Developmental-AI MOOC Assessment

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Abstract

We report lessons learned from our experience creating and administering a MOOC introducing students to developmental artificial intelligence. Our course, entitled Implementation of DEvelopmentAl Learning (IDEAL), covered advanced findings in developmental artificial intelligence spanning the fields of cognitive science and computer science. Its objectives consisted of conveying these findings to the general public, teaching developmental AI techniques to programmers and roboticists, and supporting international multidisciplinary collaboration amongst actors in the domain (academics, industrials, and hobbyists). Teaching materials included textual descriptions, short videos, and programming and writing activities. The course also supported community forums that allowed participants to engage in debates and work in teams. This form proved to be well fitted to the objectives. Participants reported that they found this design more efficient than lectures; and the forums proved useful in creating a productive community and conveying advanced scientific ideas.

1   Introduction

This paper reports our experience creating and administering the Implementation of DEvelopmentAl Learning Massive Open Online Course (IDEAL MOOC) in the

fall 2014. The goal was to convey the cognitive science background and the programming principles necessary to design robots and virtual agents capable of early-stage autonomous cognitive development. We have been conducting active research on this topic for several years at Université Claude Bernard Lyon 1 (UCBL) with our international partners. This research is situated in the context of France's broader effort to investigate Developmental Artificial Intelligence (DAI) (e.g., Oudeyer, Kaplan & Hafner 2007).

The MOOC content followed from Olivier Georgeon's course at UCBL (Master degree level). Beyond a mere course, however, this MOOC offered a place to discuss research in DAI. As such, it was a mix of a "professor centric MOOC" (xMOOC), "connectionist MOOC" (cMOOC), and Massive Open Online Research (MOOR). See a description of these categories by Dillenbourg, Fox, Kirchner, Mitchell, & Wirsing (2014). The level of content corresponds to Master's or PhD level course work, but the MOOC was open to the public without prerequisite. We advertised within our academic networks, scientific and technical mailing lists (AI, robotics, cognitive science, philosophy of mind), social media (Google+ communities, Facebook and LinkedIn groups), and MOOC index. As a result, we gathered a large variety of participants, ranging from software programmers to philosophers of mind. One of the goals of this effort was to facilitate dialog between the community members and thus to help cross-fertilize their respective fields.

Home page and registration: http://liris.cnrs.fr/ideal/mooc/
Teaser: http://youtu.be/kQPz9InhHjk
Syllabus: http://liris.cnrs.fr/ideal/mooc/syllabus.html
Lessons: http://liris.cnrs.fr/ideal/mooc/lesson.php
Google+ community:
 https://plus.google.com/u/0/communities/109445848302721599408
MOOC Platform: http://claco.univ-lyon1.fr/

3 Participation

We recorded 917 registrations, 584 views of the welcome video, 445 registrations to the Google+ community, 405 first quiz completion, 63 base track completion, 41 ad-

vanced track completion, 11 participants who played a leading role in the community. Participants came from 78 countries: France (21%), USA (17%), India (7%), UK (6%), Russia (4%), Canada (4%), Germany (4%), Spain (3%), Italy (2%), Brazil (2%), Other 68 countries: 30%.

194 participants answered the optional demographic survey. Of those, 11% reported working towards an under graduate degree, 20% a Master's degree or PhD, and 59 % reported being professionals or retirees. The intellectual background represented in the course included: computer programming (69%); cognitive science, psychology, or philosophy (7%); dual expertise in cognitive science and computer programming (12%); and other backgrounds (12%).

4   Workload for the organizing team

Design and animation: 488h (Olivier Georgeon, Cécile Barbier-Gondras, and Jonathan Morgan: course design, quiz and exercise design, proofreading). This time consisted of free work performed aside from professional work and from job-search activities supported by the French unemployment benefit system. General support from UCBL: 70h (Amel Corny, Solaine Reynaud: teaser video creation and general e-learning technology advice). UCBL students: 140h (Aurélie Kong Win Chang, Rémi Casado, Florian Bernard: preliminary mock-up, exercise testing).

5   Conclusion

We were very happy with the number, the richness, and the engagement of participants. The promotion could nonetheless have been more efficient; we failed to advertise to tech blogs or podcasts, to big companies, and to local traditional media. The most represented country was France, perhaps due to local networking and to the audience of Georgeon's lectures in French on Youtube; this shows the importance of local support. 30% of the people who viewed the teaser registered to the MOOC, which indicates good teaser efficiency. 65% of the registered participants did show up; this is a bit below average (70% reported by Dillenbourg et al. 2014), perhaps because of the long

time (3 months) between the registration opening and the MOOC beginning. 7% of the registered participants (11% of the show-ups) completed the MOOC successfully and received a certificate of participation; which is above the average in the literature.

Team-work played a central role in this MOOC. We felt the need for more efficient team management tools in the MOOC platform. There are a few actions we could have taken to favor team formation. For example, providing open permanent video hangouts or chat, or displaying participants who visit the same page at the same time could generate more encounters by serendipity. Team forming remains nonetheless challenging because of the diversity of interest, availability, and varying backgrounds of the participants. Designing this MOOC took much more time than expected. We found it analogous to writing a book and then teaching a class. Our motivation came from our passion for the subject, our pleasure doing it, and from the expected professional repercussions. The 11 participants who played a leading role in the community did impressive work. Some examples include re-programming the exercises in a different programming language, writing long documents to share their vision of developmental AI, and engaging in intense debates. Some were PhD students, professional roboticists, or retirees (anecdotally, we heard amusing complaints that their non-retired team members did not keep up with the workload). We hope that this community will remain active, and that it will play an active role in Developmental AI in the future. Now we keep the course available as a "permamooc".

References

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Oudeyer, P.-Y., Kaplan, F., & Hafner, V. (2007). *Intrinsic motivation systems for autonomous mental development*. IEEE Transactions on Evolutionary Computation, 11(2), 265-286.