

Shekhar S. Pradhan

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Advanced Degrees

Ph.D. (May, 2001) and M.S. (August, 1993), Computer Science, University of Maryland, College Park.

Ph.D. (August, 1983) and A.M. (August, 1979), Philosophy, University of Illinois, Urbana-Champaign.

Current Appointments

Visiting Associate Professor, Department of Computer Science, Vassar College, NY.

Professor, Department of Philosophy, Central Missouri State University, MO (on leave).

Expertise and Research Interests

Databases

Intelligent databases, databases and decision support systems, heterogeneous databases, agent-based information systems.

Software Engineering

Requirements engineering, formal methods, software process management issues.

Artificial Intelligence

Reasoning under uncertainty, knowledge representation, multi-agent systems.

Social and Ethical Implications of Information Technology

Social implications of the software crisis, software and intellectual property, management of risk resulting from information technology failures.

Current Research Projects

Argumentation Databases

Argumentation databases (invented by me) contain a layer of software, called the “argumentation manager,” that sits on top of a database or an

information system. The argumentation manager can extract arguments from the information in the underlying database and has mechanisms for determining the overall effect of such arguments on the answers to a query. Without in any way modifying the data model or the query answering procedure of the underlying information system, argumentation databases return exactly the same answer to a query that the underlying information system would return except that the answers are annotated with a confidence value which reflects the effect of all the conflicting and interacting arguments. Argumentation databases are needed when decisions and evaluations have to be made in the context of conflicting and interacting information, evidence, and arguments.

My publications, conference talks, and invited talks on this research:

“Argumentation Databases,” in *Logic Programming* ed. Catuscia Palamidessi, LNCS 2916, Springer Verlag, 2003.

“Connecting Databases, Information Conflicts, and Argumentation,” Invited Talk, Schloss Dagstuhl Seminar on Inconsistency Tolerance in Databases and Software Systems, Dagstuhl, Germany; June, 2003.

“Connecting Databases with Argumentation in” *Web-Knowledge Management and Decision Support Systems* ed. Ulrich Geske, Springer Verlag Publishers, 170-185, 2003.

“Contestations and Constraints for Databases,” International Conference on Innovative Applications of PROLOG, Tokyo, October, 2001.

Software development under multiple requirements viewpoints (joint work with Michael Huth of Imperial College, London, U.K.)

Different stakeholders in a software project may have different requirements of the project, which provide different viewpoints of the project. These multiple viewpoints can be partial in terms of state-space, name-space and property-space, can use different modeling techniques, and can be inconsistent with each other. We investigate formal techniques for aiding software development under multiple, partial, and possibly inconsistent viewpoints. We are developing a framework for model checking of global requirements on models of each viewpoint, which may be partial from the global perspective and which may collectively be inconsistent.

Our publications, conference talks, and invited talks on this research:

“Consistent Partial Model Checking,” DIMACS Workshop on Applications of Lattices and Ordered Sets to Computer Science, Piscataway, New Jersey; July, 2003. (presented by co-author)

Consistent Partial Model Checking (with Michael Huth), *Electronic Notes in Theoretical Computer Science*, vol. 23, 2003.

Model-Checking View-Based Partial Specifications (with Michael Huth), *Electronic Notes in Theoretical Computer Science*, vol. 45, July, 2001.

“Abstraction and Refinement for Model Checking Inconsistent Systems,” Living with Inconsistency Workshop, International Conference on Software Engineering, Toronto; May, 2001. (presented by co-author)

Teaching Interests

Databases, software engineering, object-oriented methodology, artificial intelligence, algorithms for bioinformatics, decision support systems, data structures, and social and ethical implications of information technology.

Courses Taught (CS related)

Software Development Methodology, Software Project Management, Database Systems, C++ and Data Structures, Data Structures and Analysis of Algorithms, Foundational Issues in Artificial Intelligence, Introduction to Programming, and Logic.

New Course

In Spring 2004, I am scheduled to teach a course on algorithms with emphasis on bioinformatics that I have designed with two faculty members from the biology department at Vassar College. The algorithms course will be linked with a course in genetics taught by the biology faculty. Students from the algorithms course will be paired with students from the genetics course. Each such team will have to work jointly on several assignments in which the biology student will provide biological constraints and data for solving a certain problem in genetics and the computer science student will design an algorithmic solution to this problem which satisfies the constraints and which can be tested on this data.

Teaching Experience

2003-2004, Visiting Associate Professor, Department of Computer Science, Vassar College, New York.

2002-2003, Lecturer, Software Engineering Program, Department of Electrical Engineering and Computer Science, University of Kansas.

1984-Present, Assistant, Associate, and Full Professor, Philosophy Program, Central Missouri State University.

1998-1999, Visiting Professor, Department of Computing and Information Science, Kansas State University, Kansas.

1996, Fall, Visiting Faculty, International Enrichment Program, Imperial College, London, U.K.

1992, Fall, Instructor, Department of Computer Science, University of Maryland, College Park.

Publications

Journal Papers

“Consistent Partial Model Checking” (with Michael Huth), *Electronic Notes in Theoretical Computer Science*, vol. 23, 2003.

“Connecting Databases with Argumentation” in *Web-Knowledge Management and Decision Support Systems* ed. Ulrich Geske, Springer Verlag Publishers, 170-185, 2003.

