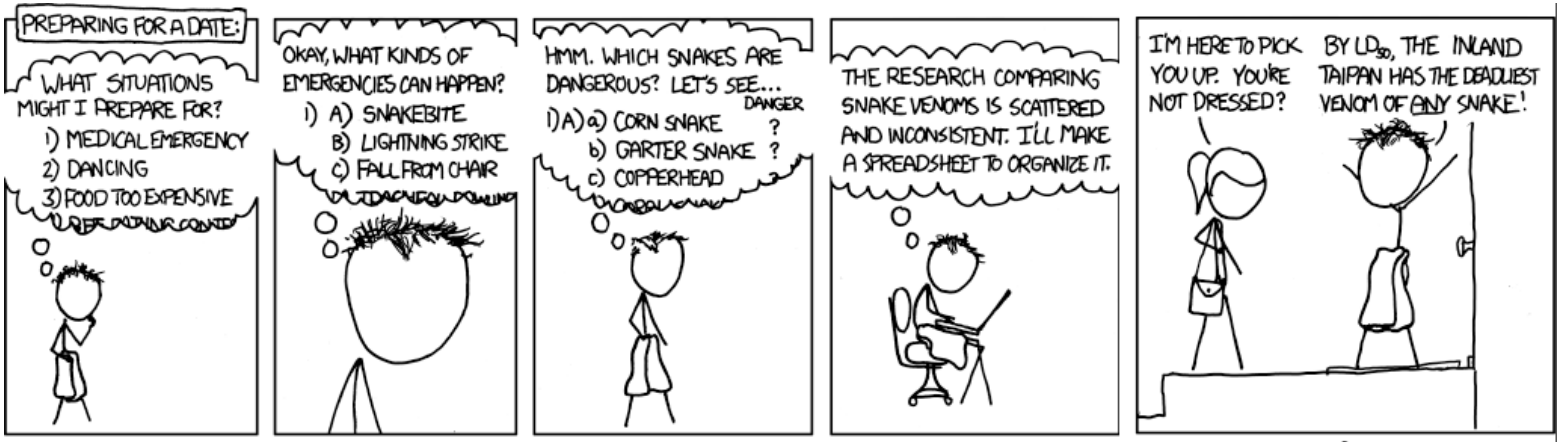


xkcd

6.034

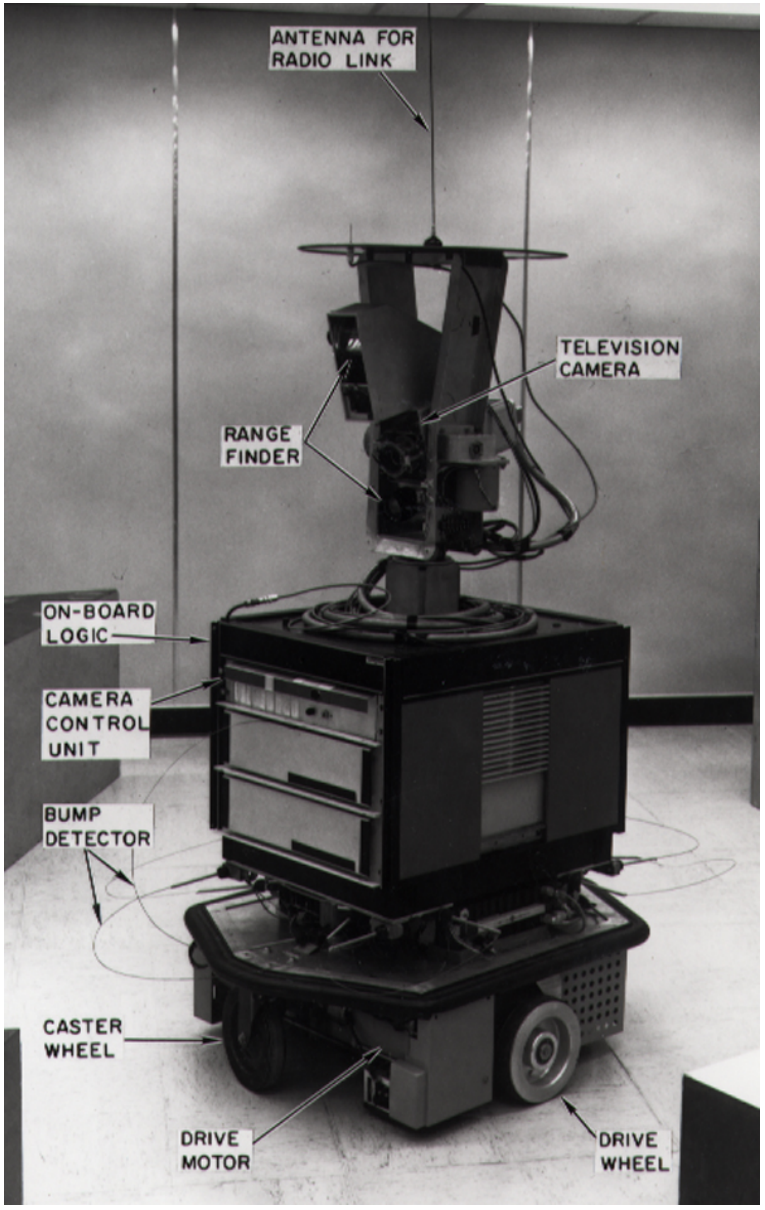
Optimal Search

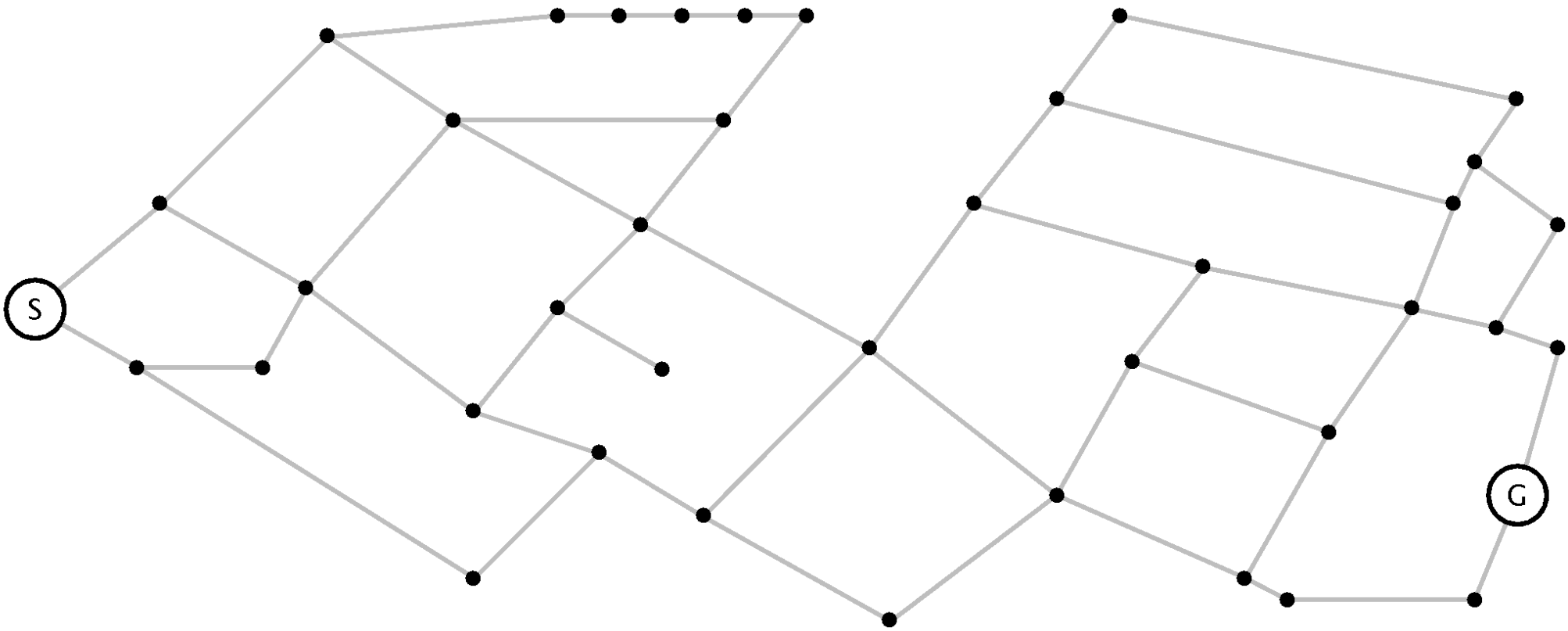
Dr. Kimberle Koile

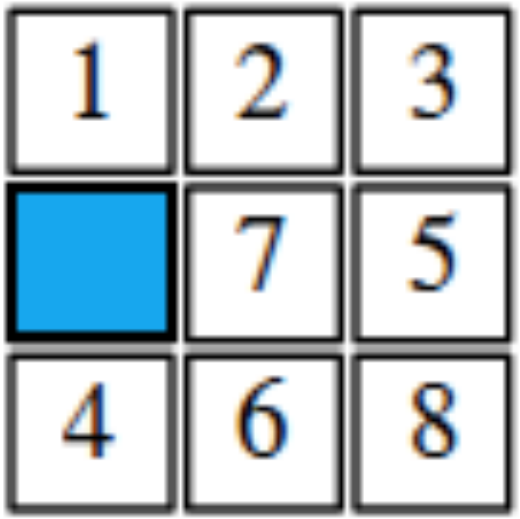
September 11, 2020

AI Methods

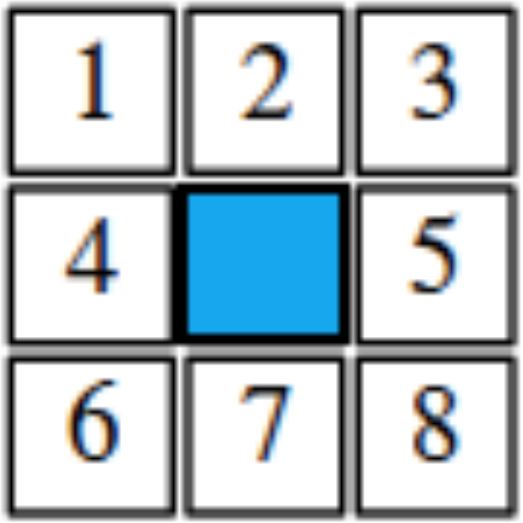
- **Problem solving**
  - G+T, *search, optimal search, games, constraint satisfaction*
- **Inference**
  - *rule-based systems, Bayesian inference*
- **Machine learning**
  - *k-nearest neighbors, id trees, neural nets*, deep neural nets, *support vector machines*, genetic algorithms, near miss/one-shot
- **Communication, perception, action**
  - natural language processing, vision, robotics


ANTENNA FOR RADIO LINK
TELEVISION CAMERA
RANGE FINDER
ON-BOARD LOGIC
CAMERA CONTROL UNIT
BUMP DETECTOR
CASTER WHEEL
DRIVE MOTOR
DRIVE WHEEL

