Modulbezeichnung	**Qualitative Descriptors and Computational Applications (QDCA)**
Modulverantwortliche(r)	Zoe Falomir Llansola
Modulart	Pflicht/Wahl ☒ Wahlpflicht ☐
Spezialisierungsbereich	
Dauer des Moduls	1 Semester
Kreditpunkte	4 ECTS CP
Arbeitsaufwand	Berechnung des Workloads Attending the seminar talks 48 h Writing Essay 36 h Preparing your talk 36 h Summe 120 h
Turnus des Moduls	Every semester
Voraussetzung für die Teilnahme	Keine ☐ Folgende Formale Voraussetzungen: Keine
Lehr- und Lernformen	Seminar ☐ Vorlesung ☒ Tutorium ☒ Praktikum ☐ Projekt ☐
Lernziele	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.

	motivation
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	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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Lerninhalte	**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

Prüfungsformen	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
Literatur	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