

Pathfinding algorithm for trains

Asked 12 years ago Modified 12 years ago Viewed 3k times

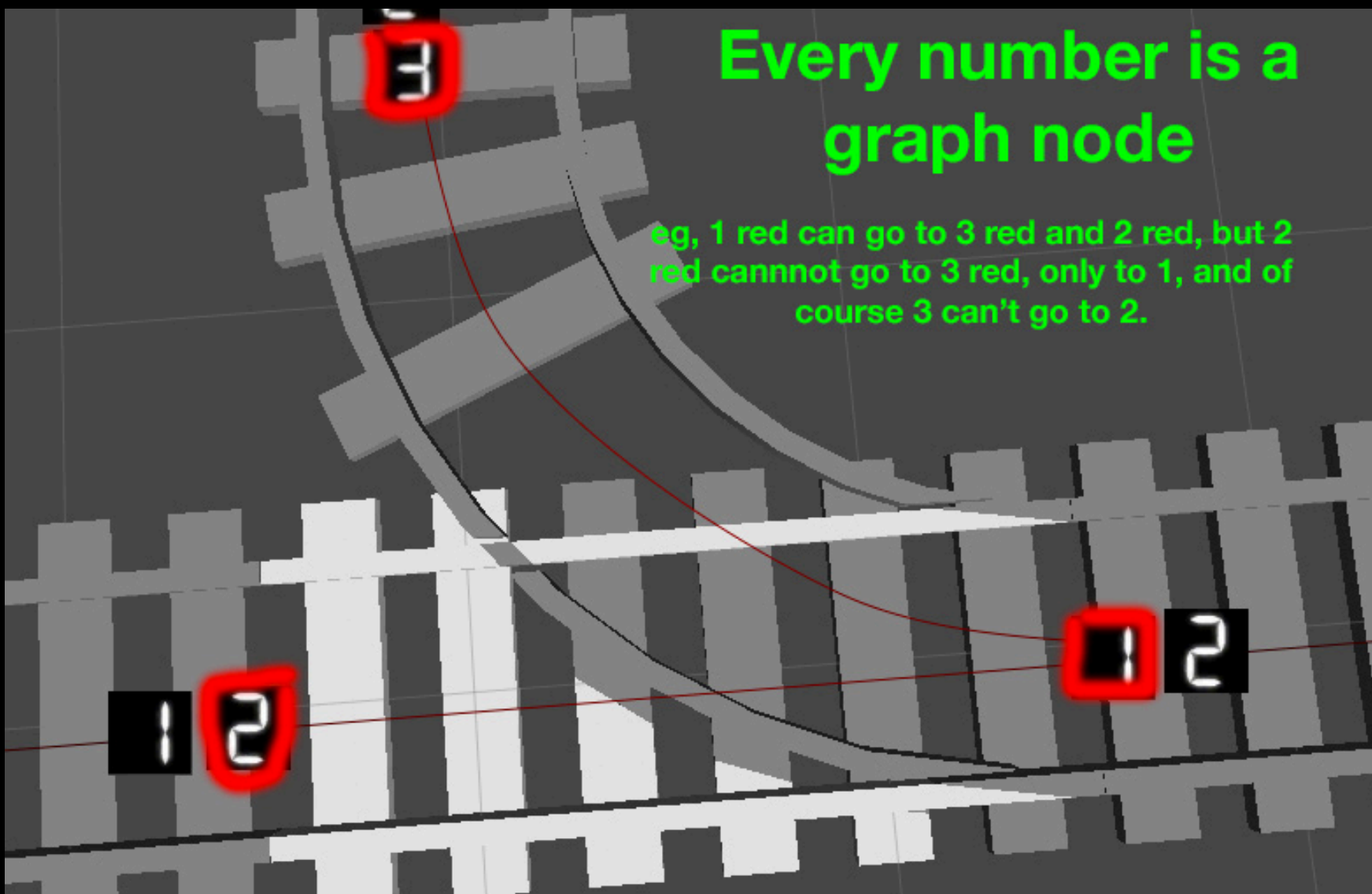
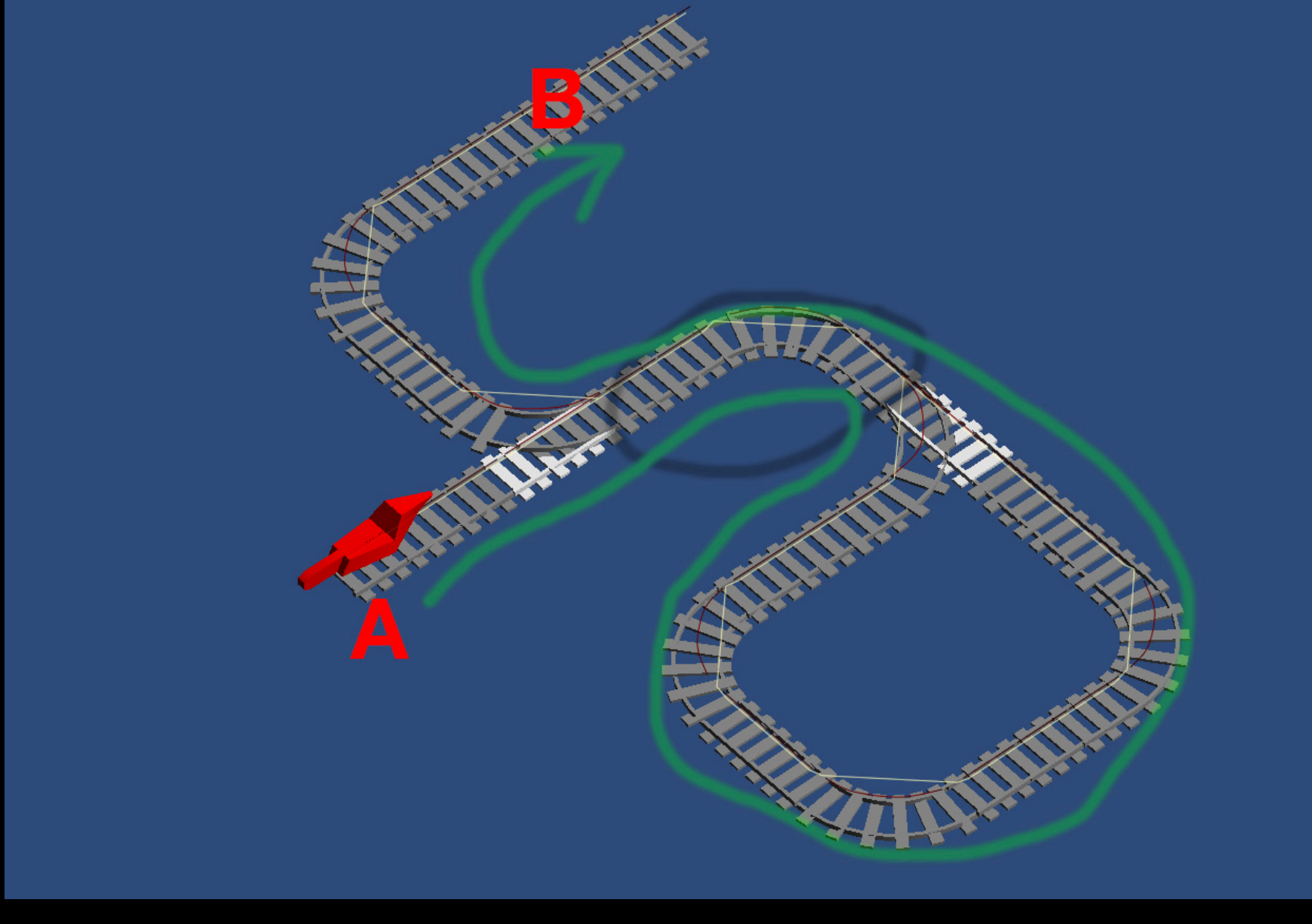
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- I'm trying to find a solution for pathfinding in a trains game where there are different kinds of bifurcations. I want the train to go from one rail to another, everything is implemented except the pathfinding.
- I need to get a list of rails so the train can follow. Now, the problem is how do I get the list.
- I've tried A*, didn't work because it stops searching if the node (rail) is already visited. This is a problem, because maybe the way to reach a point is by travelling through the longest route.
 - Tried flood fill, this time made it not stop searching if already visited, the problem is how do I reconstruct the path and how does it choose that it can't go backwards again.

