



Seminar Trends and Concepts in Digital Health Kick-off

Florian Borchert, Dr. Matthieu-P. Schapranow
Trends and Concepts in Digital Health
Summer 2024

Seminar Organization

Administrative Details Time / Dates

- Format: Seminar
- Scope: 2 SWS (3 graded ECTS)
- Dates and time:
 - Tuesdays 01.30pm - 03.00pm and
 - Individual appointments with your supervisor.
- Further details are available on the seminar website:

<https://hpi.de/digital-health-cluster/teaching/summer-term-2024/trends-and-concepts-in-digital-health.html>



The screenshot shows the Hasso-Plattner-Institut website. At the top, there is a navigation bar with the HPI logo, the name 'Hasso-Plattner-Institut', and social media icons for Facebook, Twitter, Instagram, YouTube, RSS, and LinkedIn. Below the navigation bar is a breadcrumb trail: 'HOME > TEACHING > SUMMER TERM 2024 > TRENDS AND CONCEPTS IN DIGI...'. The main heading is 'Trends and Concepts in Digital Health' in a dark red font. Underneath, there is a section titled 'General Information' in bold red. The content of this section includes: 'Teaching staff: Florian Borchert, Dr. Matthieu-P. Schapranow', 'Course kickoff: Tue Apr 16, 2024 @ 01.30pm s.t.', 'Dates & times (selected dates for joint presentations only): Tue 01.30pm-03.00 pm s.t. (Campus II, L-1.02)', '2 Semesterwochenstunden (SWS) 3 ECTS (graded)', 'Limit: Max. number of participants defined by the number of provided topics.', and 'After the kickoff event in the first course, you have to send us your preferred seminar topics (due date will be mentioned in the kickoff slides). Afterwards, you will be assigned to one of your preferred topics, which needs to be confirmed through official course enrollment by you.'

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What You Can Expect from Us

- Broaden your horizons in the fields of
 - Digital health,
 - Life sciences, as well as
 - Data challenges and opportunities
- Work on real-world use cases from digital health
- Gain in-depth knowledge for selected DH topic
- Experience in scientific writing and presentation skills



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What We Expect from You

- Commitment to your seminar topic
- Regular participation in all presentations and update meetings
- Active participation in group discussions
- Perform autonomous research to dig deeper into the topics
- Contribute with your expertise also to your colleagues
- Update supervisors on any issues you might encounter



https://www.haselden.com/wp-content/uploads/2019/01/65298106_s.jpg

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Seminar Organization Grading

- The grading of the seminar works as follows (aka “Leistungserfassungsprozess”):
 - 40% Seminar results, i.e.
 - Intermediate & final presentation conducted during seminar slots
 - 40% Scientific research article about your individual contribution submitted by the end of the seminar
 - 20% Individual commitment throughout the seminar
- All individual parts have to be passed to pass the complete seminar



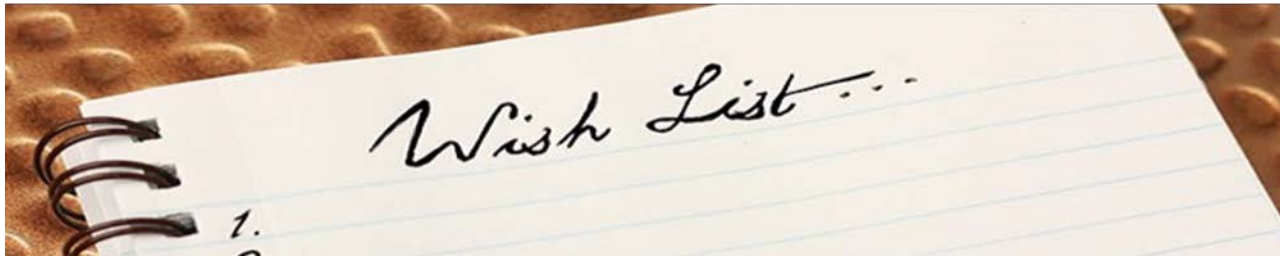
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Next Steps

Enrollment Process: How to apply for a topic?

- Send prioritized list of top three topics to Florian Borchert (Florian.Borchert@hpi.de) by **Mon Apr 22, 2024 9am (sharp)**
 - 1st choice: ...
 - 2nd choice: ...
 - 3rd choice: ...
- Assignment of seminar topics: **Mon Apr 22, 2024 by noon**
- Enrollment deadline: **Mon Apr 29, 2024 end of day (via Studienreferat)**



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Seminar Schedule: Presentations

- **May 21st (+ May 28th)** Intermediate presentations
 - 10 minutes presentation
 - Introduce your topic, problem/motivation, how you want to solve it
 - Slides due at day of presentation by 9am

- **July 9th (+ July 16th)** Final presentations
 - 20 minutes presentation
 - Slides due at day of presentation by 9am
 - Present your approach and results achieved

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Seminar Schedule: Paper Writing

