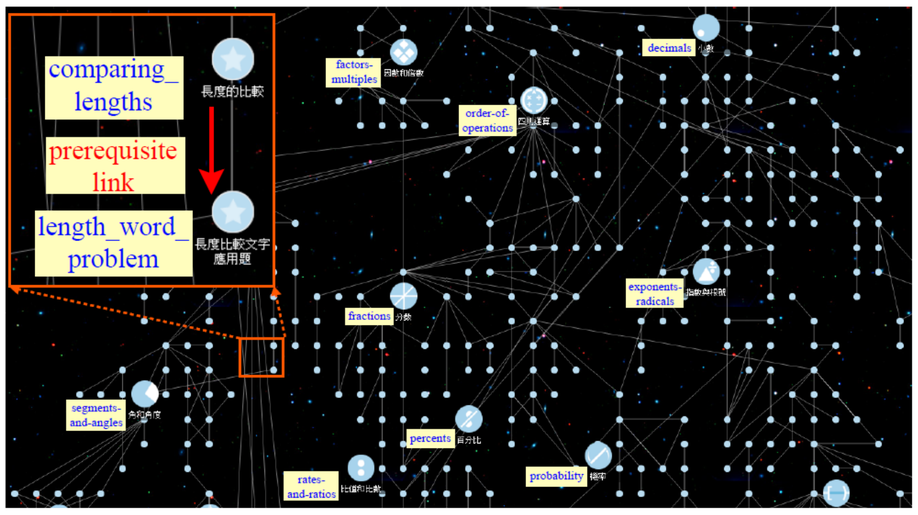
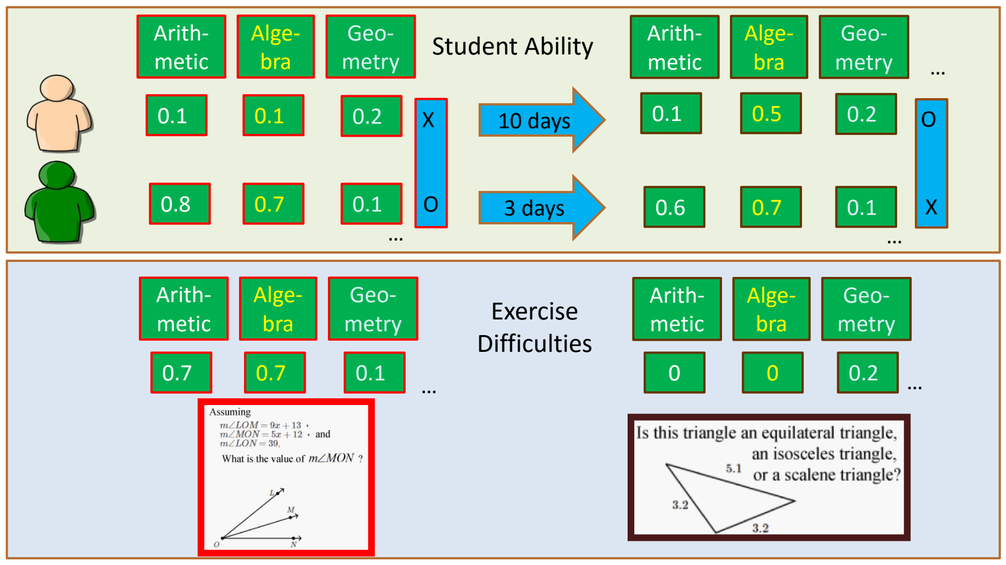
Adaptive Testing in Khan Academy Framework Based on Exercise Relationships

Problems



How to organize exercise?

How to find proper exercises?



