

Adaptive Practice of Facts in Domains with Varied Prior Knowledge

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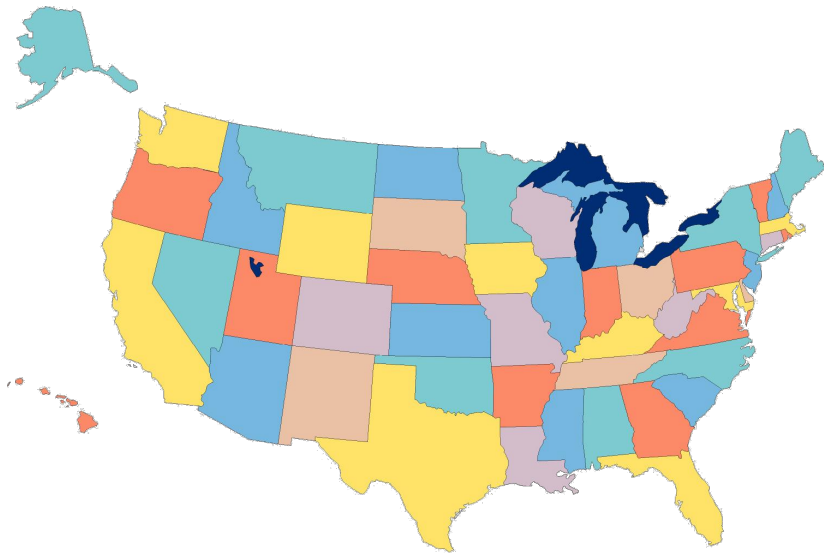
18. 11. 2015



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

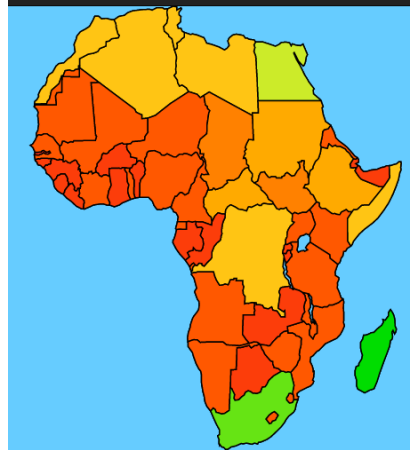
Adaptive Practice of Facts in Domains with Varied Prior Knowledge

- 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

World map showing countries colored by region (Green, Yellow, Orange, Red) and marked with colored circles. Includes zoom controls (- +).

Political map **Water** **Surface**

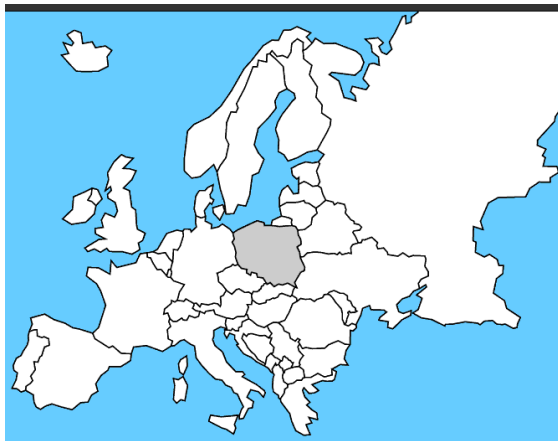
States [Practice](#) **Cities** [Practice](#)

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

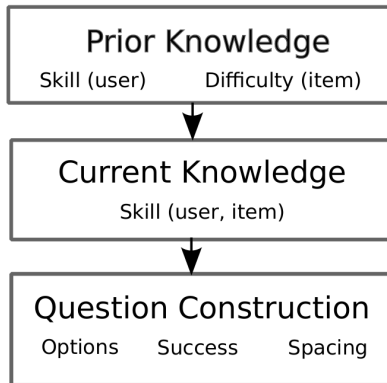
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 Highlight again

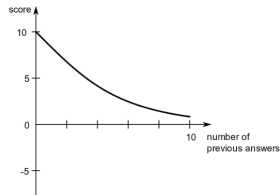
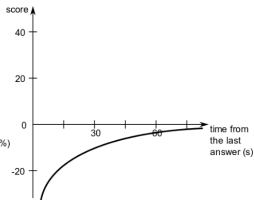
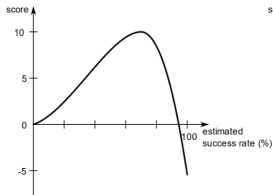
Elo rating system in chess

- 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?

- Online A/B experiment (Random vs. Adaptive)
- August to October 2015
- More than 1,300,000 answers from roughly 20,000 users

What should we measure?

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

Results - Adaptive vs. Random

- 9% lower probability to leave earlier than after 10 questions
- 15% lower probability to leave earlier than after 50 questions
- 15% higher return rate
- 20% more “Appropriate” responses in explicit feedback
- 20% higher success rate on the 10th reference question

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>