Preface

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 case/source and target, and adaptation/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 their obvious overlap in research goals and approaches, cross communication and collaboration between these areas has been progressively diminishing. CBR and Analogy researchers stand to benefit greatly from increased exposure to each others work and greater cross-pollination of ideas. The objective of this workshop is to promote such communication by bringing together researchers from the two areas, to foster new collaborative endeavors, to stimulate new ideas and avoid reinventing old ones.

In this second edition of the ICCBR Workshop on Computational Analogy, 8 papers have been selected for presentation (on 9 submissions) from researchers coming from USA, France, and Japan).

A first set of contributions concern formal aspects of the analogical inference, its complexity and evaluation. Henri Prade and Gilles Richard provide a state of the art on analogical-proportion based inference. As recent results show that affine Boolean functions can be predicted without error by means of analogical proportions, the authors discuss how one might take advantage of this result to refine the scope of application of the analogical-proportion based inference to subparts of a Boolean function that may be assumed to be "locally" linear.

Also contributing to formal analogy research, Yves Lepage addresses the problem of answering analogy questions of the type $A:B::C:D$ between word forms where the unknown is D. The author proposes to add a new criterion for partial determination of the solution to an analogy question: the pairwise indices of the positions of the characters. A character-position matrix is built which assigns a probability to each character and position in the answer D of an analogy question $A:B::C:D$.

Two papers adress the issue of the evaluation of an analogical inference. The work of Pierre-Alexandre Murena and his colleagues aim at testing the hypothesis that the relevance of an analogical solution can be measured by the complexity of the analogy. In order to compute the complexity, they propose some specifications for a prototype language used to describe analogies in a basic alphanumeric micro-world domain. Joseph Blass and his colleagues take another approach to evaluation. Starting from the observation that inferred facts are, even if the reasoning technique is sound, only as accurate as the assumptions upon which they are based, they propose a domain-independent method to evaluate inferences for analogical reasoning, via a prototype system.

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Another set of contributions concern analogy for reuse and adaptation. Scott Friedman and his colleagues explore how analogical mappings can be used to help humans and computers negotiate to define shared goals and collaborate over the fulfillment of those goals. Their application domain is plan localization, the problem of establishing the set of steps within the plan that are candidates (potentially after some adaptive repair actions) for next actions given the worlds unforeseeen changes. Fadi Badra develops a qualitative modeling approach of the case-based analogical inference, and proposes a language to represent and symbolically reason upon differences between cases. This language can be used to represent both similarity paths and adaptation rules.

A last contribution uses machine learning techniques to learn how to solve analogical equations in the domain of Natural Language Processing. Rashel Fam and Yves Lepage analyse the characteristics of a data structure called an "analogical grid", which can be used to predict new word forms (morphological forms) from purely surface level observations of the words found in text. In particular, the saturation of analogical grids is measured against their size. Reported results show that the logarithm of the saturation of an analogical grid is linear in the logarithm of its size, and the relation between the saturation and the size of an analogical grid is almost independent of the size, the genre and the language of a text.

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