

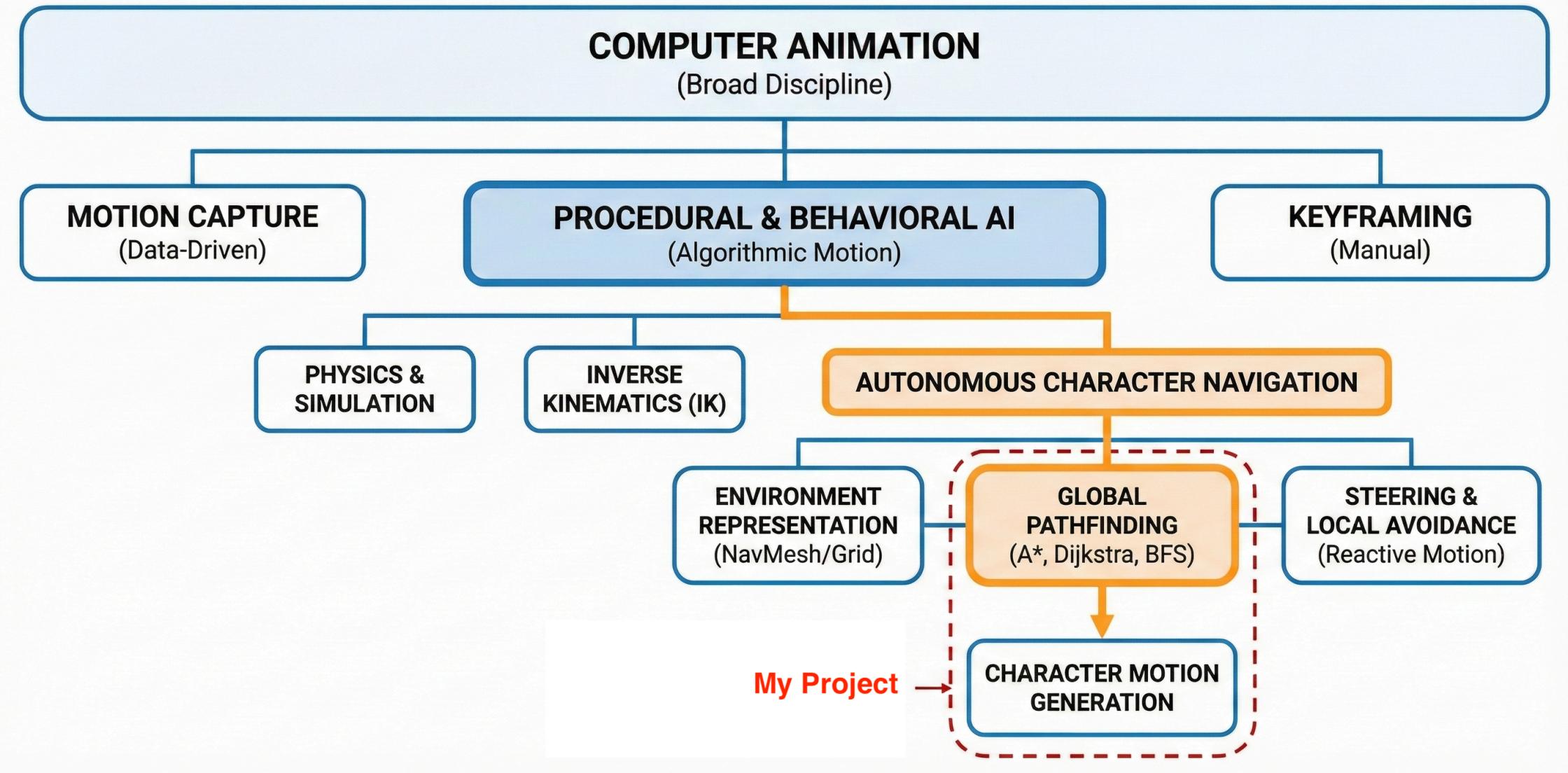
Pathfinding Animation

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TL;DR: I built a small 2D web demo that lets you see how different pathfinding algorithms generate character motion

