Qualitative Descriptors and Computational Applications (QDCA) *Qualitative Descriptors and Computational Applications (QDCA)*	Modulnummer:

Bachelor		Schwerpunkt	
Pflicht	☐	Computational Finance	☐
Winf-Schwerpunkt-Pflicht	☐	E-Business	☐
Winf-Schwerpunkt-Wahlpflicht	☐	IT-Management	☐
Winf-Wahl	☐	Logistik	☐

Anzahl der SWS	V	UE	K	S	Prak.	Proj.	Σ		Kreditpunkte: 4 ECTS	Turnus Every semester
	2	0	0	0	0	0	2			

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 Reasoning involves.

● Knowing the fundamentals of spatial cognition in education: skill training and evaluation.

● Communicating effectively in English: written essay and oral presentation.

Inhalte: motivation

Motivation

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. If you need to communicate with a human being you must use words. What concepts could you use for the human to understand you? Which qualitative models can you use to obtain concepts from your numerical sensor data?

*Module II: Psychological studies proved that people with good spatial cognition skills, are more successful in STEM (Science Technology Engineering and Math). Other studies say that we humans can train these spatial skills. Thus: How can we measure our spatial cognition skills? How can we improve them? Can we build videogames to improve them? which kind of feedback must players receive about their mistakes? Is it possible to use those logic algorithms in artificial agents?

*Module III: From all the contents, what is the most interesting topic for you? Which would you like to write about? What have you learned? What can you teach us?

content

Content

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Module I: Qualitative Descriptors applied to Images and Videos

1-Introduction

2-Qualitative Shape Descriptor (QSD)

3-Qualitative Shape Similarity applied to Mosaic building and sketch recognition (SimQSD)

4-Qualitative Colour Descriptor (QCD)

5-Fuzzy Colour Descriptor (Fuzzy-QCD)

6-Qualitative Color Similarity (SimQCD)

7-Qualitative Image Descriptor (QID)

8-Similarity of Qualitative Image Descriptors (SimQID)

9-Qualitative Descriptor of Movement (QMD)

10-Qualitatative Descriptor for Group Interactions (QS-GRI)

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Module II: Qualitative Descriptors applied in Videogames

11-Spatial Cognition and Perceptual Ability tests

12-Qualitative 3D Model based on Depth

13-Qualitative Model for Paper Folding

14-Qualitative Model for Perspective Reasoning

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Module III: Final work

15-Students' Presentations of their Essays

Unterlagen (Skripte, Literatur, Programme usw.): $references_{f}or_{m}odule_{i}$

References for 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.

$references_{f}or_{m}odule_{i}i$

References for 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 must: (i) to attend the talks, (ii) write an essay about the topic of the seminar; (iii) to present the essay in a talk.

Attendance to the classes will account for 40

Arbeitsaufwand		
	Attending the seminar talks	48 h
	Writing Essay	36 h
	Preparing your talk	36 h
	Summe	120 h

Lehrende: Zoe Falomir Llansola	Verantwortlich: Zoe Falomir Llansola