Flatland

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October 12, 2023

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1 What is this problem?

1.1 What is Flatland?

The Flatland competition seeks to address the problem of automated train scheduling and rescheduling, a major challenge for modern railway systems. It does so by providing a simplified two-dimensional grid world environment to allow for fast experimentation of new approaches to this problem [**?**].

1.2 What work is similar to Flatland?

In essence, the Flatland problem is a vehicle scheduling or vehicle rescheduling problem. The vehicle scheduling problem (VSP) is [definition].

The vehicle rescheduling problem (VSRP) arises when a previously-scheduled trip is disrupted due to interruptions such as a traffic collision, a medical emergency, or a vehicle breakdown [**?**]. Trips in the Flatland environment may be disrupted by randomly-assigned vehicle breakdowns, each of which stops a train in its current location for an unforeseen duration. Ideally, scheduled trips that are affected by a breakdown should be rescheduled in such a way that there are minimal impacts to the original plan.

1.3 What is multi-agent pathfinding?

Multi-agent pathfinding (MAPF) is a planning problem in which agents in a shared environment must find routes to their respective destinations without incurring collisions [**?**].

- Explanation
- Differences — four-connected, eight-connected, graphs
- Hypergraphs

2 How can this problem be addressed?

2.1 Which methods have been used?

- Reinforcement learning
- Deep learning
- Which ones have won?
- Others

2.2 What is answer set programming?

- Definition
- How can it help in this case?

2.3 Next section

3 What does the problem workflow comprise?

3.1 Overview of the fundamental pieces

- Environment
- Agents
- Breakdowns
- Others

3.2 Environment

- Track types
- Cities and stations
- Transitions

3.3 Agents

Information on agents.

3.4 In this paper

We start by looking at the simplest of workflows: a single agent in a small environment with only straight tracks and dead ends.