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Lucas Paletta Erich Rome (Eds.)

Attention in Cognitive Systems

Theories and Systems from
an Interdisciplinary Viewpoint

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on Attention in Cognitive Systems, WAPCV 2007
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Revised Selected Papers

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Preface

Attention has been representing a core scientific topic in the design of AI-enabled systems within the last decades. Today, in the ongoing debate, design, and computational modeling of artificial cognitive systems, attention has gained a central position as a focus of research. For instance, attentional methods are considered in investigating the interfacing of sensory and cognitive information processing, for the organization of behaviors, and for the understanding of individual and social cognition in reflection of infant development.

While visual cognition plays a central role in human perception, findings from neuroscience and experimental psychology have provided strong evidence about the perception-action nature of cognition. The embodied nature of sensory-motor intelligence requires a continuous and focused interplay between the control of motor activities and the interpretation of feedback from perceptual modalities. Decision making about the selection of information from the incoming sensory stream – in tune with contextual processing on a current task and an agent's global objectives – becomes a further challenging issue in attentional control. Attention must operate at interfaces between bottom-up driven world interpretation and top-down driven information selection, thus acting at the core of artificial cognitive systems. These insights have already induced changes in AI-related disciplines, such as the design of behavior-based robot control and the computational modeling of animats.

Today, the development of enabling technologies such as autonomous robotic systems, miniaturized mobile – even wearable – sensors, and ambient intelligence systems involves the real-time analysis of enormous quantities of data. These data have to be processed in an intelligent way to provide “on time delivery” of the required relevant information. Knowledge has to be applied about what needs to be attended to, and when, and what to do in a meaningful sequence, in correspondence with visual feedback.

The individual contributions of this book deal with these scientific and technological challenges on the design of attention and present the latest state of the art in related fields. This book evolved out of the 4th International Workshop on Attention in Cognitive Systems (WAPCV 2007) that was held in Hyderabad, India, as an associated workshop of the 20th International Joint Conference on Artificial Intelligence (IJCAI 2007). The goal of this workshop was to provide an interdisciplinary forum to communicate computational models of attention in cognitive systems from an interdisciplinary viewpoint, including computer vision, psychology, robotics and neuroscience. The workshop was held as a single-day, single-track event, consisting of high-quality podium and poster presentations. Revised selected papers from WAPCV 2007 together with contributions from invited speakers – Tom Ziemke on embodied dynamics of emotion and attention, and Jochen Triesch on learning of attention – add to this collection. To enable

a broad overview of the state of the art, the editors decided to add some revised papers from WAPCV 2005 and to invite additional contributions about current relevant research themes.

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October 2007

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Table of Contents

Embodiment of Attention

The Embodied Dynamics of Emotion, Appraisal and Attention	1
<i>Robert Lowe, Carlos Herrera, Anthony Morse, and Tom Ziemke</i>	
The Role of Attention in Creating a Cognitive System	21
<i>John G. Taylor</i>	
The Influence of the Body and Action on Spatial Attention	42
<i>Catherine L. Reed, John P. Garza, and Ralph J. Roberts Jr.</i>	
Abstraction Level Regulation of Cognitive Processing Through Emotion-Based Attention Mechanisms	59
<i>Luís Morgado and Graça Gaspar</i>	
Embodied Active Vision in Language Learning and Grounding	75
<i>Chen Yu</i>	
Language Label Learning for Visual Concepts Discovered from Video Sequences	91
<i>Prithwijit Guha and Amitabha Mukerjee</i>	

Cognitive Control of Attention

Learning to Attend—From Bottom-Up to Top-Down	106
<i>Hector Jasso and Jochen Triesch</i>	
An Attentional System Combining Top-Down and Bottom-Up Influences	123
<i>Babak Rasolzadeh, Alireza Tavakoli Targhi, and Jan-Olof Eklundh</i>	
The Selective Attention for Identification Model (SAIM): Simulating Visual Search in Natural Colour Images	141
<i>Dietmar Heinke, Andreas Backhaus, Yarou Sun, and Glyn W. Humphreys</i>	
A Bayesian Approach to Attention Control and Concept Abstraction . . .	155
<i>Saied Haidarian Shahri and Majid Nili Ahmadabadi</i>	

