Week 4 Video 1

Knowledge Inference
Goal of Knowledge Inference

- Measuring what a student knows at a specific time
- Measuring what relevant knowledge components a student knows at a specific time
Knowledge Component

- Anything a student can know that is meaningful to the current learning situation
  - Skill
  - Fact
  - Concept
  - Principle
  - Schema

http://www.learnlab.org/research/wiki/index.php/Knowledge_component
Knowledge Inference

- Also called Latent Knowledge Estimation

- Latent: “not directly measurable”
Why is it useful to measure student knowledge?

- Enhancing student knowledge is the primary goal of a lot of education
- If you can measure it, you know whether you’re making it better
- If you can measure it, you can inform instructors (and other stakeholders) about it
- If you can measure it, you can make automated pedagogical decisions
Different than measuring performance

- In the first three weeks, we discussed prediction models
- You can use prediction models to determine if a student will do well on a future test
- You can use prediction models to infer if a student’s performance right now is associated with successfully demonstrating a skill
Different than measuring performance

- Inferring if a student’s performance *right now* is associated with successfully demonstrating a skill

- Not the same as knowing whether the student has the latent skill
  - Maybe they appeared to demonstrate skill without having it (“guess”)
  - Maybe they appeared to not demonstrate skill despite having it (“slip”)
How do we get at latent knowledge?

- We can’t measure it directly
- We can’t look directly into the brain
- Yet
  - But we can look at performance
  - And we can look at performance over time
    - More information than performance at one specific moment
Not trivial…

- This is a research problem with a long history…
This week

- I will cover some of the key approaches for latent knowledge estimation/knowledge inference, within EDM

- I will not be going in chronological order, but will focus on key methods for online learning first
This week

- In your assignment, you’ll try out two ways of creating Bayesian Knowledge Tracing models, a popular algorithm for knowledge inference
Next Up

- Bayesian Knowledge Tracing