Case-Based Reasoning

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The American Association for Artificial Intelligence (AAAI) 1994 Workshop on Case-Based Reasoning (CBR) focused on the evaluation of CBR theories, models, systems, and system components (for example, retrieval, adaptation, learning). The 4 invited talks, 14 paper presentations, 19 poster presentations, and 1 summary panel discussion were attended by 66 participants.

The four invited speakers discussed how CBR approaches can be evaluated in research projects, industrial applications, and military tasks. Katia Sycara (Carnegie Mellon University [CMU]) outlined an exhaustive set of measures for evaluating CBR systems and discussed how she applied some of these measures in empirical comparisons with other approaches for solving job shop scheduling problems. Hiroaki Kitano (Sony CSL) and Hideo Shimazu (NEC) described and demonstrated SQUAD, a system for software quality control and help-desk applications. They argued that fielded CBR systems can be evaluated by measuring their effect on an organization (for example, significant increases in code quality and annual savings). Trung Nguyen (Compaq Computer Corporation) described and demonstrated three industrial CBR applications that assisted both customers and customer-service personnel. He argued that CBR systems are easy to assess, develop, and deploy (for example, QUICKSOURCE was created in six months) and can be evaluated in terms of their cost benefits. Finally, John Lemmer (Rome Laboratories) outlined lessons learned through his experience in managing the funding for five groups researching CBR for crisis battle planning. He described how well his groups' systems met the funding task's goals and addressed challenges to transitioning research efforts to this application.

The paper and poster sessions included statistical evaluations of specific approaches, mathematical and empirical cross-paradigm com-

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parisons, evaluations involving integrated CBR approaches, and reports on pilot studies. Topics discussed included derivational analogy, similarity functions, retrieval algorithms, memory-based reasoning, feature selection, argument construction, and decision theory.

The summary panelists (Manuela Veloso [chair], Kevin Ashley, Chris Atkeson, Eric Jones, and Janet Kolodner) used a round-robin discussion format to stimulate discussions. Many topics were raised on evaluation, including the explicating of the purpose of evaluation, concerns about conservative evaluations with few implications, evaluations of fielded CBR systems in the context of social environments, reports on how some system evaluations greatly countered expectations, and suggestions for forming a context-directed taxonomy of evaluation approaches.

In this workshop, the CBR community addressed the evaluation of theories and implemented systems, which several researchers believe has been underrepresented at previous CBR gatherings. The consensus opinion is that a balance between novel innovations and evaluations could maximize progress. However, several researchers cautioned that evaluations, when performed, are not useful unless driven by specific goals that pinpoint the sources of power in CBR systems.

The organizing committee included David W. Aha (Naval Research Laboratory [NRL]), Chris Atkeson (Georgia Institute of Technology), Ray Bareiss (ILS), Karl Branting (University of Wyoming), Patrick Harrison (NRL), Ashwin Ram (Georgia Tech), Evangelos Simoudis (Lockheed), and Manuela Veloso (CMU). AAAI Press is publishing the workshop proceedings (Technical Report WS-94-01).

David W. Aha received his Ph.D. from the University of California at Irvine in 1990; his dissertation concerned instance-based learning algorithms, an area that intersects machine learning and case-based reasoning. He is currently with the Naval Research Laboratory Navy Center for Applied Research in AI, where he pursues research in machine learning and case-based reasoning.