“Model-Checking View-Based Partial Specifications” (with Michael Huth), *Electronic Notes in Theoretical Computer Science*, vol. 45, July, 2001.

“Using Priorities to Combine Knowledge Bases” (with Jack Minker), *International Journal of Cooperative Information Systems*, vol. 5, no. 2 & 3, 333-364, 1996.

“Combining Databases with Prioritized Information” (with Jack Minker and V.S. Subrahmanian), *Journal of Intelligent Information Systems*, vol 4, 231-260, 1995.

International Conference Papers

“Argumentation Databases,” in *Logic Programming* ed. Catuscia Palamidessi, LNCS 2916, Springer Verlag, 2003.

“Contestations and Constraints for Databases,” *Proceedings of the International Conference on the Innovative Applications of PROLOG*, October, 2001.

“Logic Programs with Contested Information,” *Proceedings of the Joint International Conference and symposium on Logic Programming*, MIT Press, 1996.

“Semantics of Normal Logic Programs and Contested Information,” *Proceedings of the 11th IEEE Symposium on Logic in Computer Science (LICS)*, IEEE Press, 1996.

“Combining Datalog Databases using Priorities,” *Proceedings of the Sixth International Conference on the Management of Data*, Tata-McGraw Hill, 1994.

Other Conference Papers

“A Logic for Integrating Knowledge,” *Proceedings of the Fifth Midwest Conference on Artificial Intelligence and Cognitive Science*, April 1995.

“Circumscription Policy” (with Steven Graham), *Proceedings of the Second Midwest Conference on Artificial Intelligence and Cognitive Science*, June 1990.

Details of my publications in philosophy will be provided upon request.

Major Talks (CS Related)

International Conference and Workshop Talks

“Argumentation Databases,” International Conference on Logic Programming (ICLP), Mumbai, India; December, 2003.

“Connecting Databases, Information Conflicts, and Argumentation,” Invited Talk, Schloss Dagstuhl Seminar on Inconsistency Tolerance in Databases and Software Systems, Dagstuhl, Germany; June, 2003.

“Contestations and Constraints for Databases,” International Conference on Innovative Applications of PROLOG (INAP), Tokyo; October, 2001.

“Aspect-driven Abstraction and Refinement for Model-checking Inconsistent Systems,” (with Michael Huth), International Conference on Mathematical Foundations of Programming Semantics, Aarhus, Denmark; May, 2001. (Presented by co-author.)

“Abstraction and Refinement for Model Checking Inconsistent Systems,” (with Michael Huth), Second International Conference and Workshop on Living with Inconsistency, International Conference on Software Engineering, Toronto; May, 2001. (Presented by co-author.)

“Logic Programs with Contested Information,” Joint International Conference and Symposium on Logic Programming (JICSLP), Bad Honnef, Germany; September, 1996.

“Semantics of Normal Logic Programs and Contested Information,” 11th Annual Symposium on Logic in Computer science (LICS), New Brunswick, New Jersey; July, 1996.

“Combining Datalog Databases using Priorities,” Sixth International Conference on the Management of Data (COMAD), Bangalore, India; December, 1994.

Other Invited Talks (CS Related)

I have presented invited talks on my research at the following universities: Vassar College, University of Kansas, Wichita State University, Kansas State University, University of Maryland, Drexel University, University of Missouri at Kansas City, Imperial College, University of Toronto, New University of Lisbon, Indian Institute of Technology in Bombay, and Tata Institute of Fundamental Research in Bombay.

(I will be happy to provide details upon request.)

Dissertation Information

Reasoning with Conflicting Information in Artificial Intelligence and Database Theory (Supervisor: Professor Jack Minker), University of Maryland, College Park; May, 2001.

Abstract: Distributed information systems and multi-agent systems, which answer queries and solve problems by pooling together information from different sources, are likely to use information that contains logical as well as non-logical conflicts. This dissertation develops a semantic framework for reasoning with information containing non-logical (semantic

and evidential) conflicts. We represent information in terms of logic programming constructs, and, thus, our semantics also provides a new semantics for normal and extended logic programs containing conflicting information.

We augment our framework with preferences among conflicting statements and provide a semantics for the augmented framework. We show that this framework can be used to integrate heterogeneous information using the preferences of the integrator.

Administrative Experience

1994-1996, 1999-2003, Coordinator, Philosophy Program, Central Missouri State University.

Professional Service (CS Related)

Program Committee, Midwest Artificial Intelligence and Cognitive Science Conference, 1997, 1998, and 2002.

References

Professor Jack Minker, Department of Computer Science, University of Maryland, College Park, MD 20742.

Tel: (301) 405-2676; Email: minker@cs.umd.edu

Professor Michael Huth, Department of Computing, Imperial College, London, U.K.

Tel: +44-20 7594 8244, Email: mrh@doc.ic.ac.uk

Professor Hossein Saiedian, Electrical Engineering and Computer Science Department, University of Kansas, Lawrence, KS 66045.

Tel: (913) 897-8515; Email: saiedian@eecs.ku.edu

Additional reference, if needed, can be obtained from:

Professor John Horty, University of Maryland Institute for Advanced Computer Studies and Department of Philosophy, University of Maryland, College Park, MD 20742.

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