TUTORIAL / **ETRA 2018**

The tutorial on Spatial Cognition in the Wild presents an interdisciplinary perspective on conducting evidence-based human behaviour research from the viewpoints of spatial cognition and computation, environmental psychology, and visual perception. The tutorial emphasises the semantic interpretation of multimodal behavioural data, and the (empirically-driven) synthesis of embodied interactive experiences in real world settings. Of special focus are: visual (e.g., perception, attention based on eye-tracking), visuo-locomotive (e.g., movement, indoor wayfinding), and visuo-auditory (e.g., moving images) cognitive experiences in the context of areas such as architecture & built environment design, narrative media design, product design, cognitive media studies (e.g., film, animation, immersive reality).

The technical focus of the tutorial is on demonstrating general computational methods, tools, and cognitive assistive technologies that can be used for multi-modal human behaviour studies in visual, visuo-locomotive, and visuo-auditory perception. Presented methods are rooted in foundational research in artificial intelligence, spatial informatics, and human-computer interaction. The tutorial utilises case-studies from large-scale experiments in domains such as evidence-based architecture design, communication and media studies, and cognitive film studies to demonstrate the application of the foundational practical methods and tools.

REFERENCES

Bhatt, M., Schultz, C. (2017). People-Centered Visuospatial Cognition: Next-generation Architectural Design Systems and their Role in Conception, Computing, and Communication. In (edited volume): The Active Image: Architecture and Engineering in the Age of Modeling. Editors: Ammon, S. and Capdevila-Werning, R. Pages: 291, Volume 28 of Philosophy of Engineering and Technology, Springer International Publishing., ISBN: 331956465X, 9783319564654, 2017.

V. Kondyli., M. Bhatt, and T. Hartmann. (2017). Towards Precedent Based Design Foundations for Parametric Design Systems. In 24th International Workshop on Intelligent Computing in Engineering, Nottingham, July 2017.

V. Kondyli, C. Schultz, and M. Bhatt. (2017). Evidence-Based Parametric Design: Computationally generated spatial morphologies satisfying behavioural-based design constraints. In Proceedings of13th International Conference on Spatial Information Theory 2017, L'Aquila, Italy, September 2017.

Suchan, J., Bhatt, M. (2016). Semantic Question-Answering with Video and Eye-Tracking Data – AI Foundations for Human Visual Perception Driven Cognitive Film Studies. IJCAI 2016: 25th International Joint Conference on Artificial Intelligence, New York City, USA.

Suchan, J., Bhatt, M. (2016). The Geometry of a Scene: On Deep Semantics for Visual Perception Driven Cognitive Film Studies., in: WACV 2016: IEEE Winter Conference on Applications of Computer Vision (WACV 2016)., Lake Placid, NY, USA, IEEE.

Bhatt, M., Suchan, J., Schultz, C., Kondyli, V., Goyal, S. (2016). Artificial Intelligence for Predictive and Evidence Based Architecture Design: Integrating Spatial Reasoning, Cognitive Vision, and Eye-Tracking for the Analysis of Embodied Visuo-Locomotive Experience in the Built Environment. In: Thirtieth AAAI Conference on Artificial Intelligence (AAAI-16 - Demo track)., February 12–17, 2016, Phoenix, Arizona USA.

Bhatt, M., Suchan, J., Kondyli, V., Schultz, C. (2016). Embodied Visuo-Locomotive Experience Analysis: Immersive Reality Based Summarisation of Experiments in Environment-Behaviour Studies. Proceedings of the ACM SIGGRAPH Symposium on Applied Perception (SAP 2016), Anaheim, USA.

Suchan, J., Bhatt, M., Yu, S. (2016). The Perception of Symmetry in the Moving Image: Multi-Level Computational Analysis of Cinematographic Scene Structure and its Visual Reception. Proceedings of the ACM SIGGRAPH Symposium on Applied Perception (SAP 2016), Anaheim, USA.

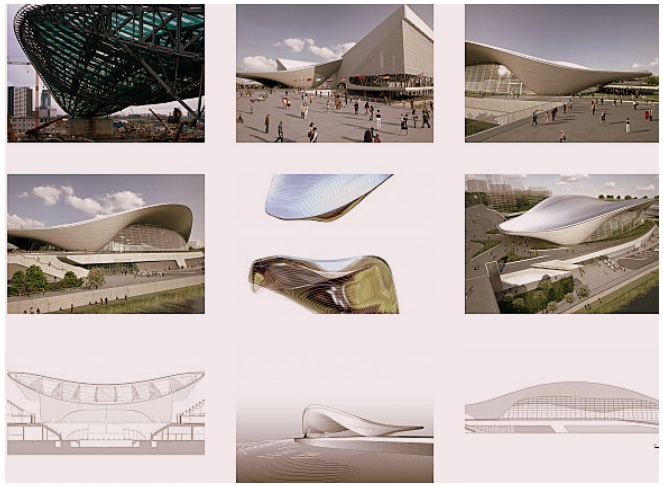
Bhatt, M., Schultz, C., Freksa, C. (2013). The `Space' in Spatial Assistance Systems: Conception, Formalisation, and Computation. in Thora Tenbrink, Jan Wiener, Christophe Claramunt (editors). Representing space in cognition: Interrelations of behavior, language, and formal models. Series: Explorations in Language and Space. Oxford University Press, 2012.