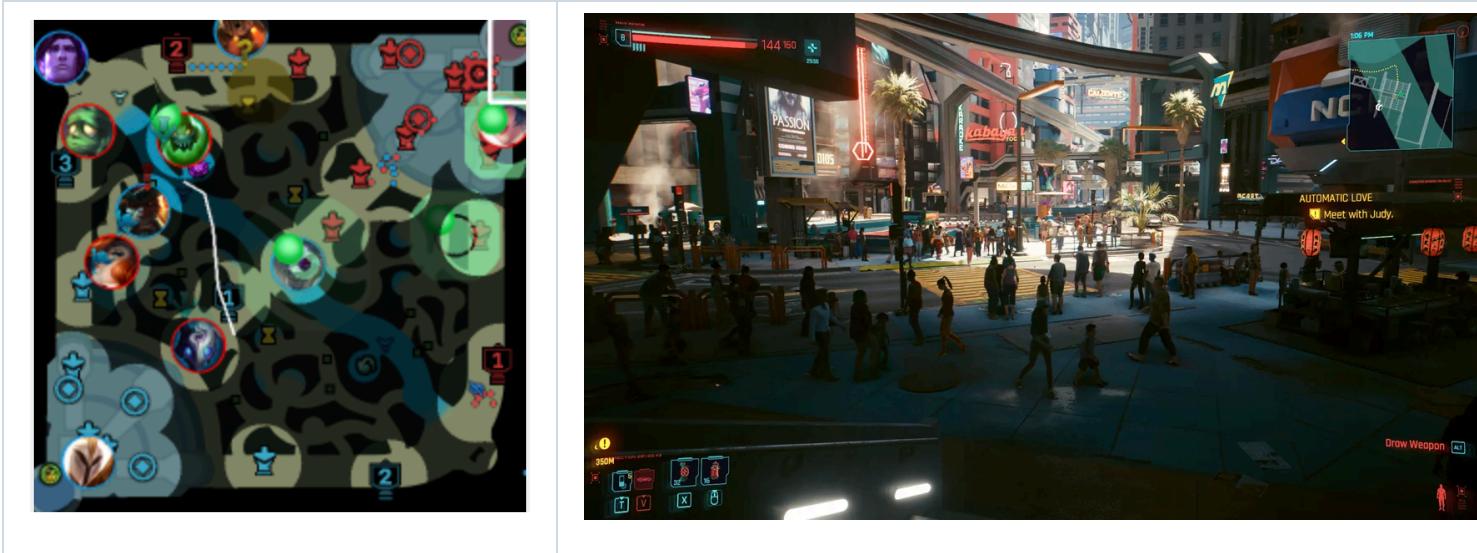
Try it at <https://766.jiamingliu.com/> (PC recommended)

COMPUTER ANIMATION DISCIPLINE HIERARCHY & PATHFINDING DEMO CONTEXT



Why It Matters

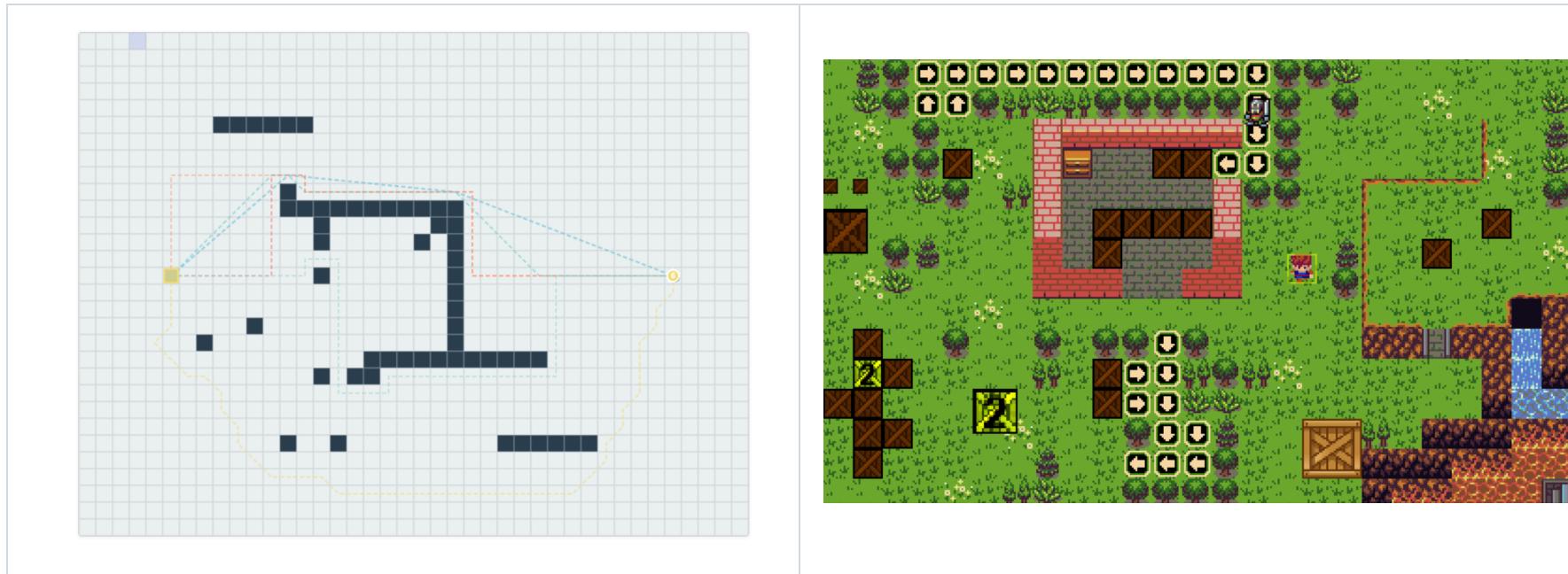
- Think about how characters move in Games



