Paul J. Galkin Global Health Grand Rounds Lecture Series

Digitizing Hope: Using AI & Technology to Drive Global Health Equity

Opening Remarks by Michael Littman

Associate Provost for Artificial Intelligence

Kirsten Langdon, PhD

Director, Substance Abuse Disorder Program
Spring Health

Hamish Fraser, MD

Associate Professor of Medical Science
Associate Professor of Health Services, Policy and Practice

Stephanie Garbern, MD

Associate Professor of Emergency Medicine
Director of Medical Student Research

Rochelle Rosen, PhD

Associate Professor of Psychiatry and Human Behavior
Associate Professor of Behavioral and Social Sciences

Tuesday, September 30th

The Warren Alpert Medical School | Room 280
5 - 7 pm; Dinner provided.
Zoom option available.

BROWN UNIVERSITY Center for Digital Health

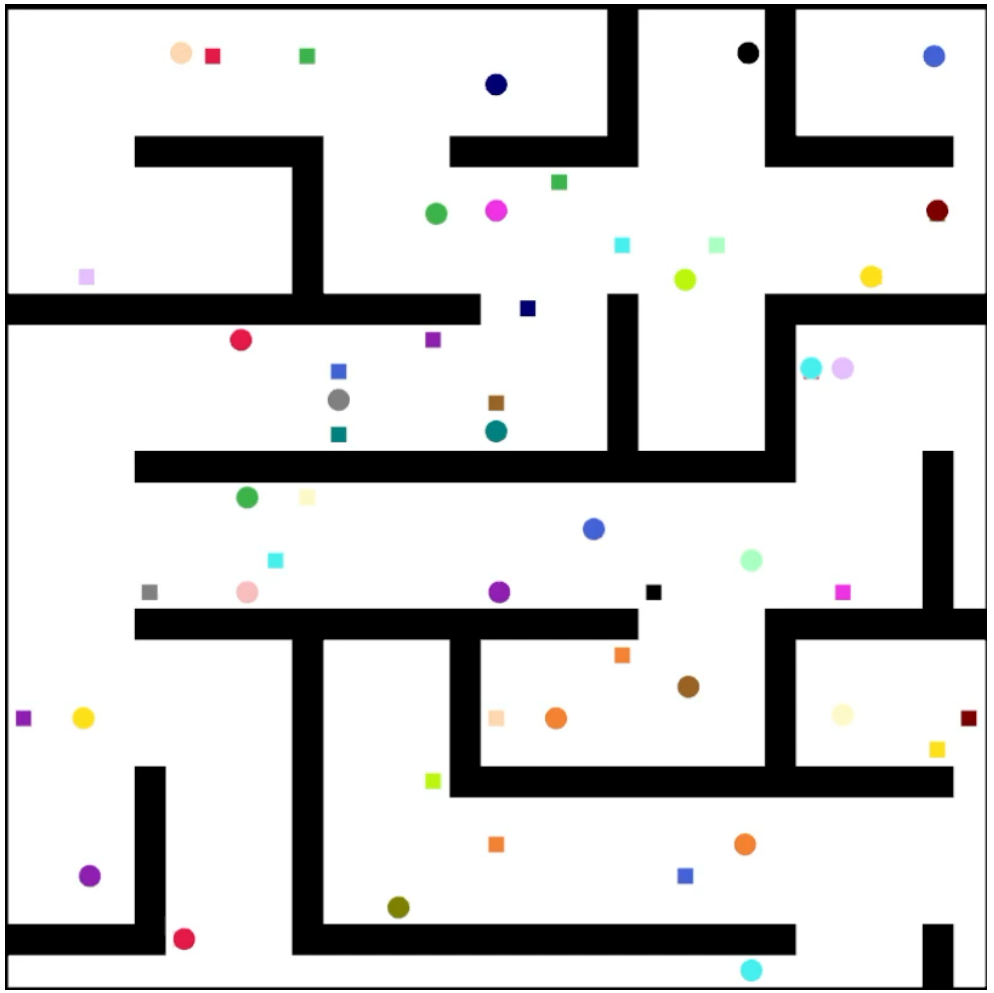
BROWN Division of Biology and Medicine
CENTER FOR GLOBAL HEALTH EQUITY

Funding support provided by the Arnold T. Galkin Fund in memory of Paul J. Galkin. RSVP with QR code.

Multi-Agent Pathfinding (MAPF)

Problem: Find *non-conflicting* paths for n agents on a graph

Objective: Minimize total travel time



Coordination is hard even in *controlled environments*

Source: https://www.usatoday.com/story/tech/2024/08/15/waymo-driverless-cars-honking-parking-lot-video/74810195007/

Multi-Robot Coordination

What's currently missing?

- Trust between agents
- Communication between agents
- Centralized authority

*Even with nice assumptions, multi-robot coordination is **hard***

Source: TED, Wanis Kabbaj, 2016

Methods to Solve MAPF Problems

1. Formulate as search problem

   Action space is all possible combinations of actions agents can take at a certain timestep

2. Formulate as discrete optimization problem

   Use large neighborhood + local search

3. Formulate as Boolean Satisfiability problem
4. Formulate as Mixed-Integer Program

N-Queens

Queens can move along rows, columns or diagonals.

Can you fit N Queens on an NxN chess board?