The thing is that there are cases in which the train must go through a rail multiple times to reach its destination.

Any ideas?

Starting point is A, end B. As you see the green path is the way it should travel. The black circle are the rails which the train will step more than once, in this case 2 times.



And obviously, you need to come from 2 black->get to 3 red. You can't just go 1black->2red->3red.

algorithm path-finding a-star flood-fill

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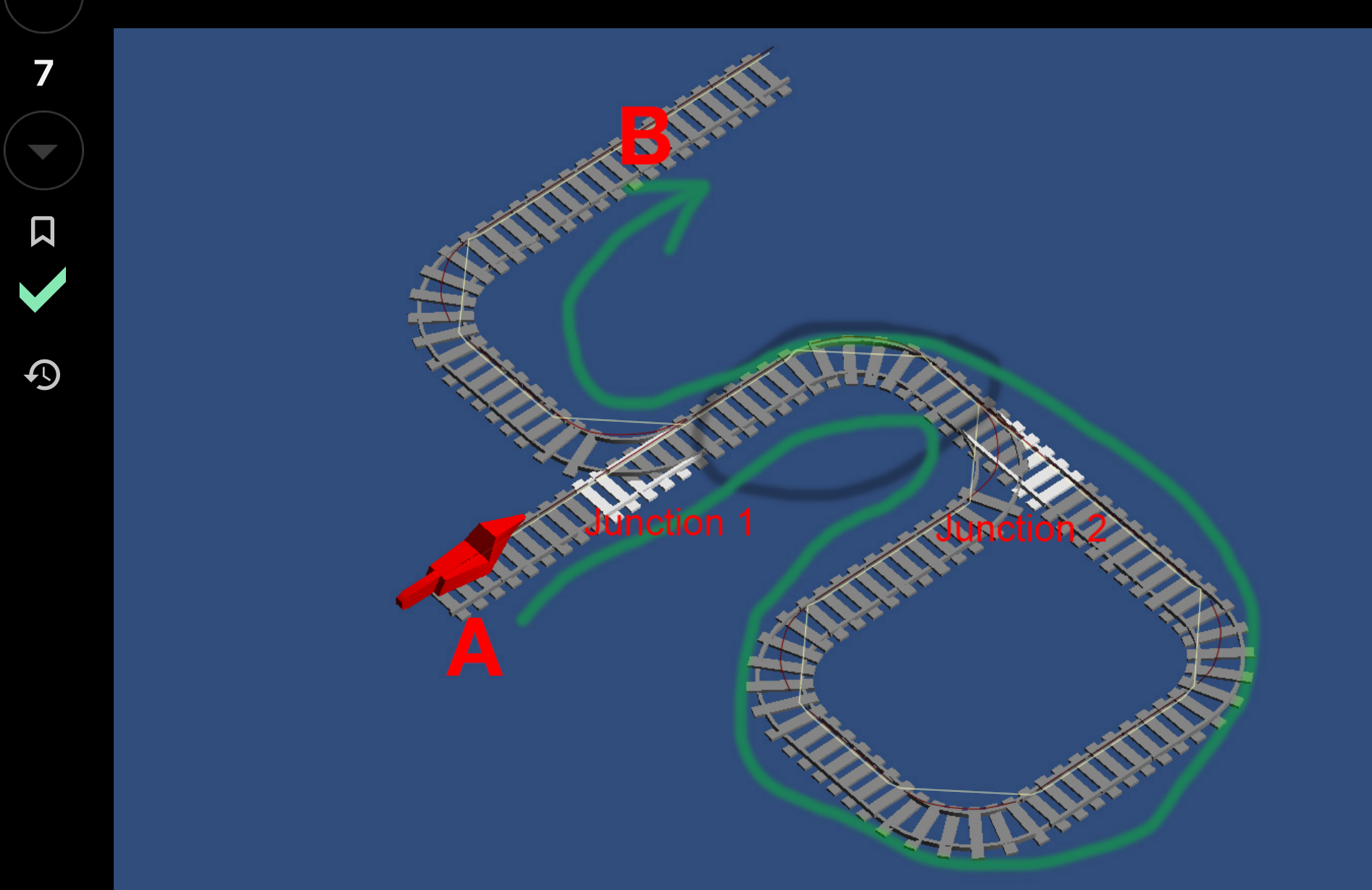
- 2 Can you give an example of when you have to go through a rail multiple times? – Vitaly Olegovitch Oct 1, 2013 at 7:38
- I don't understand what's wrong with A*, wouldn't you want to take the shortest path? "maybe the way to reach a point is by travelling through the longest route" if a route exists A* will find it, if there are several, it would find the shortest one, why would you want the longer one. – pseudoDust Oct 1, 2013 at 7:39
- 1 "maybe the way to reach a point is by travelling through the longest route" - What does this mean, exactly? Under what circumstances would you not want to take the shortest route? – BlueRaja - Danny Pflughoeft Oct 1, 2013 at 7:43
- So you have a graph that is made of rails that are connected through stations, and a train can switch to any rail at a station .. simply, at every station, the train take the rail that has the minimum value of distance(next-stop, destination) – Khaled.K Oct 1, 2013 at 7:58
- It's a graph, not exactly made of rails but the extrem limit rails. Let me upload an image... – marc11 Oct 1, 2013 at 9:46