- Player clicks a destination → algorithms plan the path → animation runs in real time
- My project compares several algorithms side by side so we can see the difference

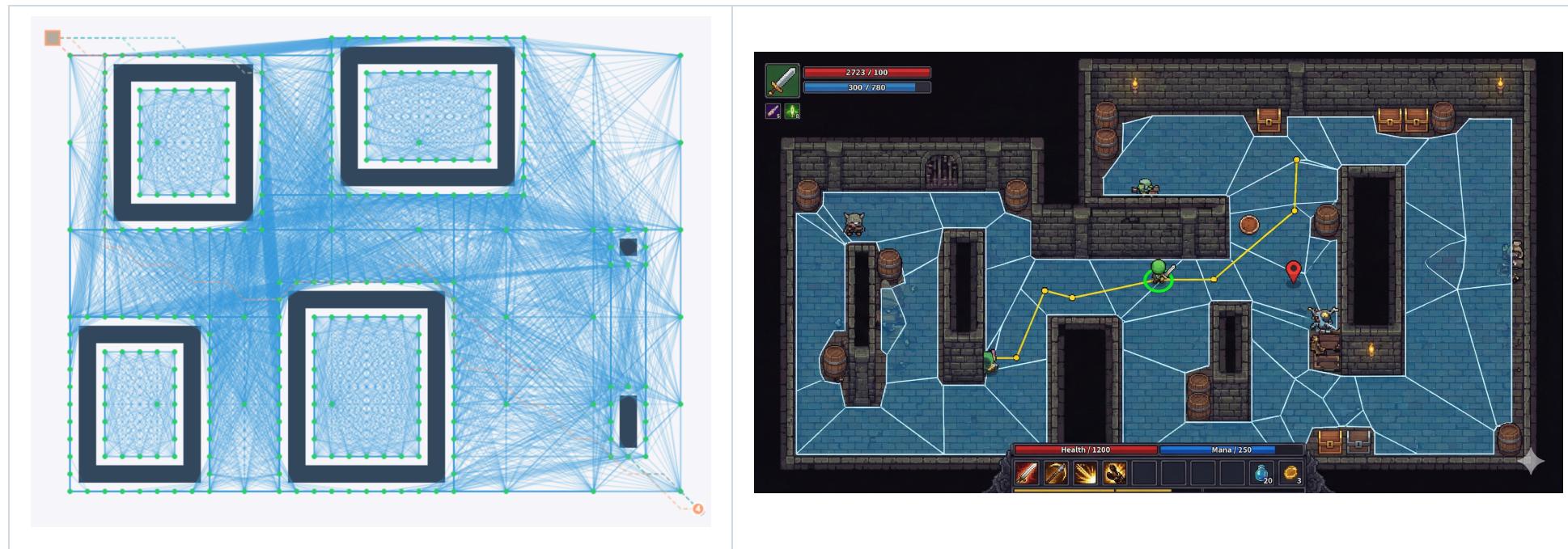
Grid-Based Motion

- Divide space into walkable or blocked tiles
- Common in RTS, roguelikes, tower-defense, puzzle games
- Path = list of cells, renderer interpolates for smooth travel



NavMesh Motion

- **Efficient Geometry:** Replaces dense grids with simple polygons. Fewer nodes, faster calculation.
- **Fluid Movement:** Enables natural, **any-angle motion** (Standard in *LOL*, *Overwatch*).



- **Blue Edges:** The walkable mesh boundaries

Algorithms Included

- **A*** – goal-directed shortest path (StarCraft II, Civilization)
- **Dijkstra** – uniform exploration baseline
- **Greedy Best-First** – quick but not always optimal
- **Jump Point Search** – grid optimization common in MMO server AI
- **Theta*** – any-angle grid paths
- **RRT** – sampling-based, popular in robotics demos

Compare different algorithms

Algorithm Performance Comparison

Agent 1

A* Search

Computation Time **1.800 ms**

Nodes Explored **368**

Path Length **42 steps**

Agent 2

JPS (Jump Point)

Computation Time **1.100 ms**

Nodes Explored **31**

Path Length **35 steps**

Agent 3

Theta*

Computation Time **1.700 ms**

Nodes Explored **179**

Path Length **33.6 steps**

Agent 4

Dijkstra

Computation Time **3.100 ms**

Nodes Explored **1068**

Path Length **42 steps**

Agent 5

Greedy Best-First

Computation Time **0.300 ms**

Nodes Explored **108**

Path Length **46 steps**

Agent 6

RRT

Computation Time **1.100 ms**

Nodes Explored **134**

Path Length **45.6 steps**