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444

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Preface

The area of Knowledge Based Computer Systems (KBCS) is becoming increasingly popular for intellectual endeavor, and for commercially viable enterprise. The past few years have seen a number of practical applications of AI technology coming out of the laboratories. We are now on the threshold of major advances in KBCS.

This volume consists of forty-seven papers covering a broad spectrum of areas in Knowledge Based Computer Systems, both theoretical and practical. This volume will give readers an insight into developments in the rapidly growing area of Artificial Intelligence and will also give a feel for practical applications that are possible with the state of the art.

These papers were selected by an international team of referees for presentation at the Conference on Knowledge Based Computer Systems - KBCS '89. This is the second in a series of annual conferences hosted by the Knowledge Based Computer Systems Project. This project is funded by the Government of India and is assisted by the United Nations Development Programme. This volume also contains papers describing research and development at the nodal centres of the KBCS project.

We thank the sponsors and the members of the advisory committee and the program committee for their support and suggestions in arranging the conference. We also thank the referees (listed on page 543) who played a major role in helping the program committee select the papers in this volume from the one hundred and forty-one received. The intellectual capital for the conference was contributed by the invited speakers, authors, tutorial speakers and authors of poster papers. We thank them all.

Mr Sasikumar contributed substantially to the planning of the conference, coordination and communication with the referees, and the production of this volume. Mr Srinivas lent us his expertise with TEX, in typesetting parts of this volume. Every member of the KBCS group at NCST contributed to the organisation of the conference. Colleagues at NCST helped in a variety of ways. Colleagues in the ERNET Project provided us with excellent e-mail facilities. Mr NK Mehra of Narosa Publishing House helped us plan the publication of this volume, and organised remarkably fast printing of the participants' edition. We are grateful to all of them.

S Ramani
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Bombay, March 1990

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Contents

AI Applications

Computer Architecture and Parallel Processing

Expert Systems

Intelligent Tutoring Systems

Knowledge Representation

Logic Programming

Natural Language Understanding

Pattern Recognition and Vision

Reasoning

Search

Speech

Activities at the KBCS Nodal Centres

AI Applications

A Computational Architecture for Co-operative Systems

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Abstract

This paper argues that computer systems can be classified according to the relative amounts of cognitive processing that are required from the human user and the system software, and that co-operativity takes different forms in these different classes of systems. It proposes a generic architecture for the class of systems in which cognitive processing is interactively shared between computer and user, and argues that in an important sub-class of systems, much of what is normally understood by "user-modelling" is unnecessary to provide co-operative responses to questions.

1 Introduction

This paper proposes a computational architecture that will be appropriate for co-operative computer programs in any application domain. This generic architecture is derived from a consideration of the types of functionality that might be necessary in order to provide co-operativity in a problem-solving program. We identify reasoning about participants, dialogues, tasks and applications as being the four major components of a generic co-operative architecture, and note that some domains require sophisticated kinds of reasoning in all of these components.

However, in well-structured problem-solving domains, there are definite practical limits to the complexity of reasoning that is required in order to produce co-operative responses to user inputs. Thus even though we believe that the theoretical problems of reasoning about dialogues, participants and tasks are far from being solved in the general case, we do not believe that it is premature to begin building truly co-operative problem-solving systems.

We are currently developing PROCODE, a PROtotype COonfiguration Dialogue Environment, at Hewlett Packard Laboratories, Bristol. This program takes advantage of the structure of the computer configuration domain to derive limitations upon the functionality that we need to provide, and in particular eliminates all explicit reasoning about participants. We argue below that the characteristics of the configuration domain