Logic in Computer Science

Yu “Tony” Zhang, Ph.D.
Assistant Professor
Arizona State University
Logic’s role in Computer Science

- Computer Architecture
- Software Engineering & Robotics
- Programming languages
- Databases
- AI & Robotics
- Computation Theory
- ...

P = NP?
Topics covered in this class

- Propositional logic
- First-order logic
- Logic programming
What are the current trends in Logic Modeling and/or AI?

- Incorporating uncertainty into logic modeling
- Knowledge augmented learning systems
- Model retrieval (learning) for common sense reasoning
  - Magellan, the explorer, went around the world three times. On one of his trips, he died. Which trip did he die?
What is Knight’s Tour?

A game where you play as a chess knight.

Goal:

- Go to every square.

Restrictions:

- You may not revisit a square.
Solutions

Solutions:

- Open Tour
- Closed Tour
- No Tour
A Heuristical Approach

Warnsdorff’s Rule:
Choose the tile with the least number of possible moves.
Our Solution

1. Find Moves
2. Filter moves
3. Count
4. Pick best
Improvements

Resolving Ties:

**Arnd Roth Hypothesis:**
- Take the position furthest from the center

**Ira Pohl Hypothesis:**
- Sum the neighbors of the neighbors, then choose the least
Solution quality analysis as the board size increases (not student data)
Computation analysis as the board size increases (not student data)
Conclusions

1. XXXX
2. YYYY

...
Sources

https://en.wikipedia.org/wiki/Knight%27s_tour

Douglas Squirrel and Paul Coll, A Warnsdorff-Rule Algorithm for Knight’s Tour on a Square Chessboard
Final project reminder (in lieu of the final exam)

1. Code due Dec 8, Sunday 11:59:59PM

2. Presentation slides due Dec 10, Tuesday 12:00PM (noon)

3. Final Presentation Dec 11, Wednesday Coor174 12:10-2:00PM. Prepare for about 5 mins for your presentation.

4. Final report due Dec 12, Thursday 11:59:59PM

Also, as voted today, the optional project will now replace the lowest project grade from project 1-3 (instead of just project 1). The 80% rule is still in place.

*No extensions are allowed* for the final team project.

**Survey response rate now at ~70%**