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B.Sc. Medieninformatik (ab PV16)

Winter 2025/26

Stand 20.10.2025

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B.Sc. Medieninformatik (ab PV16)

Projektbörse
Montag, 13. Oktober 2025, 17.00 Uhr, Steubenstraße 6, Maurice-Halbwachs-Auditorium

425210007 Immersive Decision Theater

B. Fröhlich, T. Zöppig, E. Schott Veranst. SWS: 10
Projekt

Beschreibung

In today’s fast-paced and interconnected world, making effective decisions in domains such as politics, sustainable development, large-scale infrastructure planning, or crisis response requires a deep understandingof complex systems and their dynamic interdependencies. To make the right decisions, stakeholders must

quickly grasp intricate relationships, integrate expert knowledge from remote locations, visualize cascading effects, and simulate potential outcomes. Immersive environments offer a powerful medium for supporting such high-stakes decision-making processes, enabling distributed decision-makers to collaboratively experience, explore, and evaluate complex scenarios through interactive simulations and immersive visual analytics. In our project ”Immersive Decision Theater,” we aim to develop a mixed-reality application where multiple users can explore complex scenarios and gain deeper insights into decision parameters and their potential consequences. We envision this as a space where decision-makers, domain experts, and affected communities can collaboratively plan, communicate, and discuss future strategies and scenarios. The platform will feature interactive representations of underlying system models, immersive visual analytics of available data sources and effective visualizations of simulated outcomes to support informed, data-driven decision-making. A central challenge lies in enabling natural communication and collaboration between collocated and distributed VR users, ensuring mutual understanding and supporting decision processes through immersive simulation.

Finding solutions to complex problems in distributed immersive environments raises several research questions. These include how to spatially organize diverse information sources and corresponding data visualizations within the virtual decision theater, how to ensure coherent and meaningful experiences for both collocated and remote participants and how to enable fluid transitions between different content layers, presentation forms, and user perspectives, e.g. by transitioning between the real and virtual worlds.

To address these challenges, you will learn to design and implement social mixed reality applications using Unity3D and C#. Furthermore, you will explore advanced multi-user interaction concepts by experimenting with world-in-miniatures, mixed-reality transitions, visualizing data in a spatial context and many others. Programming and interaction design will be central components of the project; therefore, we recommend a strong background in VR development with Unity and C#, and/or solid experience in designing user

interactions for social immersive environments.

Objectives

• Design and conceptualize a decision theater that supports multiple perspectives on complex scenarios.

• Implement strategies and techniques to interact with and explore the scenario and its underlying data.

• Address potential conflicts between collocated and spatially or temporally distributed users.

• (Optional) Integrate simulation frameworks that react on changes in the virtual model.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Solid software programming / scripting experience (e.g. C#, C++, Python). Experience in Unity is very helpful. Successful completion of the Virtual Reality course is recommended.

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425210003 Digital Twin Framework for Buildings and Structures

M. Artus, C. Koch, J. Ringert, B. Burse Veranst. SWS: 10
Projekt

Beschreibung

Buildings and civil engineering structures are unique. Creating a digital twin for them takes much time because of the requirements specific to each building. Reducing the time for creating Digital Twins for these assets, it would be helpful to have a framework that takes care about generating software for embedded systems, data storage, communication and visualization. This project can make use of several software developed in prior projects.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Basic Knowledge in Programming, Software Engineering

425210038 Responsible AI

M. Jakesch Veranst. SWS: 10
Projekt

Beschreibung

Responsible AI refers to principles, practices, and frameworks that can guide the ethical and accountable development of artificial intelligence systems and ensure that deployed systems are safe, fair, and beneficial to society. In this project, students will engage with perspectives from across the field through weekly readings, reflections, and discussions of central texts.

In parallel, each student will design and carry out a Responsible AI research project. Possible approaches include system audits, experiments, user studies, conceptual work, or dataset collection. The course emphasizes both conceptual engagement and hands-on practice, with the goal of preparing students to participate in the evolving debates around responsible AI.

The main project outcome will be an individual project report, giving students the opportunity to practice scientific writing and potentially develop a publishable contribution. Assessment will be based on the final project, as well as active participation, presentations, and demonstrated progress throughout the semester.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Successful prior completion of ”Methods of Social Data Analysis” or "Machine Learning" or "Natural Language Processing". If you do not fulfill the requirement but believe you would be a good fit for the project, please reach out to the instructor.

Leistungsnachweis

Scientific project report

Wahlmodule

425220000 Methods of Social Data Analysis (B.Sc)

M. Jakesch, N. Navajas Fernández Veranst. SWS: 4
Vorlesung
Mi, wöch., 11:00 - 12:30, Bauhausstraße 11 - R 015, Vorlesung, ab 22.10.2025
Di, wöch., 15:15 - 16:45, Bauhausstraße 11 - R 015, Übung, ab 28.10.2025

Beschreibung

How can we use data to answer questions about people and society? This course introduces foundational concepts and methods in the quantitative analysis of social data. Through a blend of theoretical insights and hands-on

practice, students will get to know the quantitative data analysis pipeline—from data collection and cleaning to statistical modeling and inference.

Topics include the design and execution of surveys and experiments, the concepts of sampling, bias and variance, statistical modeling and inferences, and the ethics of working with people's data. Students will develop an understanding of correlation, regression, statistical power, confidence intervals, and hypothesis tests—skills essential for conducting robust analyses in a data-rich but complex social world.

By the end of the course, students will be able to design basic studies, evaluate the reliability of quantitative evidence, and use statistical methods to test hypotheses on data. They will also have gained some familiarity with R, a statistics-focused programming language widely used data scientists and researchers

Voraussetzungen

Familiarity with basic concepts of programming and probability is required.

Leistungsnachweis

In-class presentations, course mini-project, final exam.

425260000 Advanced Cryptography: Cryptanalysis of the AES and Reduced-Round AES

S. Lucks, J. Leuther
Seminar

Beschreibung

Since its standardization in October 2000, the Advanced Encryption Standard is worldwide the most commonly used block cipher. Many attempts have been made to analyze the AES -- and specifically, to attack reduced-round variants of the AES. Also, certain unusual attack methods have been presented, such as "known-key attacks" and "related-key attacks", which made it able to attack the AES with the full number of rounds. The purpose of the seminar is to study some of those attempts. Each student will be assigned an attack.

The seminar will be a block seminar with a joint meeting and student talks in March 2026. The deadline for students to register their participation will be early November 2025.

To enroll, please join the course on moodle.

Voraussetzungen

"Introduction to Modern Cryptography" or any equivalent course.