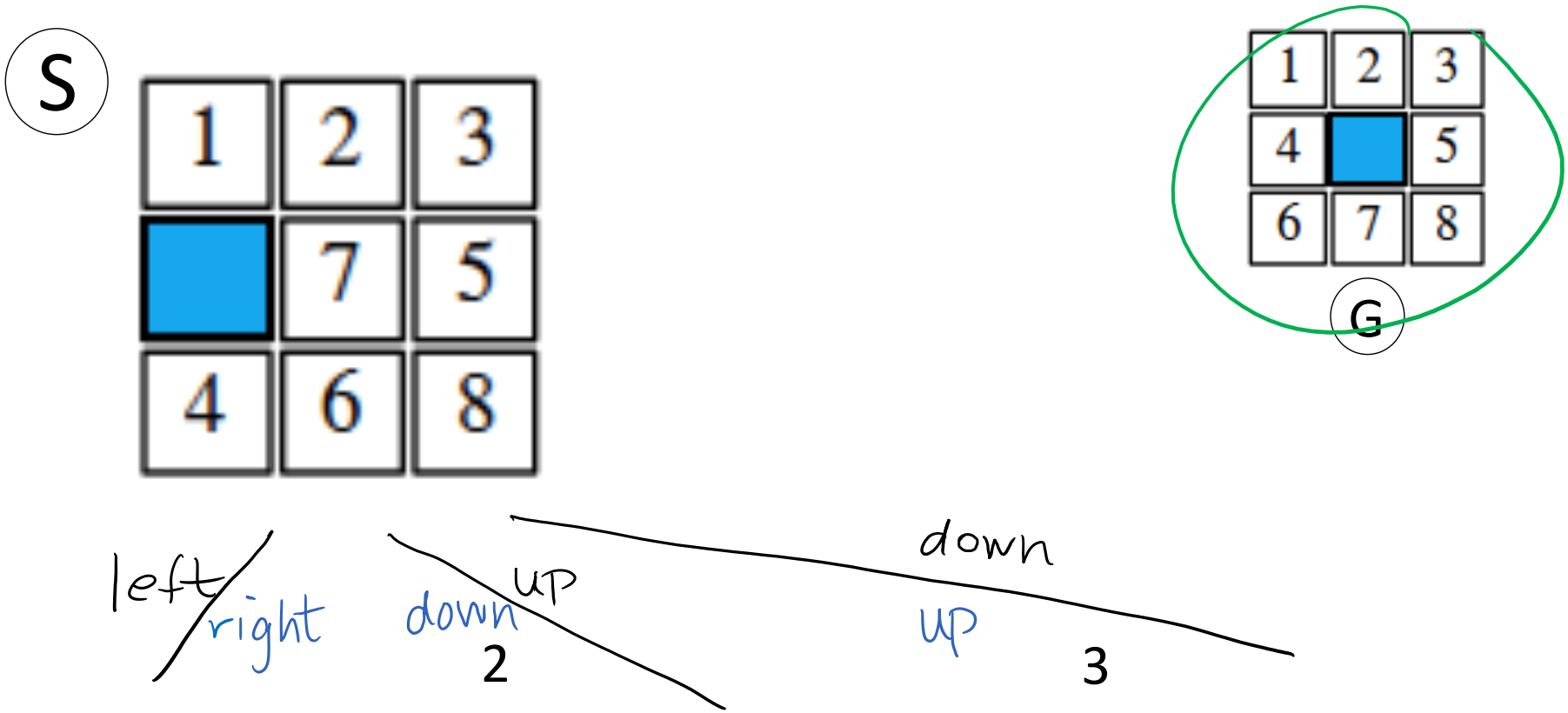

S
G

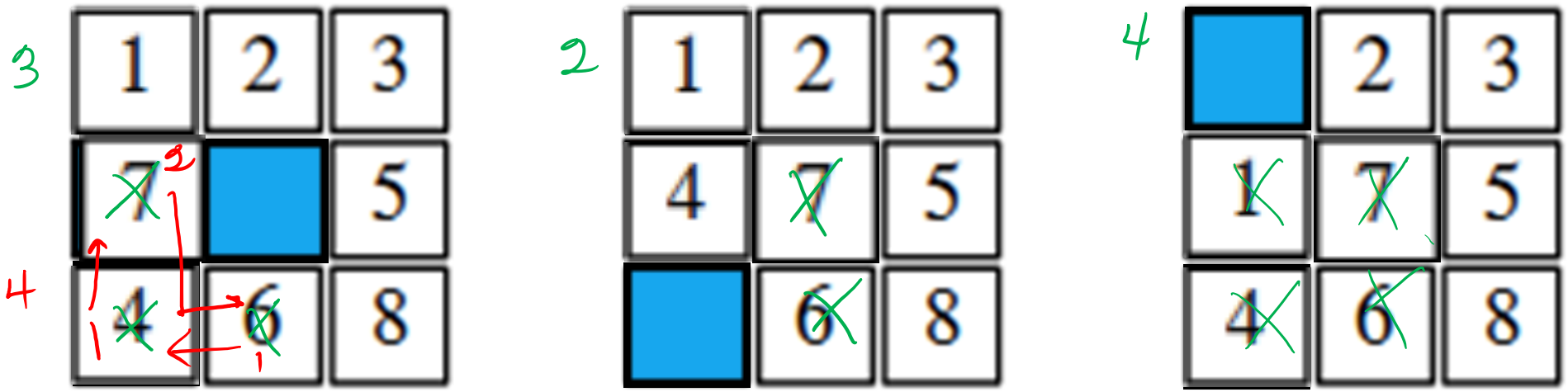


S



G

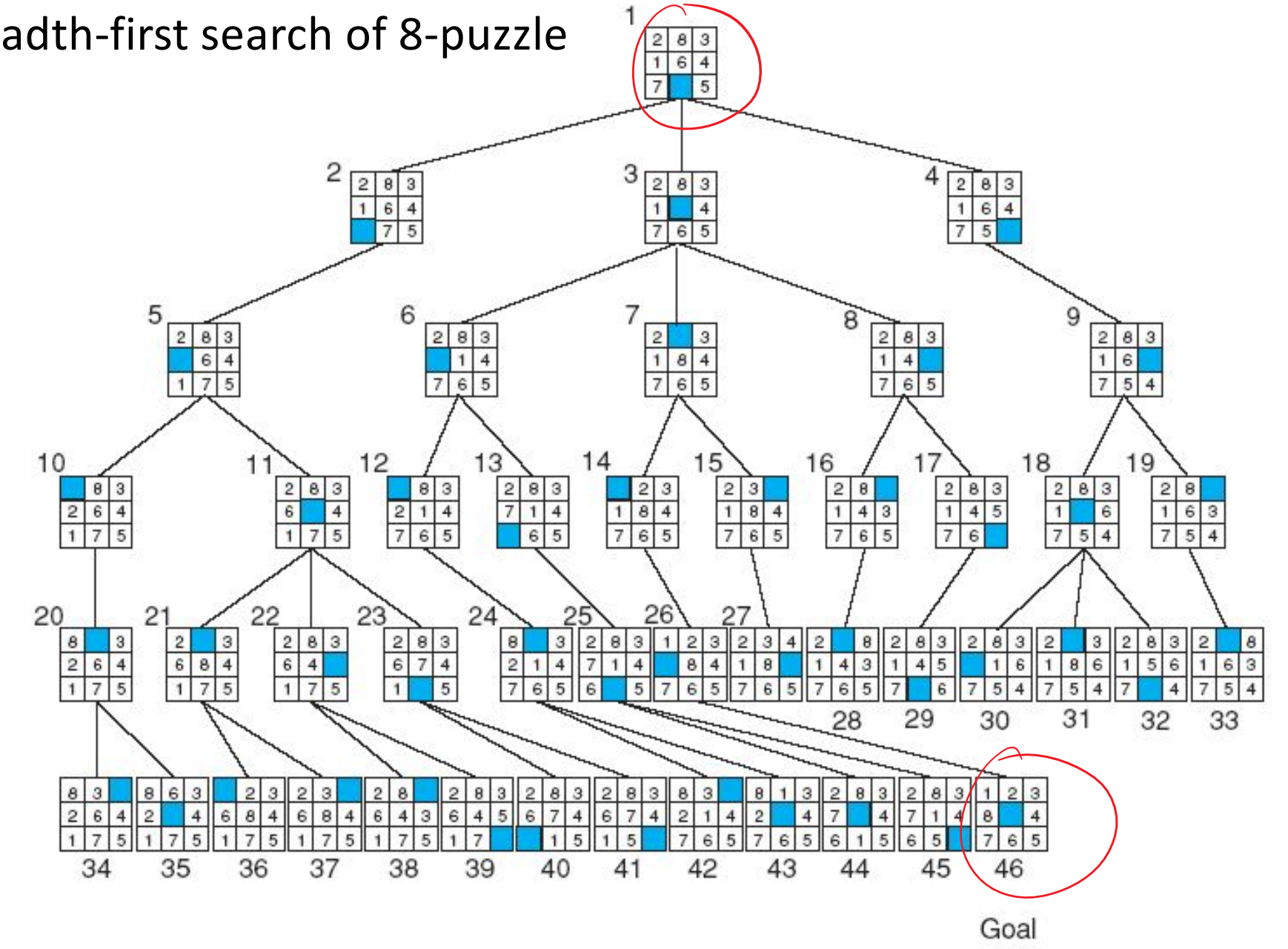


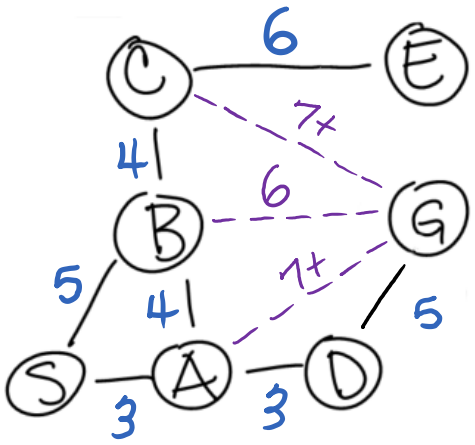


