Plan, Activity, and Intent Recognition: Theory and Practice

From Morgan Kaufmann

Plan, Activity, and Intent Recognition: Theory and Practice From Morgan Kaufmann

Plan recognition, activity recognition, and intent recognition together combine and unify techniques from user modeling, machine vision, intelligent user interfaces, human/computer interaction, autonomous and multi-agent systems, natural language understanding, and machine learning.

Plan, Activity, and Intent Recognition explains the crucial role of these techniques in a wide variety of applications including:

- personal agent assistants
- computer and network security
- opponent modeling in games and simulation systems
- coordination in robots and software agents
- web e-commerce and collaborative filtering
- dialog modeling
- video surveillance
- smart homes

In this book, follow the history of this research area and witness exciting new developments in the field made possible by improved sensors, increased computational power, and new application areas.

- Combines basic theory on algorithms for plan/activity recognition along with results from recent workshops and seminars
- Explains how to interpret and recognize plans and activities from sensor data
- Provides valuable background knowledge and assembles key concepts into one guide for researchers or students studying these disciplines

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Editorial Review

Review

"This book serves to provide a coherent snapshot of the exciting developments in the field enabled by improved sensors, increased computational power, and new application areas." - HPCMagazine.com, August 2014

"Plan recognition, activity recognition, and intent recognition all involve making inferences about other actors from observations of their behavior. These inferences are crucial in a wide range of applications including intelligent assistants, computer security, and dialogue management systems. This volume, edited by leading researchers, provides a timely snapshot of some of the key formulations, techniques, and applications that have been developed in this rich and rapidly evolving field."

–Dr. Hector Geffner, ICREA & Universitat Pompeu Fabra, Barcelona

"This book collects some of the top senior people in the field of plan recognition with some of the newest researchers. It offers a comprehensive review of plan recognition from multiple viewpoints, encompassing both logical and probabilistic formalisms and covering mathematical theory, computer science applications, and human cognitive models."

–Dr. Peter Norvig, Director of Research at Google Inc.

"Plan, Activity, and Intent Recognition is an indispensable resource for creating systems that infer peoples' goals and plans on the basis of their behavior. Researchers in security, natural language dialog systems, smart spaces and pervasive computing, and other areas will find a comprehensive and up to date survey of methods, applications, and open research challenges."

–Dr. Henry Kautz, University of Rochester, Past President of AAAI (Association for the Advancement of Artificial Intelligence)

From the Back Cover

Plan, activity, and intent recognition are computational mechanisms for analyzing people's behavior from an incomplete set of observations. These algorithms combine insights from diverse areas of computer science including user modeling, human-computer interaction, autonomous and multi-agent systems, natural language understanding, machine vision, probabilistic reasoning and machine learning. This book explains the crucial role of these techniques in a wide variety of applications including:

- Personal agent assistants
- Intelligent user interfaces
- Cognitive models
- Opponent modeling in games and simulation systems
- Multi-agent coordination
- Human-robot interfaces

- Smart homes
- Pervasive and wearable sensors

The book follows the history of this research area and presents exciting new developments in the field made possible by improved sensors, increased computational power, and new application areas.

About the Author

Dr. Gita Sukthankar is an Associate Professor and Charles N. Millican Faculty Fellow in the Department of Electrical Engineering and Computer Science at the University of Central Florida, and an affiliate faculty member at UCF's Institute for Simulation and Training. She received her Ph.D. from the Robotics Institute at Carnegie Mellon, an M.S. in Robotics, and an A.B. in psychology from Princeton University. In 2009, Dr. Sukthankar was selected for an Air Force Young Investigator award, the DARPA Computer Science Study Panel, and an NSF CAREER award. Gita Sukthankar's research focuses on multi-agent systems and computational social models.

Christopher Geib is an Associate Professor in the College of Computing and Informatics at Drexel University. Before joining Drexel, Prof. Geib's career has spanned a number of academic and industrial posts including being a Research Fellow in the School of Informatics at the University of Edinburgh, a Principal Research Scientist working at Honeywell Labs, and a Post Doctoral Fellow at the University of British Columbia in the Laboratory for Computational Intelligence. He received his Ph.D. in Computer Science from the University of Pennsylvania and has worked on plan recognition and planning for over 20 years.

Dr. Hung Bui is a Principal Research Scientist at the Laboratory for Natural Language Understanding, Nuance, Sunnyvale, CA. His main research interests include probabilistic reasoning, machine learning and their applications in plan and activity recognition. Before joining Nuance, he spent 9 years as a senior computer scientist at SRI International, where he led several multi-institution research teams developing probabilistic inference technologies for understanding human activities and building personal intelligent assistants. He received his Ph.D. in Computer Science in 1998 from Curtin University, Western Australia.

Dr. David V. Pynadath is a Research Scientist at the University of Southern California Institute for Creative Technologies. He received his Ph.D. in Computer Science from the University of Michigan, Ann Arbor, where he studied probabilistic grammars for plan recognition. He was subsequently a Research Scientist at the USC Information Sciences Institute, and is currently a member of the Social Simulation Lab at USC ICT, where he conducts research in multiagent decision-theoretic methods for social reasoning.

Robert P. Goldman is a Staff Scientist at SIFT, LLC, specializing in Artificial Intelligence. Dr. Goldman received his Ph.D. in Computer Science from Brown University, where he worked on the first Bayesian model for plan recognition. Prior to joining SIFT, Dr. Goldman was Assistant Professor of Computer Science at Tulane University, and then Principal Research Scientist at Honeywell Labs. Dr. Goldman's research interests involve plan recognition, the intersection between planning, control theory, and formal methods, computer security, and reasoning under uncertainty.

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