

Hackathon Artificial Intelligence and Inclusive Education

Center for Research and Interdisciplinarity - May 11-13, 2018

General Information

Project Name

Cognitive Learning Assistant

Summary of the Project

Build a demonstrator for a Cognitive Learning Assistant based on the Google Home platform that can provide **guidance**, **support** and **feedback**¹ to learners of all ages by leveraging a personal learning profile based on an assessment of generic learning skills, prior knowledge, and indicators of engagement, through analysis of the individual's interactions on social networks. Google Home is an attractive platform for this project because of the availability in Europe, Asia and the Americas of a fairly low-cost device, the Google Home Mini², and suspected availability to some 50 countries and 25 languages of Google Assistant on Android phones.

Context of the Project

As individuals are progressively empowered with the responsibility for life-long learning and development, it becomes critical to be able to access personalized guidance, support and feedback at scale. The widespread availability of intelligent personal assistants which can respond to voice commands on devices such as Alexa, Google Home or on smartphones, has given rise to a yet unrealized potential to respond to this need while reaching a wide and diverse audience.

¹Reif, Frederick. "Applying Cognitive Science to Education: Thinking and Learning in Scientific and Other Complex Domains." *MIT Press (BK)* (2008).

² https://store.google.com/fr/product/google_home_mini



As an example in a specific domain, consider the Liulishuo app³, the world's first "AI English Teacher" which incorporates a Deep Learning AI engine similar to Alpha Go that is based on Philip Lance Knowles Recursive Hierarchical Recognition⁴ language learning theory.

Project Sponsors

Mooky Skills

<https://www.mookyskills.com>

Mooky Skills is an early-stage startup building a intelligent learning platform that can meet the challenges of the fast-changing vocational training landscape by providing a highly personalized learning experience through a comprehensive individual learning profile that links an individual's needs and aspirations to their organization's business objectives.

All In

<https://all-in.co>

All In is an international nonprofit organization aiming at bringing more diversity within the AI field. All In runs workshops on technical topics and runs meetups to share view on relevant topics with a focus on real-life case studies.

Aims

The Cognitive Learning Assistant aims to provide an adequate level of assistance in achieving learning objectives through personalized guidance, support and feedback.

Personalized guidance could be provided by a "Hello Assistant" type vocal command that responds by giving the student some indications to start their study routine such as what to study given the student's available time. The student could ask questions and obtain additional information from the assistant to clarify learning objectives or obtain additional resources to supplement their learning experience.

TBD: GUIDANCE SAMPLE DIALOGUE

Support could be provided when a student finds themselves stuck while working through a learning path. The assistant could then interact with the student to assess particular roadblocks and help the student by proposing a more fine-grained learning trajectory or specialized exercises.

TBD: SUPPORT SAMPLE DIALOGUE

³ <https://www.liulishuo.com/en/index.html>

⁴ Knowles, Phillip. (2008). Recursive Hierarchical Recognition: A Brain-based Theory of Language Learning.

Finally the assistant could provide feedback to improve performance by detecting deficiencies through exercises and assessments, providing likely reasons for these deficiencies and suggestions for improvement.

TBD: FEEDBACK SAMPLE DIALOGUE

Economical Model

Different economic models could make sense depending on the target audience such as subscriptions, pay per use, or in-app purchases. A B2B model targeting schools, universities and vocational training centers is another possibility. The exact nature of the business model for the Cognitive Learning Assistant is an area that requires further research and will benefit from the existence of an initial prototype.

Committed Non-Financial Means

- The presence during the hackathon of 2-3 persons with skills in AI, product and process design, diversity in AI.
- 2-3 laptops
- 2 Google Home units
- FloydHub account with 17 hours of GPU and 20 hours of CPU usage to train and run machine learning models
- The commitment to participate, if our project is accepted, as mentors in the CRI Labs Summer School⁵ from June 4 to July 27 to continue iterating on this project

Details of the Hackathon Challenge

Description of the Challenge Inside the Project

The team that coalesces around this project is free to choose a challenge (that seems attainable in the allotted time frame given the skills and proficiency of the team members) among the traditional literacies of reading, writing and mathematics, the new literacies of data literacy, technological literacy and human literacy (humanities, communication and design, etc...) or the cognitive capacities involved in the concept of humanics, namely systems thinking, entrepreneurship, cultural agility or critical thinking⁶.