Modeling of Saliency and Visual Search

An Information Theoretic Model of Saliency and Visual Search	171
<i>Neil D.B. Bruce and John K. Tsotsos</i>	

An Experimental Comparison of Three Guiding Principles for the Detection of Salient Image Locations: Stability, Complexity, and Discrimination	184
<i>Dashan Gao and Nuno Vasconcelos</i>	
A Proto-object Based Visual Attention Model	198
<i>Francesco Orabona, Giorgio Metta, and Giulio Sandini</i>	
Context Driven Focus of Attention for Object Detection	216
<i>Roland Perko and Aleš Leonardis</i>	
Color Saliency and Inhibition Using Static and Dynamic Scenes in Region Based Visual Attention	234
<i>Muhammad Zaheer Aziz and Bärbel Mertsching</i>	
I See What You See: Eye Movements in Real-World Scenes Are Affected by Perceived Direction of Gaze	251
<i>Monica S. Castelhana, Mareike Wieth, and John M. Henderson</i>	

Sequential Attention

Selective Attention in the Learning of Viewpoint and Position Invariance	263
<i>Muhua Li and James J. Clark</i>	
Generating Sequence of Eye Fixations Using Decision-Theoretic Attention Model	277
<i>Erdan Gu, Jingbin Wang, and Norman I. Badler</i>	
Reinforcement Learning for Decision Making in Sequential Visual Attention	293
<i>Lucas Paletta and Gerald Fritz</i>	
Biologically Inspired Framework for Learning and Abstract Representation of Attention Control	307
<i>Hadi Fatemi Shariatpanahi and Majid Nili Ahmadabadi</i>	

Biological Aspects of Attention

Modeling the Dynamics of Feature Binding During Object-Selective Attention	325
<i>Albert L. Rothenstein and John K. Tsotsos</i>	
The Spiking Search over Time and Space Model (sSoTS): Simulating Dual Task Experiments and the Temporal Dynamics of Preview Search	338
<i>Eirini Mavritsaki, Dietmar Heinke, Glyn Humphreys, and Gustavo Deco</i>	

On the Role of Dopamine in Cognitive Vision	352
<i>Julien Vitay and Fred H. Hamker</i>	
Differences and Interactions Between Cerebral Hemispheres When Processing Ambiguous Words	367
<i>Orna Peleg, Zohar Eviatar, Hananel Hazan, and Larry Manevitz</i>	
Attention in Early Vision: Some Psychophysical Insights	381
<i>Kuntal Ghosh and Sankar K. Pal</i>	
Auditory Gist Perception: An Alternative to Attentional Selection of Auditory Streams?	399
<i>Sue Harding, Martin Cooke, and Peter König</i>	
 Applications of Attentive Vision	
Simultaneous Robot Localization and Mapping Based on a Visual Attention System	417
<i>Simone Frintrop, Patric Jensfelt, and Henrik Christensen</i>	
Autonomous Attentive Exploration in Search and Rescue Scenarios	431
<i>Andrea Carbone, Daniele Ciacelli, Alberto Finzi, and Fiora Pirri</i>	
Attention-Based Landmark Selection in Autonomous Robotics	447
<i>Antonio Chella, Irene Macaluso, and Lorenzo Riano</i>	
Simulation and Formal Analysis of Visual Attention in Cognitive Systems	463
<i>Tibor Bosse, Peter-Paul van Maanen, and Jan Treur</i>	
Region-Oriented Visual Attention Framework for Activity Detection	481
<i>Thomas Geerinck and Hichem Sahli</i>	
 Author Index	 497