

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