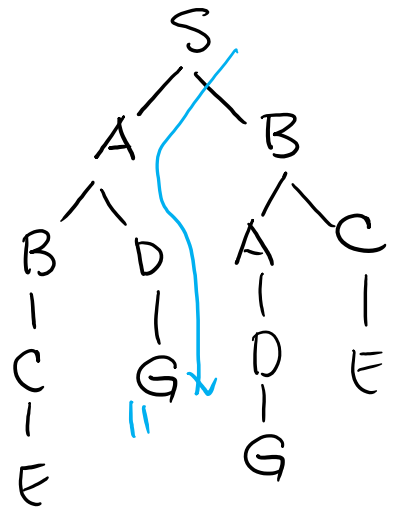
H = # tiles in place or out of place ✓

H = Manhatten distance

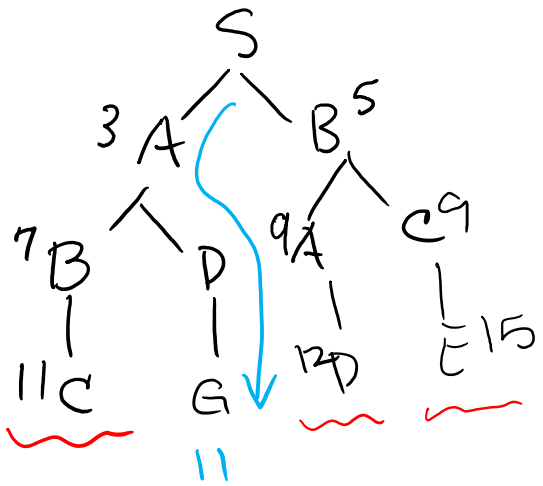
Breadth-first search of 8-puzzle





