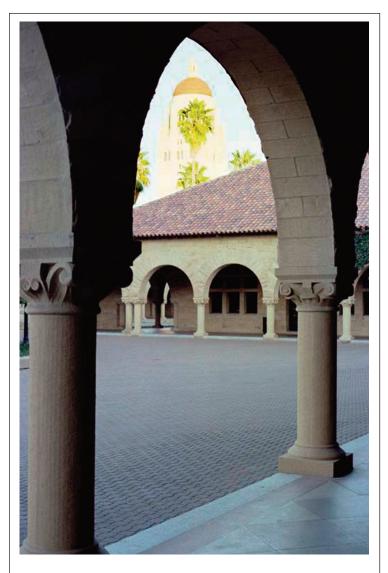# The Computational Analogy Workshop at ICCBR-16

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■ *The Computational Analogy Workshop was held October 31, 2016, as part of the ICCBR 2016 conference in Atlanta, Georgia. This report summarizes the workshop.*

Computational analogy and case-based reasoning (CBR) are closely related research areas. Both employ prior cases to reason in complex situations with incomplete information. Analogy research often focuses on modeling human cognitive processes, the structural alignment between a base or source and target, and adaptation or abstraction of the analogical source content. While CBR research also deals with alignment and adaptation, the field tends to focus more on retrieval, case-base maintenance, and pragmatic solutions to real-world problems. However, despite the overlap in their research goals and approaches, cross communication and collaboration between these areas have been progressively diminishing.

ICWSM-18

The Twelfth International AAAI Conference on Web and Social Media (ICWSM) will be held June 25-28, 2018 at Stanford University in Palo Alto, California USA. Tentative dates for abstract and paper submission are February 9 and 15, respectively. For complete details, please see:

www. icwsm.org/2018

This workshop brought together researchers who use a variety of analogical reasoning approaches together with researchers in CBR. The workshop included 11 papers representing a range of computational analogy research methods and topics, including corpus mining for analogies, analogical proportions, analogy for natural language processing, design by analogy, analogy tutors, and instruction for analogical agents. Two invited talks set the stage for discussing the intersection of analogy and CBR. Ashok Goel (Georgia Institute of Technology) discussed the role of computational analogy in the domains of biologically inspired design, visual thinking, and cognitive robotics. Ken Forbus (Northwestern University) discussed applications of analogical reasoning in qualitative and commonsense reasoning and cognitive architectures.

Three major themes ran through the rest of the workshop: formal analogy, adaptation and abstraction, and design by analogy. Four papers dealt with formal (symbol-string) analogies. These papers examined how to predict the morphology of rare words, predict unseen words in text translation, solve symbol-string analogical equations, and translate natural language input to bash commands.

The design-by-analogy session discussed the use and development of systems that identify similar designs from a database. Three presenters discussed using crowdsourcing to construct a relational data set, using latent semantic analysis and latent Dirichlet analysis to categorize patents into meaningful groups, and abstracting design functions and flows to identify similar designs in a database.

Adaptation and abstraction enable learning and case reuse in new domains. Presentations in this final session discussed both a data-driven approach and several system approaches to case adaptation. System-based contributions included using natural language to bootstrap commonsense reasoning by analogy, generalizing task knowledge in a robotic agent to improve knowledge reuse, and a cognitive tutor that reasons over a student's misconceptions to provide problems designed to overcome student misconceptions.

The workshop concluded with a panel discussion about the future directions of computational analogy. Panelists included Ken Forbus (Northwestern University), Katherine Fu (Georgia Institute of Technology), Ashok Goel (Georgia Institute of Technology), Philippe Langlais (University of Montreal), and Santiago Ontañón (Drexel University). A central topic of this discussion was the role of computational analogy with respect to the greater AI community, including which problems are best addressed through computational analogy approaches, and which are better suited by a combination of strategies (such as integration with statistical methods or formal methods). This discussion continued at the 2017 iteration of the ICCBR workshop held in Trondheim, Norway.

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