Cognitive Qualitative Descriptions and Applications (CogQDA)

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Modulnummer: ME-711.36

Master

Pflicht/Wahl	☐				
Wahl	☒	Basis	☐	Ergänzung	☒
Sonderfall	☐				

Zugeordnet zu Masterprofil

	Basis	Ergänzung
Sicherheit und Qualität (SQ)	☐	☐
KI, Kognition, Robotik (KIKR)	☐	☒
Digitale Medien und Interaktion (DMI)	☐	☒

Modulbereich: Praktische und Technische Informatik

Modulteilbereich: 711 Kognitive Systeme

Anzahl der SWS

V	UE	K	S	Prak.	Proj.	Σ
0	0	0	2	0	2	4

Kreditpunkte: 4 ECTS

Turnus: Every year

Formale Voraussetzungen: Keine

Inhaltliche Voraussetzungen: -

Vorgesehenes Semester: ab 1. Semester

Sprache: Englisch

Ziele: objectives

Objectives

- Understanding what is a Qualitative Representation, a Qualitative Model, and what Qualitative Spatial Reasoning involves.
- Knowing the fundamentals on spatial cognition & education: skill training and evaluation.
- Practising how to do an effective oral presentation and how to write a good essay.
- Improving English language skills.

Inhalte: This seminar provides an introduction to Qualitative Descriptions and Reasoning from a Cognitive point of view. It is divided into 2 learning modules and 1 working module. The topic of each module is introduced as follows:

*Module I: If you were a robot, you would see the world pixelized through your camera. How would you explain to a human being what do you see? What concepts could you use for the human to understand you? How can you compare them?

*Module II: Psychological studies proved that people with good spatial cognition skills, are successful in STEM (Science Technology Engineering and Math). Other studies say that we humans can train these spatial skills. Therefore:

–How do we measure our spatial cognition skills? How do we improve them? Can we build systems that help us to improve them?

–Can a robot have spatial cognition skills? What logical thinking must the robot have?

*Module III: From all the contents, what is the most interesting topic for you? Which one would you like to explore/learn/research more? How? Theoretically or practically? Let's explore it together. What have you learned? What can you teach us?

content

Content

Module I:

1-Introduction

2-Qualitative Shape Description and Similarity applied to Mosaic building and sketch recognition

3-Qualitative Colour Naming and Comparing applied to Art

4-Qualitative Spatial Descriptions: models on Topology, Location, Direction, etc.

5-Qualitative Descriptions of Images, Icons, Videos

Module II:

6-Spatial Cognition and Perceptual Ability tests

7-Qualitative 3D Model based on Depth

8-Qualitative Model for Paper Folding

Module III:

9-Selection of Content to Explore: Theoretically? Practically?

10-Student Lab Work

11-Student Lab Work

12-Student Lab Work

13-Student Lab Work

14-Final Discussion: What can you teach us?

More details at: https://sites.google.com/site/zfalomir/teaching/cogqda

Unterlagen (Skripte, Literatur, Programme usw.): general

General

Falomir, Z. (2015). Teaching spatial thinking, computer vision, and qualitative reasoning methods. In H. Burte, T. Kauppinen, & M. Hegarty (Eds.), Proceedings of the Workshop on Teaching Spatial Thinking from Interdisciplinary Perspectives (TSTIP 2015) with Confernce on Spatial Information Theory XII (COSIT 2015). Santa Fe, NM: CEUR Proceedings Vol. 1557, pp. 11-15. http://ceur-ws.org/Vol-1557/

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Module I

Falomir Z., Museros L., Gonzalez-Abril L. (2015), A Model for Colour Naming and Comparing based on Conceptual Neighbourhood. An Application for Comparing Art Compositions, Knowledge-Based Systems, 81: 1-21. DOI: http://doi.org/10.1016/j.knosys.2014.12.013

Museros L., Falomir Z., Sanz I., Gonzalez-Abril L. (2015), Sketch Retrieval based on Qualitative Shape Similarity Matching: Towards a Tool for Teaching Geometry to Children, AI Communications, 28 (1): 73—86. DOI: http://doi.org/10.3233/AIC-140614

Falomir Z., Gonzalez-Abril L., Museros L., Ortega J. (2013), Measures of Similarity between Objects from a Qualitative Shape Description, Spatial Cognition and Computation, 13 (3): 181–218. DOI: http://doi.org/10.1080/13875868.2012.700463

Falomir Z., Museros L., Gonzalez-Abril L., Velasco F. (2013), Measures of Similarity between Qualitative Descriptions of Shape, Colour and Size Applied to Mosaic Assembling, J. Vis. Commun. Image R. 24 (3): 388–396. DOI: http://doi.org/10.1016/j.jvcir.2013.01.013

Falomir Z., Olteteanu A. (2015), Logics based and Qualitative Descriptors for Scene Understanding, Neurocomputing, 161: 3-16, SI: Recognition and Action for Scene Understanding, DOI: http://doi.org/10.1016/j.neucom.2015.01.074.

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Module II

N. Newcombe, Picture this: Increasing math and science learning by improving spatial thinking, American Educator, vol. 34, no. 2, pp. 29–35, 2010.

S. A. Sorby, Educational research in developing 3D spatial skills for engineering students, International Journal of Science Education 31 (3) (2009) 459–480. doi:10.1080/09500690802595839.

Z. Falomir and E. Oliver (2016), Towards testing a Qualitative Descriptor of 3D Objects using a Computer Game Prototype, International Workshop on Models and Representations in Spatial Cognition (http://spatial.cs.illinois.edu/2016workshop/index.html), Delmenhorst, Germany, 3-4 March 2016.

Z. Falomir and E. Oliver (2016), Q3D-Game: A Tool for Training User's 3D Spatial Skills, Symposium on Future Intelligent Educational Environments and Learning, SOFIEE (www.sofiee.org), London, UK, 12-13 September 2016, in press.

Z. Falomir (2016). Towards a qualitative descriptor for paper folding reasoning. Proceedings of the 29th International Workshop on Qualitative Reasoning, co-located at Int. Joint Conf. on Artificial Intelligence (IJCAI), New York, USA. https://ivi.fnwi.uva.nl/tcs/QRgroup/qr16/program.html

Form der Prüfung:
To receive credits for this course students need to continually participate throughout the semester; this includes: (i) to attend the classes, (i) to do a theoretical work (i.e. present a paper, topic review, model, etc.) or a practical work (i.e. programming a little application), (iii) to present the chosen work, (iv) to write a report on the chosen work.

Attendance to the classes will account for 20

Presentations should be well-prepared, well-informed, and above all serve to help your classmates understand the facts and issues connected with the topic in the paper(s)/application. It should enable your classmates to ask interesting questions about it. Ideally, plan on a 20-30 min duration for your presentation and a subsequent discussion. Presentations will be evaluated using voting by classmates and they will account for 40

The final report will count for 40

Arbeitsaufwand		
	Präsenz	28 h
	Übungsbetrieb/Prüfungsvorbereitung	92 h
	Summe	120 h

Lehrende: Dr.-Ing. Zoe Falomir Llansola	Verantwortlich: Dr.-Ing. Zoe Falomir Llansola