Recommendation of New Questions in Online Student Communities

Motivation

- Students' performance in Massive Open Online Courses (MOOCs) is enhanced by high-quality discussion forums or recently emerging educational Community Question Answering (CQA) systems.
- Problems of discussion tools in MOOCs:
  - A small number of students answer questions asked by their peers.
  - An increasing proportion of unanswered questions (up to 50%).
  - Dropout rates for courses can be as high as 94%.
- Introducing a new task of educational question routing - routing of new questions without any answer in educational CQA system to suitable answerers

Contributions

- While existing methods primarily focus on askers' needs, we take an answerer-oriented approach by considering not only students' expertise, but also willingness to answer a question.
- Incorporating additional non-QA data from the course to involve more students in question answering and reduce the burden on individual users.
- Offline experiment as an A/B test of the proposed method with more than 4600 MOOC students.

Ensemble classifier

- Predicting whether a user has sufficient expertise to answer a new question.
- Predicting user willingness to answer a new question.
- Combination:
  \[ P(y = 1) = P(\text{expertise} = 1) \times P(\text{willingness} = 1) \]

Educational question routing framework

- Construction of question profile
- Construction of user profile
- Matching of questions and users
- Optimization
- Recommended answers

Matching of questions and users

- QuCryptox Quantum Cryptography offered by TU Delft and Caltech at MOOC system edX
- Open-source CQA system Askalot

Accuracy of question recommendation

- Educational 23.25% 18.29% \( \chi^2(2, N=2640) = 10.03, p < 0.01 \)
- Baseline 15.91% 10.61% \( \chi^2(2, N=264) = 1.61, p = 0.20 \)

Conclusions

- Higher accuracy of answerers prediction compared to baseline
- Higher interest of users in the routed questions and engaged more students, who in addition provided more contributions
- Lower dropout rate of active contributors in CQA and the lower instructors workload
- Cooperation with Harvard University
- Full paper accepted for ACM RecSys 2017 (acceptance rate 20.8%)