

# Adaptive Practice of Facts in Domains with Varied Prior Knowledge

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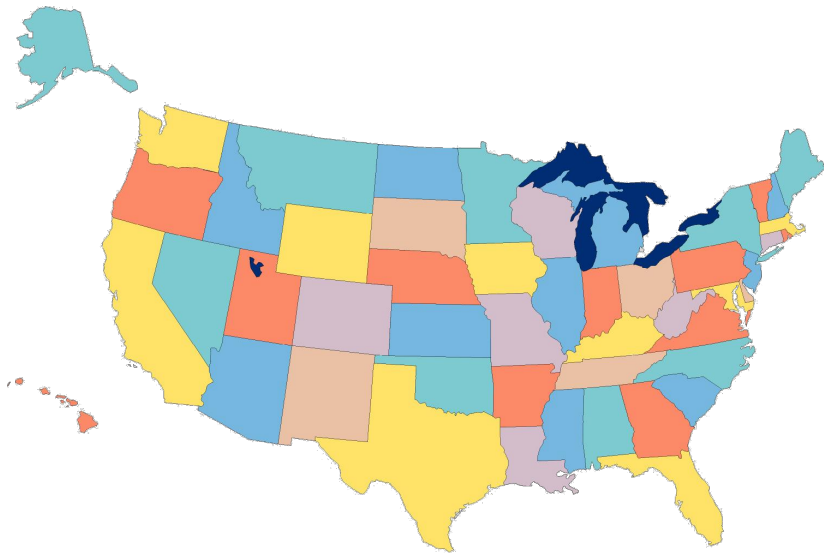
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# Presentation overview

- Context of facts learning
- Case study - Geography facts system
- Evaluation of the system

## Example of facts



# ... Practice of Facts ...

## Adaptive **Practice of Facts** in Domains with Varied Prior Knowledge

- How to learn a lot of facts?
- e.g. vocabulary, countries, human bones
- retrieval practice

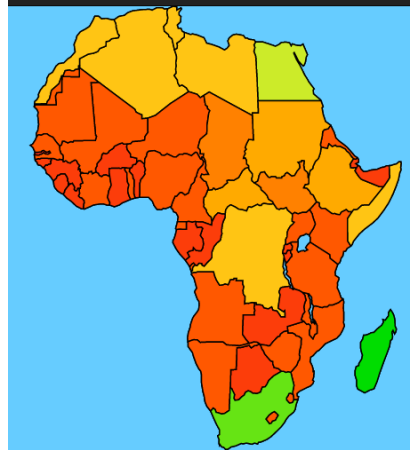
## **Adaptive** Practice of Facts in Domains with Varied Prior Knowledge

- Which items need to be practiced?
- flashcard software

# ... Domains with Varied Prior Knowledge

## Adaptive Practice of Facts in **Domains with Varied Prior Knowledge**

- Where is **Egypt**?
- Where is **Burkina Faso**?



# Case Study - Geography facts system

Outline maps World Continents States Maps overview Sign in

## World

Feedback

- +

Political map Water Surface

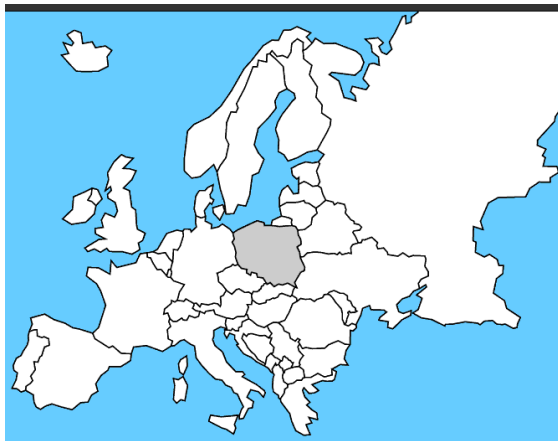
States Practice Cities Practice

|              |         |          |                 |           |
|--------------|---------|----------|-----------------|-----------|
| Afghanistan  | Algeria | Angola   | Argentina       | Australia |
| Bangladesh   | Belarus | Bolivia  | Botswana        | Brazil    |
| Burkina Faso | Chad    | China    | Dem. Rep. Congo | Egypt     |
| Ecuador      | Eritrea | Ethiopia | Philippines     | Finland   |

|          |           |         |               |                  |           |        |
|----------|-----------|---------|---------------|------------------|-----------|--------|
| Rome     | Lisbon    | Kiev    | Madrid        | Berlin           | Athens    | Vienna |
| London   | Moscow    | Paris   | San Francisco | Denver           | Houston   |        |
| Miami    | Atlanta   | Chicago | Los Angeles   | Washington, D.C. |           |        |
| New York | Vancouver | Toronto | Melbourne     | Sydney           | Monterrey |        |

adaptive learning

# Practice



What is the name of state highlighted on the map?

 Belarus

 Lithuania

 Poland

 Don't know

 Continue

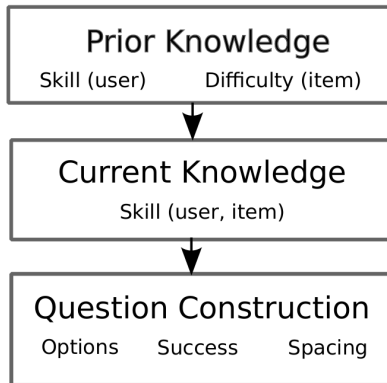
 Highlight again



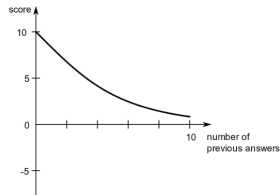
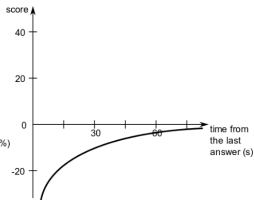
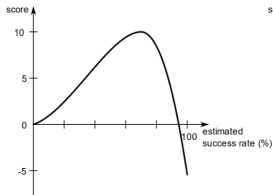
# Elo rating system in chess

- Each player has a number (how good they are)
- Result of a match can be predicted
- Changing after each match

# Question Construction Steps



# Item Selection – Scoring Functions



Are adaptive questions better than random?

