

## 1. prologue: AlphaGo

what is alphago? what search algorithm is it based on? who is Fan Hui? Lee Sedol? Aja Huang? David Silver? Remi Coulom? (do you know the UA connection to Huang and Silver?) how old is Monte Carlo Tree Search? who is Csaba Szepesvari? what was the score in the AG-LS match this year? why do I think that the shoulder hit in Game 2 signifies the end of an era? what does alphago have to do with the problem of image classification (eg. is there a cat in this image?)?

## 2. maze traversal puzzle

be familiar with the random walk, bfs, dfs, iterative dfs maze algorithms, and implementations in directory `simple/maze`. the maze adjacency graph. graph traversal. pros/cons of the different algorithms.

## 3. sliding tile puzzle

how to solve by hand. formula for solvability. the sliding tile search space. number of states as function of grid dimensions. what size problems will exhaustive search be good enough for? Dijkstra's algorithm. A\* algorithm. what heuristic works well for A\* on distance problems (eg. towns within Alberta). A\* example: Arad to Bucharest. algorithms and code in `simple/stile`

## 4. go game

Tromp-Taylor rules. T-T scoring. interactive way to go: 1 to 9.

## 5. tic tac toe game

adversarial search. minimax value. minmax algm: min/max format, neg-max format. ttt search tree. ttt solution tree. alphabeta search. enhancements: move ordering. eg ttt: can player win? if no, can opponent win? if no, continue ... strong chess players.

## 6. nim game

suitable for alphabeta? game space search: tree vs dag. state equivalence. nim(2 2 2) dag. dp. dp nim solver. trace dpsolve(3 3 3). solving checkers: endgame database. nim formula theorem. all winning nim moves. pros/cons: solving game with dp or formula. combinatorial game theory.