Challenge: The #observed variables are much smaller than #hidden variables

Our observations are biased by freedom of choices

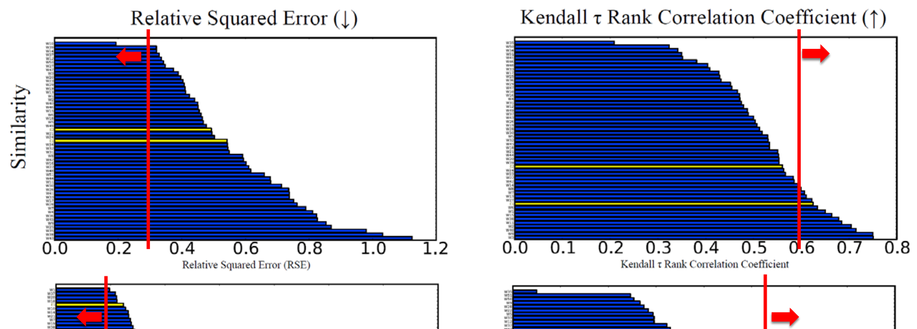
Results

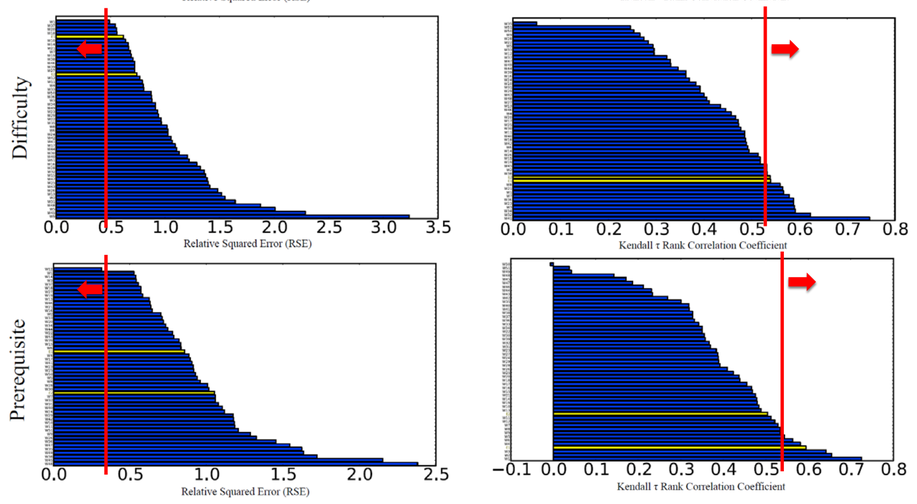
System Visualization

Open source

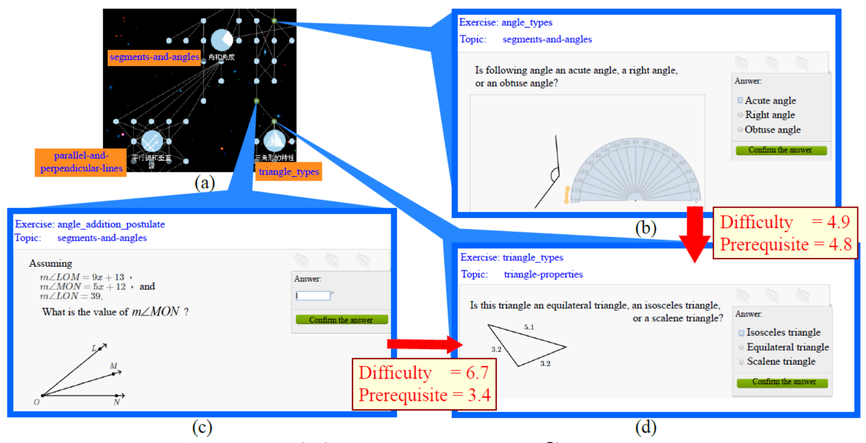
Chinese

System Demo



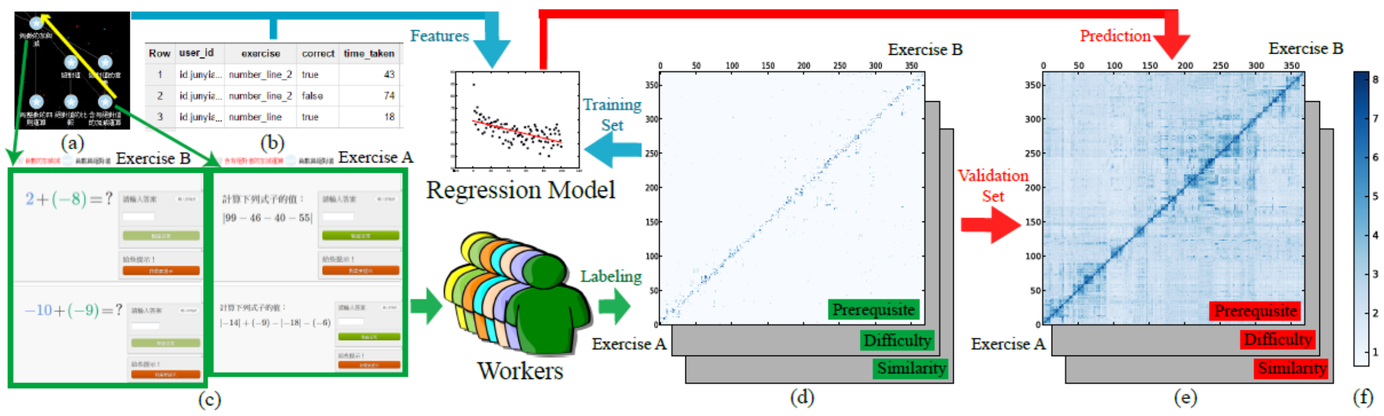


Worker , teacher, and prediction performance

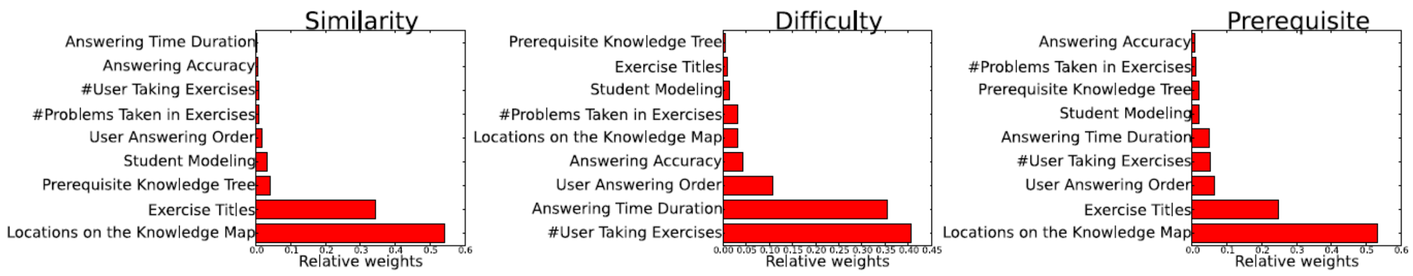


Prerequisite structure refinement

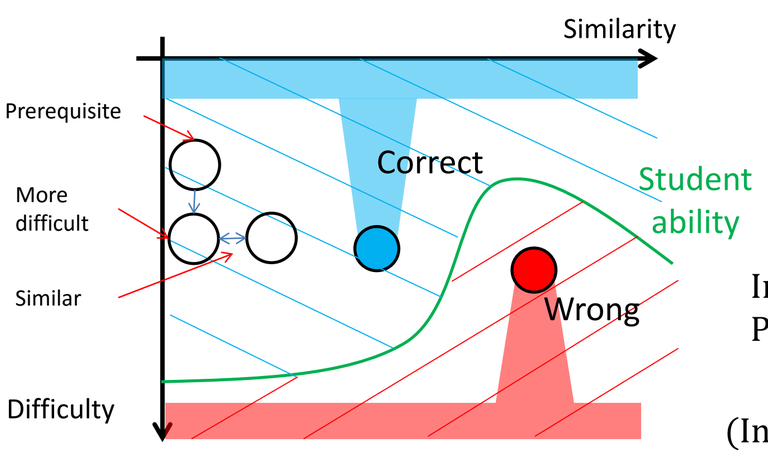
Solution

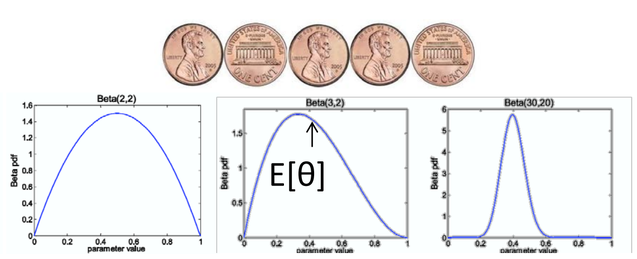


Our work flow for predicting exercise relationships



The importance weights of each features





$$\text{Information\_gain}(e) = P(R_e{=}c)\delta\text{var}(R_e{=}c) + P(R_e{=}f)\delta\text{var}(R_e{=}f)$$

$$\text{Recommended exercise} = \max_e (\text{Information\_gain}(e) \times \text{Ideal\_difficulty\_score}(e))$$

Future

- Evaluate our adaptive testing system
- Infer relationships of general materials
  - Scientific papers
  - Videos
  - News
- Understand the user intention
  - Automatic adjustment for learning speed
  - Exploratory search engine

Seeking...

Internship related to machine learning, knowledge graph, user modeling, crowdsourcing, visualization, text analysis, education, and game AI, etc.

Personal Website