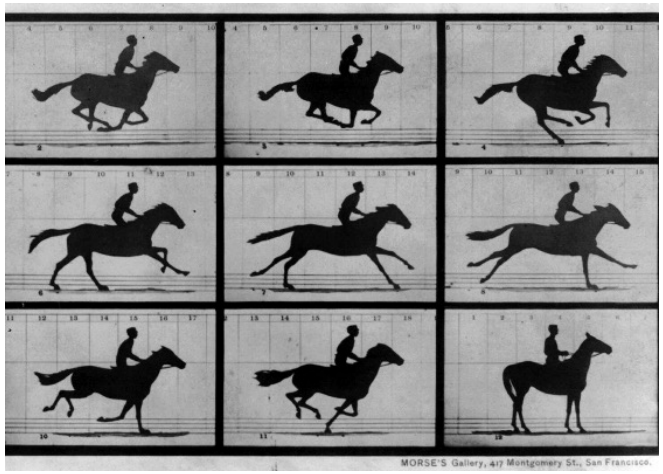
SPATIAL COGNITION IN THE WILD

METHODS FOR LARGE SCALE BEHAVIOURAL RESEARCH IN VISUO-LOCOMOTIVE PERCEPTION

Presenters / PROF. MEHUL BHATT and JAKOB SUCHAN

Venue / ETRA 2018, June 14-17 2018, Warsaw, Poland





TUTORIAL / **ETRA 2018**

SCOPE

Interdisciplinary scientific agenda targeting an audience with an interest or curiosity in visual and spatial cognition, visual perception, and artificial intelligence (emphasis on knowledge representation and reasoning, and high-level event perception).

Particular focus will be utilising case-studies to demonstrate the state of the art in artificial intelligence, cognitive vision, and applied perception with respect to their impact on eye-tracking in particular, and multi-modal human behavioural research in general.

AUDIENCE / (at ETRA 2018)

- Developers of basic eye-tracking methodologies interested in synergies with general artificial intelligence based methods / tools for multimodal human behaviour studies
- Young researchers (e.g., masters and early stage doctoral candidates) desirous of exploring open research questions and avenues for applications of eye-tracking in domains such as:
  - ⋆ architecture design / wayfinding
  - ⋆ media design / visuo-auditory media
  - ⋆ human-robot interaction
- Design practitioners from areas such as architecture, animation, cinematography, visual art, digital media, interaction design seeking to get insights from existing case-studies involving eye-tracking in their respective domains of application.

PRESENTERS

Mehul Bhatt is Professor within the School of Science and Technology at Örebro University (Sweden), and Professor at the Department of Computer Science, University of Bremen (Germany). His research interests lie at the intersection of artificial intelligence, cognitive science, and HCI with a focus on visual and spatial cognition, knowledge representation and reasoning, design cognition, and multimodality.

Örebro University, Sweden
University of Bremen, Germany
www.mehulbhatt.org

Jakob Suchan is research assistant within the Human-Centred Cognitive Assistance Lab at the Department of Computer Science, University of Bremen (http://hcc.uni-bremen.de). His research focusses on the integration of vision and KR from the viewpoint of computational cognitive systems where integrated (embodied) perception and interaction are involved.

University of Bremen, Germany
www.cognitive-vision.org

SPATIAL COGNITION IN THE WILD

METHODS FOR LARGE SCALE BEHAVIOURAL RESEARCH IN VISUO-LOCOMOTIVE PERCEPTION

This tutorial is part of:

The Tenth ACM Symposium on Eye Tracking Research & Applications (ETRA 2018)
ETRA 2018. June 14-17 2018 / Warsaw, Poland

An initiative of:

CoDesign / COGNITION. AI. INTERACTION. DESIGN.
www.co-design.eu

Cognitive Vision and Perception. www.cognitive-vision.org
The DesignSpace Group. www.design-space.org

aass

HCC | UNI-BREMEN

ÖREBRO UNIVERSITET

Universität Bremen