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2 Answers

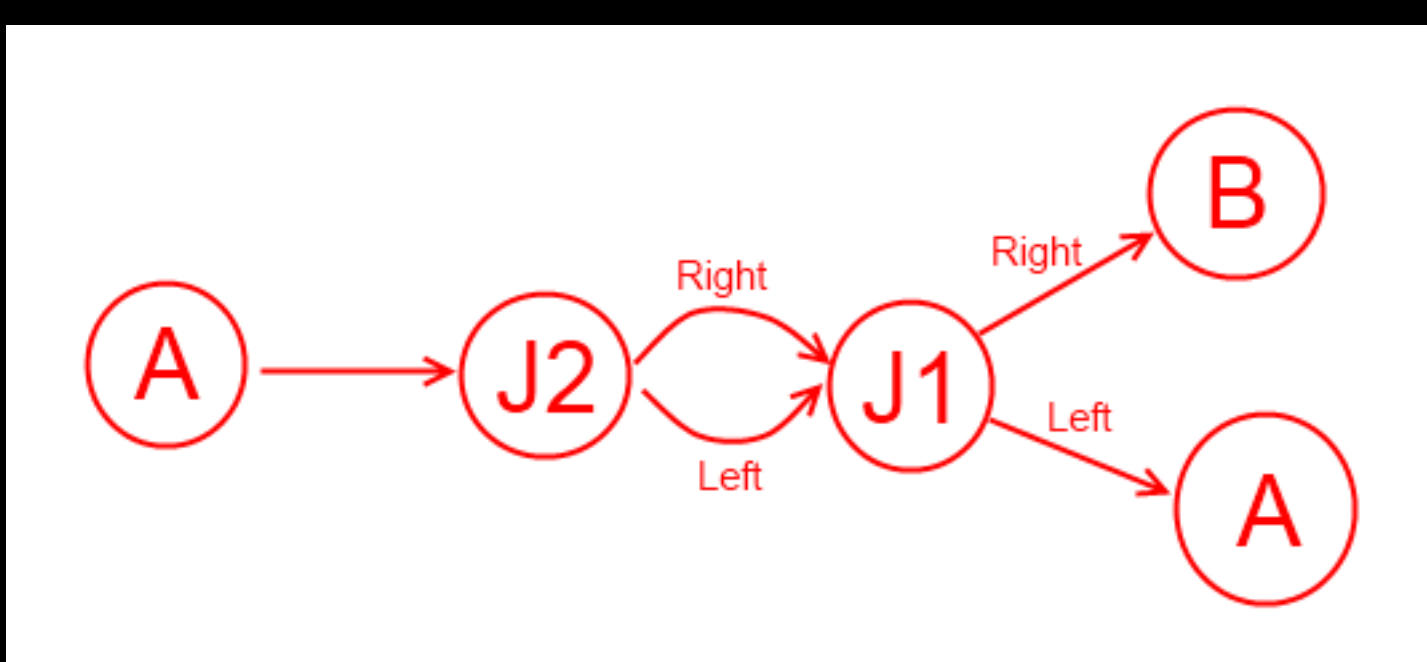
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Looking at this picture