⁵ <https://cri-paris.org/cri-labs-summer-school-2018/>

⁶ Aoun, Joseph E. *Robot-proof: Higher Education in the Age of Artificial Intelligence*. MIT Press, 2017.

Challenge Goals

Goals are presented in an approximate order of dependency, however the team will need to reevaluate how to achieve these goals in the allotted time and may consider working towards some goals in parallel, for instance by splitting them into sub-goals.

Goal	Difficulty
Elaborate one or more user journeys for the three assistance modalities: guidance, support and feedback	Bronze
Identify and gather relevant data to train predictive models for adaptive learning (external such as social networks, or generated through learning activities)	Silver
Design and implement a simple learning profile that characterizes elements of an individual's prior knowledge, learning style and environment	Gold
Design and implement a simple predictive model allowing some degree of personalization based on available data and the learning profile	Gold
Design, build and demonstrate a Google Home Action that builds on the above and demonstrates a personalized cognitive learning experience	Silver

Accessibility of the Data for Machine Learning

☐ The data for the development of artificial intelligence functionalities will be provided by the project leader

☒ **The data for the development of artificial intelligence functionalities are freely available online**

☐ The data for the development of artificial intelligence functionalities will be gathered during the week-end (and the project leader believes it feasible)

☐ The data for the development of artificial intelligence functionalities will be generated during the weekend (and the project leader believes it to be feasible)

☐ No data are necessary for this challenge

☐ The data for the development of artificial intelligence functionalities have not been identified yet

▣ **Other: Some data for the development of artificial intelligence functionalities have not been identified yet**

Under what conditions will the data and deliverables of the hackathon be shared?

All data and deliverables gathered and produced during the hackathon will be published under a [Creative Commons Attribution-ShareAlike 4.0 international](https://creativecommons.org/licenses/by-sa/4.0/) license for data and an [MIT](https://open.mit.edu/licenses/mit-license/) license for software) under joint copyright with Mooky Skills, All In and the team members.

Required Competencies

	Blue (At least one participant has some idea of the subject)	Green (One or more participants have intermediate skills in the subject)	Yellow (Several participants have skills in the subject or one participant is an expert in the subject)	Red (Several participants are experts in the subject)
Algorithmic and artificial intelligence			▣	
Pedagogy			▣	
Knowledge of (extra-)academic institutions		▣		
Knowledge of medico-social institutions	▣			
Knowledge of inclusivity problematics			▣	
Programming of interfaces (web, app...)		▣		

Database management		<input type="checkbox"/>		
Interface design			<input type="checkbox"/>	
Graphic design	<input type="checkbox"/>			
Audio design		<input type="checkbox"/>		
Electronics	<input type="checkbox"/>			
Object design	<input type="checkbox"/>			
Medical skills	<input type="checkbox"/>			
Others (please give information below in the comments)		<input type="checkbox"/>		

Comments On Required Competencies

The project could benefit from additional competencies as follows:

- One person with expertise in the design and UX of voice apps either in an on-call mentorship role or ideally full time during the hackathon
- One person with practical knowledge of building Google Home Actions⁷
- One person with expertise in the application of cognitive science to education
- One person with a broad perspective on inclusion and diversity in AI
- One person with a storytelling and or theatrical background

Participants Acknowledgement

Mooky Skills will give team members credits in the final project and the possibility for CRI students to continue iterating on the project through the Summer School program. Applications for internship for continued involvement are also welcome. In addition we will organize a learning journey in our Lab RH⁸ ecosystem to better understand the impact of the

⁷ <https://developers.google.com/actions/>

⁸ <https://www.lab-rh.com/>



project in the context of vocational training. Team members will also obtain beta access to our Learning Profile assessment program. And last but not least, Mooky Skills will also happily provide team members with a Mooky Skills polo to wear with pride!

Project Leader

First Name and Surname

Sarah Nafaa

Position in the Project

Project Leader and Coordinator

Working Languages

- French
- English