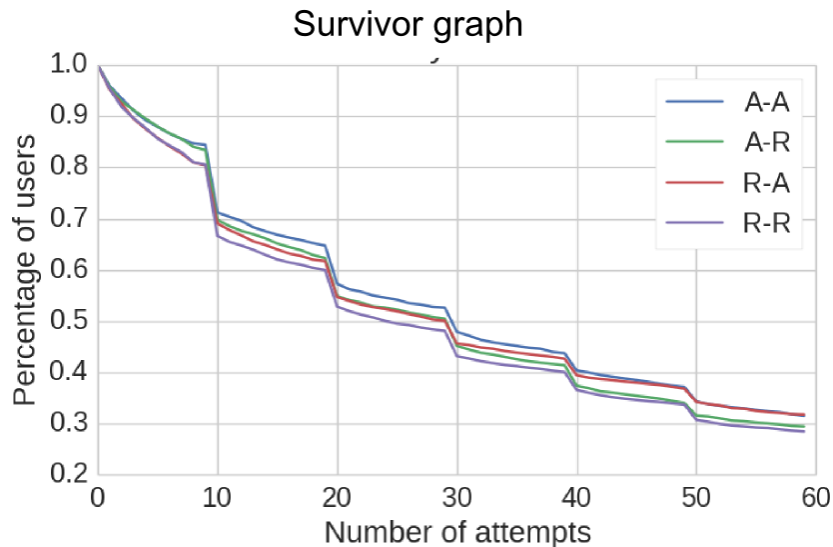
# Are adaptive questions better than random?

| Condition | Item selection | Options selection |
|-----------|----------------|-------------------|
| A-A       | Adaptive       | Adaptive          |
| A-R       | Adaptive       | Random            |
| R-A       | Random         | Adaptive          |
| R-R       | Random         | Random            |

# What should we measure?

- Time in the system?
- User impression?
- Success rate increase?

# Results - survivor graph

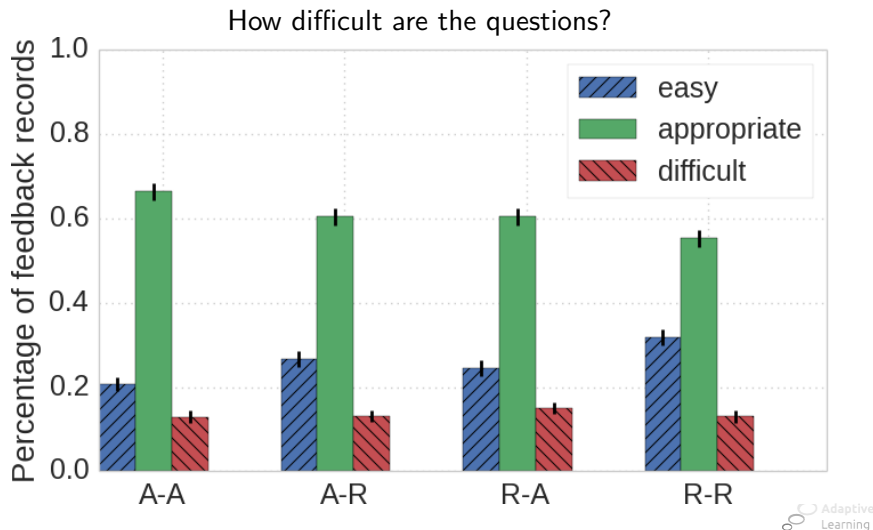


# Results - return rate

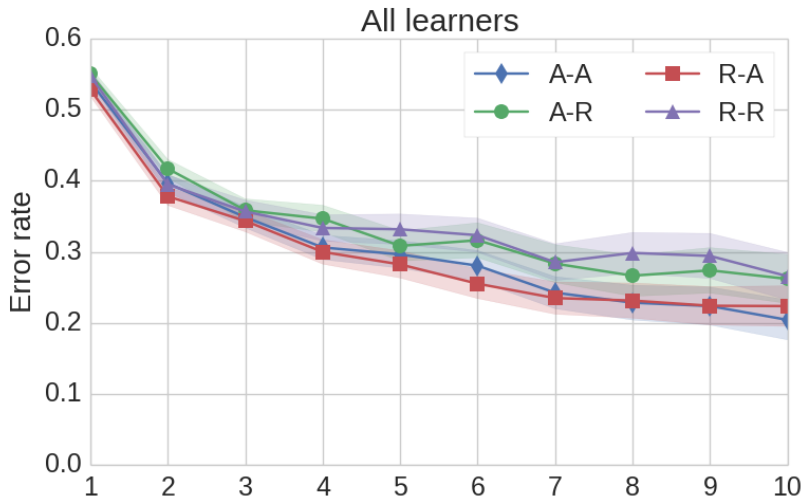
| Condition | Return rate |
|-----------|-------------|
| A-A       | 15.1%       |
| A-R       | 13.9%       |
| R-A       | 14.3%       |
| R-R       | 13.1%       |



# Results - explicit feedback



# Results - learning curve



# Conclusion

- Adaptive system for practicing facts
- Prior and current knowledge estimation
- Adaptivity has positive effects on user motivation to stay
- Effects on learning are difficult to measure
- Try it out at <http://slepemapy.cz>