It appears your problem would be represented well by a [directed graph](#). Give each stop and each junction **two** nodes in the graph, one for each direction of the train. [Dijkstra's algorithm](#) works perfectly on directed graphs, so once you have the problem in that form, the rest is easy.

So for example, in the picture above, starting from **A**, we move to **junction 1**. From there, there's only one place to move to, **junction 2**, so there'd be an arrow from **A** --> **junction 1** and an arrow from **junction 1** --> **junction 2**. Regardless of which choice you make, you end up at **junction 1**, but moving in the other direction, so we create a separate node from there. From there, you have the option of going to **A** or **B**.



Notice that I removed one of the **J1**'s, since it is superfluous (*there's only one place to go*).

If the train can stop and turn around at stops like **A**, we can connect those two nodes by edges in both directions, or just combine them into one node.

You can give the edges weights to specify distances.

answered Oct 1, 2013 at 13:36 BlueRaja - Danny Pflughoeft 86.1k 36 207 296

7 Comments

- marc11 Over a year ago I don't understand, seems like your image describes exactly what I have, link
- BlueRaja - Danny Pflughoeft Over a year ago @marc11: I think what you're describing is essentially the same, though you described it in a very confusing way. But if you already have the correct setup, then what exactly is the problem?
- marc11 Over a year ago So instead of one connection (bidirectional) I need two connections between the nodes. Dijkstra's algorithm doesn't stop if already visited a node? I think the problem here is the alorithm, somehow, I need one that can re-check a node again and construct the path.
- BlueRaja - Danny Pflughoeft Over a year ago @marc11: The shortest path will never contain the same node more than once. As I mention in my answer, you should **treat visiting the same node but facing a different direction as two separate nodes**. Your issue is not with a wrong algorithm, but the wrong representation of your problem.
- pseudoDust Over a year ago I would clarify that you don't really need two nodes for each junction, I think it's better if you don't think of junctions as nodes, instead, think of a node as a "place where a decision is needed" that way a junction is only a node in one direction, in this case **A**—>**J2**, because that is the first place where there is a chose. I don't know if this is constructive, ignore this if it is just confusing.

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- 0 Algorithms should be allowed to pass the same segment in different direction, but not in the same. I.e. each segment really should be regarded as two separate.
- to reconstruct the path you should assign numbers to segments while flooding them, so that each reached from **N-1** is marked with **N** - then while move backward, tracking segments should be done so that numbers steadily decrease by one.
- It is really kind of BFS.

answered Oct 1, 2013 at 10:12 Rodion Gorkovenko 2,912 3 27 40

1 Comment

- marc11 Over a year ago Really confusing, can you post some pseudocode, would be very helpful. What do you mean by segments? I have nodes with connections between them.

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Maestro 9.6k 2 days ago

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