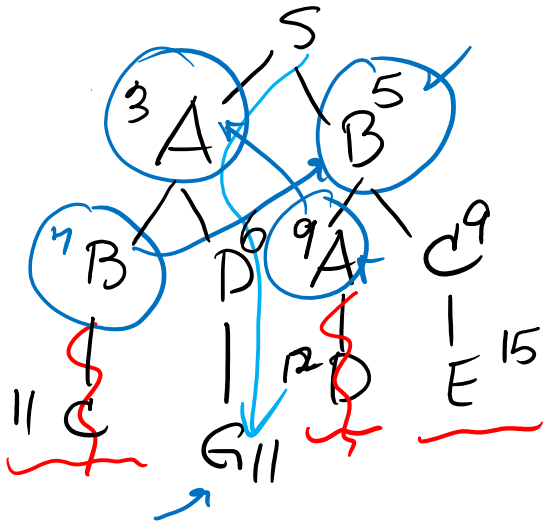


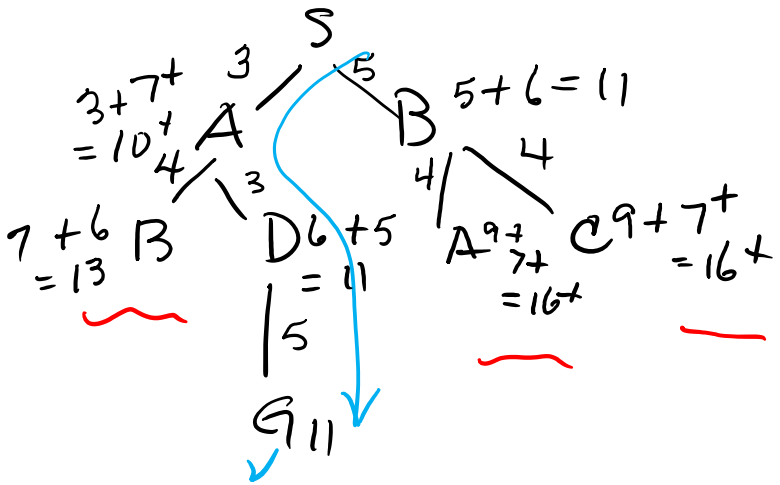
ORACLE



+ H

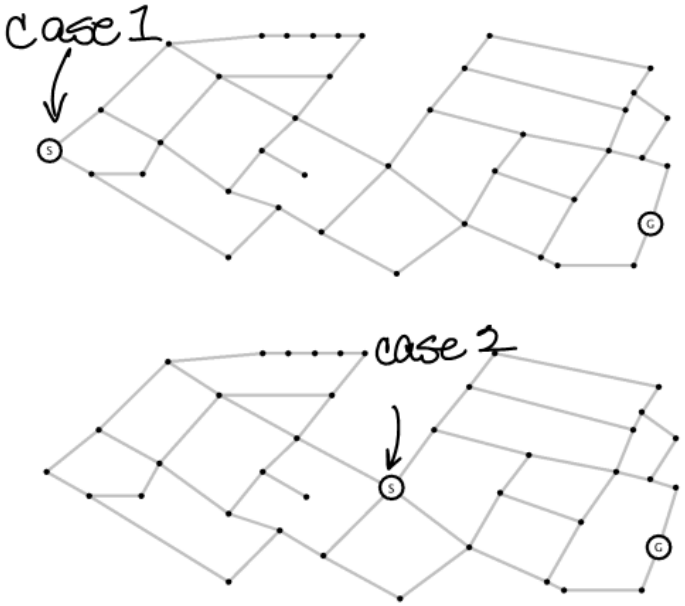
BRANCH + BOUND

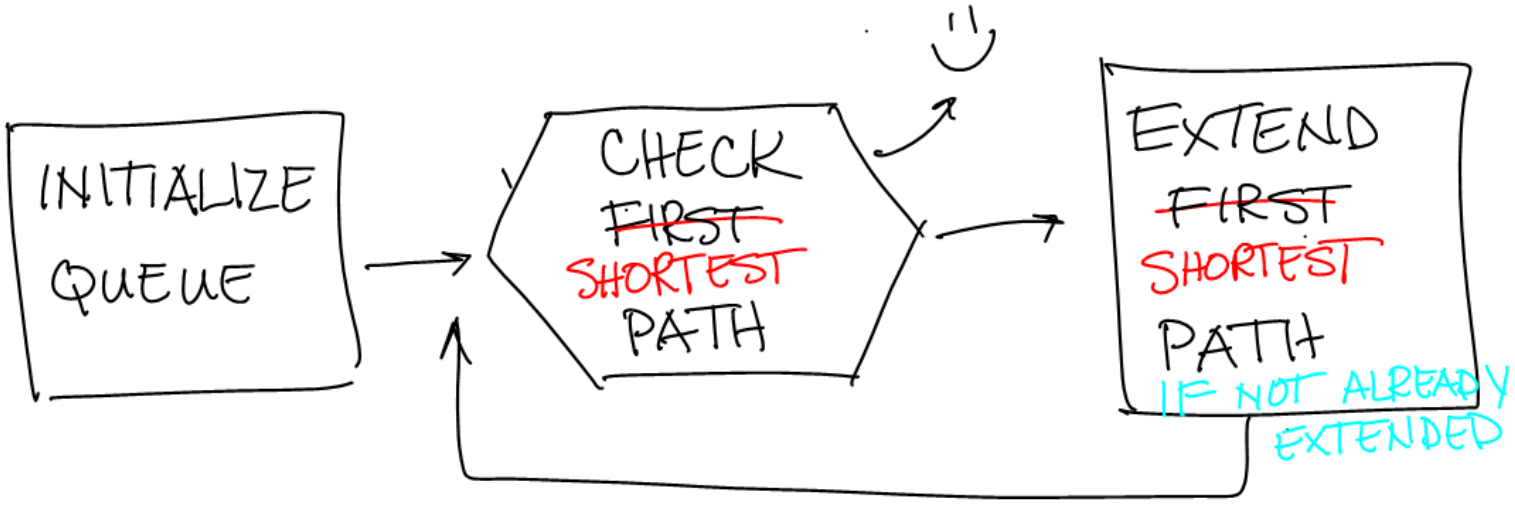




COUNTING ENQUEUINGS

	case 1	case 2
BRANCH + BOUND	1190	111
+ EXTENDED LIST	63	60
+ H	153	11
A*	45	11





COUNTING EXTENSIONS

	case 1	case 2
BRANCH + BOUND	738	60
+ EXTENDED LIST	35	33
+ H	72	5
A*	26	5