Computational Cognition Ideation Challenge

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Introduction

Across a diverse assortment of topics, competitions have been established to motivate and focus scientists and engineers, as well as students interested in such careers, on ambitious objectives. Examples include the famous RoboCup robotic soccer tournaments, the International Conference on Functional Programming (ICFP) contests, and the High Performance Computing (HPC) challenges. The National Institute of Standards and Technology (NIST) speaker recognition evaluations, although officially considered not to be competitions, also provide intriguing examples of "crowd-sourced" improvements in methodology and capability. Whether we refer to them as competitions, challenges, tournaments, or evaluations, the purpose these recurring annual events serve is to create opportunities for a broad cross-section of interested and capable people to participate in the process of accelerating scientific and technological progress.

The organizers of this symposium have rallied around the premise that it is time to establish one or more recurring annual competitions for the cognitive sciences. Given our particular areas of expertise and interests, at this time we are specifically targeting the intersection of cognitive modeling and artificial intelligence. There is a rich history of interaction between these disciplines, but in recent years (or decades) the tendency has been toward increasing fractionation and sub-specialization, with decreasing methodological, scientific, and technological cross-fertilization and integration. Consistent with the spirit of the recent AAAI Fall Symposium on Integrated Cognition and with the far-reaching goals motivating the co-location of the 2014 CogSci and AAAI conferences, our intent is to use competition as a mechanism for bringing these communities together, to advance computational cognitive science and technology.

There are precedents for attempting this kind of thing in the past. For instance, the PokerBot Competition (Lebiere & Bothell, 2004) and the Dynamic Stocks and Flows Model Comparison Challenge (Lebiere, Gonzalez, & Warwick, 2010) involved a competitive evaluation of computational systems implemented somewhere in the intersection of AI and cognitive modeling. Both of these were successful and interesting activities. However, they were also both single shot modeling competitions that did not evolve into annually recurring events.

An open, recurring competition would provide, it is hoped, a visible measure of scientific and technological progress in understanding and implementing a computational instantiation of the mind. Preliminary input and feedback from the scientific community (Gluck, 2012) indicates resounding interest in such a competition. Agreement and enthusiasm regarding a competition as a mechanism for pursuing this ill-defined goal is all fine and good, but does not in itself provide us with a concrete focus and set of evaluation metrics. There are many places we *could* focus the attention of an annual competition. We must ask the question, though: Where *should* we focus our attention, in order to maximize the positive effect such a competition can have on cognitive science and technology?

An Ideation Challenge

In this symposium, we will present for general discussion and debate the outcome of what is called an Ideation Challenge. The Challenge is a general call to the scientific community to provide answers to the question at the end of the introduction: *where* should we focus the attention of an annually recurring computational cognition competition? In challenges of this sort, a "Seeker," which in this case is the consortium of organizers of this symposium, posts a public challenge made available to "Solvers" all over the world. By adopting this approach, we are casting a wide net across the global community, soliciting proposals focused on the creation of a recurring annual competition in computational cognition. Our hope is that this will motivate diverse groups to bring their respective strengths together to create compelling new capabilities that are achievable only through multi-disciplinary, integrative cognitive science and technology.

The Ideation Challenge has the following features:

- **There are guaranteed awards**. The total payout will be $8,500, with at least one award being no smaller than $5,000 and no award being smaller than $1,000. This provides some flexibility regarding the number of awards to be paid out – anywhere from one to four, depending on the number and quality of submissions.

- In addition to the cash award, winning Solver's will be **invited to participate in this symposium**. Travel expenses associated with attending and presenting at the conference will be covered by the Seeker, up to a maximum of $3,000 per idea.

- Solvers are not required to transfer exclusive intellectual property rights to the Seeker. Rather, by submitting an idea, the Solver grants to the Seeker a **royalty-free, perpetual, and non-exclusive license to use any information included in the idea**.

- **All submitted ideas may be made publicly available** (at the Seeker's discretion) in their entirety, to foster open discussion and evaluation of the content generated by the Challenge.

The Ideation Challenge will be open to any interested individuals or teams not directly involved in the organization of the event. Employees of the Seeking organizations will be allowed to submit ideas for consideration, and may achieve honorable mention, but will not be eligible for the prize money or travel funds to the symposium. Participation may involve individuals or teams from anywhere in the world. All submitted material may (at the Seeker's discretion) be made available to the public through the Challenge website.

Criteria and Process

The most promising submissions will be clear and concise descriptions of an idea for an annually recurring computational cognition competition, and should follow these solution guidelines:

1. Low barrier to entry – minimal costs for hardware required to compete
2. Engage both target communities: AI and cognitive modeling
3. Total cost of $500,000 or less per year, including competition prizes of $100,000, $50,000, and $25,000 (actual cost below $500,000 will not be a judging factor)
4. Find the sweet spot at the intersection of challenging and feasible
5. May be an online competition or a live event
6. Provide a means for objective scoring of competitors – preferably automated and able to run in fast-time simulation

Submitted proposals will not include any personal identifying information the Solvers do not want to make public, or any information the Solvers may consider to be their Intellectual Property that they do not want to share. Solvers in this design competition are not required to participate in any subsequent annual competition, should one or more of them be funded.

The selection process will be completed by the Seekers. Our small working group of technical experts (the organizers of this symposium) will review the viable ideas and make a decision regarding the winning solution(s).

The Symposium

The symposium itself will be organized into three segments. One of the organizers will open with an introduction to Ideation Challenges in general and the focus of this Challenge in particular. This will be followed by a series of three 20-minute presentations by the Ideation prize winners. These are the creative Solvers who submitted the best ideas in response to the solicitation. It can't be known ahead of time precisely who those speakers will be. We anticipate compelling diversity in the ideas they present, although we can't engineer this into the result, given that the outcome is dependent on the input, which is outside our control. The third segment of the symposium will be a question-answer session and discussion with the audience regarding the outcome of the challenge, as well as the merits of and issues with some of the best submitted ideas.

The Computational Cognition Ideation Challenge resulted in 60 idea submissions from Solvers around the world. As of the submission deadline for the final draft of the symposium description, the organizers are reviewing those submissions and are in the process of selecting the award winners. We encourage you to attend the symposium to find out who the award winners are and to discuss with us the merits of their ideas.

References

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