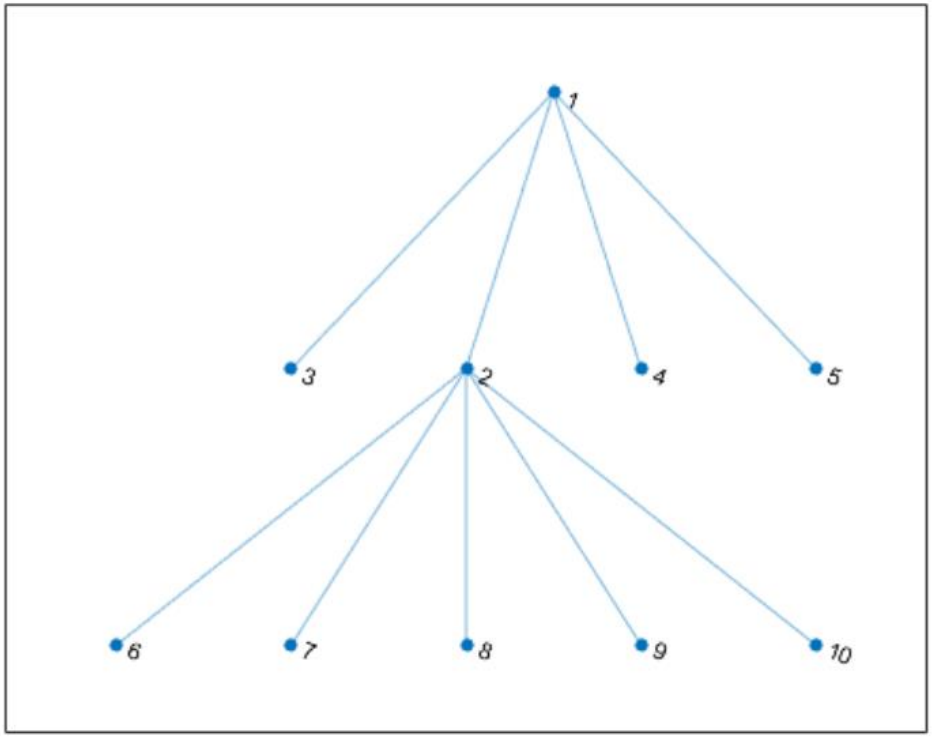
In general, path searching algorithms proceed as follows.

- The starting node is first checked to determine if it is also the goal node.
- The search is extended to other nodes in the neighborhood of the current node.
- One of the neighbor nodes is selected (***how the nodes are selected depends on the used search algorithm and its cost function***), and if it is not the goal node, then the search is also extended to the neighbor nodes of this new node.
- This procedure is continued until the solution is found or until all graph nodes have been investigated.

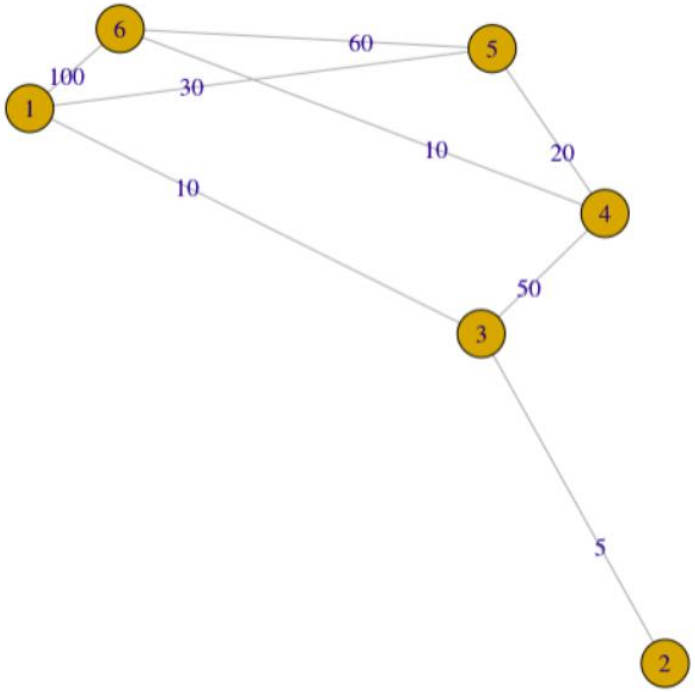
Bread-First Search



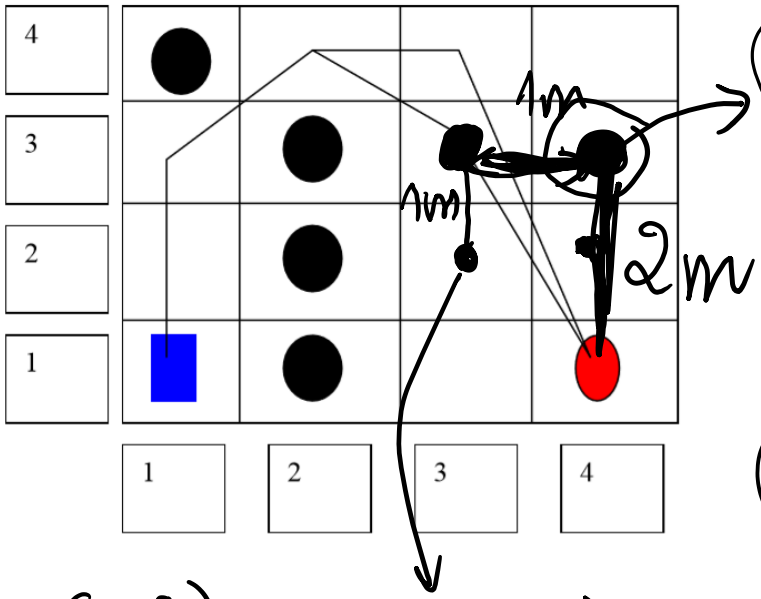
Depth-First Search



Dijkstra's Algorithm



A* Algorithm



* Djira algorithm.

(3,3) - (4,3)
(3,3) - (3,2)
} g(n) = 1

(3,3) - (4,2) g(n) = √2

h(n) = distance point → goal

f(n)(4,3) = 1 + 2 = 3

(3,2).

f(n)(3,2) = 1 + √2

f(n)(4,2) = √2 + 1

(4,3) → goal = 2m = h(n)

(3,2) → goal = √2 = h(n)

(4,2) → goal = 1 (m)

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Algorithm Demonstration

- Breadth First Search: https://www.youtube.com/watch?v=oDqjPvD54Ss
- Depth First Search: https://www.youtube.com/watch?v=7fujbpJ0LB4
- Dijkstra's Algorithm: https://www.youtube.com/watch?v=GazC3A4OQTE
- A* Algorithm: https://www.youtube.com/watch?v=ySN5Wnu88nE

MATLAB Demonstration

- Breadth First Search: https://www.mathworks.com/help/matlab/ref/graph.bfsearch.html
- Depth First Search: https://www.mathworks.com/help/matlab/ref/graph.dfsearch.html
- Dijkstra's Algorithm and A* Algorithm:

https://drive.google.com/open?id=19oXgVDXKGaKcwDARvFr6YpsMZo53jih8

Thank you for your attendance :D

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Reference

- *MATHWORKS official tutorial.*
- *Lecture slides from RMIT Melbourne Autonomous System course, delivered by Prof Reza Hoseinnezhad.*
- *Introduction to Autonomous Mobile Robots by Roland Siegwart and Ilah R. Nourbakhsh.*

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