- **July 16th:** Introduction to scientific writing

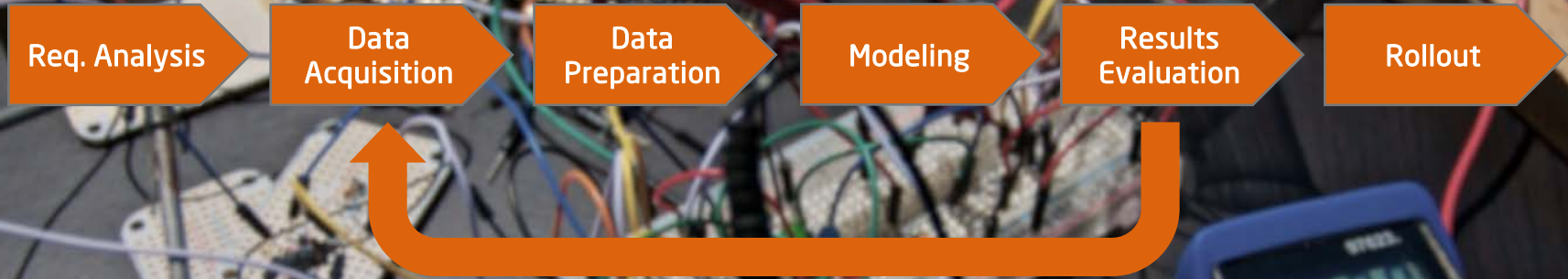
- **Aug 18th (end of day):** Project results submission
 - One paper per topic
 - Max. 4 pages excluding appendix
 - Iterate regularly with your supervisor prior to submission
 - Paper (LaTeX) including all sources to build it

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Machine Learning for Digital Health Process:



While designing the following topics, we had in mind, that each of them should cover selected steps of the ML process to allow you to broaden your competency.

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Overview of Seminar Topics

- A. Pre-trained Models for Medical Language
- B. Generative Models for Medical Language
- C. Telematics Infrastructure in Germany: Overview and Concepts
- D. EU AI Act
- E. E-Prescription in Germany vs. the rest of the world
- F. Digital Health Data Sources for Research and Science

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A: Pre-trained Models for Medical Language

- Language model pre-training on large amounts of unlabelled data achieves state-of-the-art results for most NLP tasks
- Domain- and language-specific models often improve performance over general-domain models
- Topic:
 - Investigate / compare different **medical PLMs**
 - Training data, model architecture, training regime, target tasks...
- Literature:
 - Lentzen et al. (2022): <https://doi.org/10.1093/jamiaopen/ooac087>
 - Labrak et al. (2023): <https://doi.org/10.18653/v1/2023.acl-long.896>
 - Touchent et al. (2023): <https://doi.org/10.48550/arXiv.2306.15550>
 - Bressemer et al. (2024): <https://doi.org/10.1016/j.eswa.2023.121598>



B: Generative Models for Medical Language

- Recently, very large generative models have achieved impressive zero-shot / few-shot performance
- Topic:
 - Investigate / compare different **generative LLMs**
 - Training data, model architecture, training regime, target tasks...
- Literature:
 - Luo et al. (2022): <https://doi.org/10.1093/bib/bbac409>
 - Chen et al. (2023): <https://doi.org/10.48550/arXiv.2311.16079>
 - Labrak et al. (2024): <https://doi.org/10.48550/arXiv.2402.10373>



BioMistral



C: Telematics Infrastructure in Germany: Overview and Concepts

- The Telematics Infrastructure (TI) is the technology backbone of the German healthcare system enabling protected exchange of sensitive data between healthcare actors, e.g. payment data, patient data, etc.
- Topic:
 - Investigate the current software architecture of the TI, e.g. software components, applications, and functions
 - Identify current limitations, e.g. interoperability
- Literature:
 - <https://www.ina.gematik.de/mitwirken/expertengremium>
 - <https://gesund.bund.de/en/telematics-infrastructure>
 - <https://ti-lage.prod.ccs.gematik.solutions/d/oGvaba47k/monitoring-lagebild-der-ti>



<https://ti-lage.prod.ccs.gematik.solutions/d/oGvaba47k/monitoring-lagebild-der-ti>

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- The EU AI Act is the first of its kind to address risks of AI in different daily life scenarios and to define a legal framework for vendors.
- **Topic:**
 - Investigate the current version of the EU AI Act
 - Identify specific sections with (potential) impact on digital health solutions and the use of AI in them
 - Relate to existing regulations / limitations required for digital health solutions
- **Literature:**
 - <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>
 - [https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729512/EPRS_STU\(2022\)729512_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729512/EPRS_STU(2022)729512_EN.pdf)



<https://the-decoder.de/der-eu-ai-act-ein-umfassender-ueberblick-ueber-europas-vorstoss-in-der-ki-regulierung/>

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E: E-Prescription in Germany vs. the rest of the world

- E-prescription is a digital health service recently released for public use in Germany.
- Topic:
 - Investigate how does e-prescription work in Germany vs. the rest of the world
 - Identify current limitations
 - How do other countries deal with such challenges, how to overcome them?
- Literature:
 - <https://www.das-e-rezept-fuer-deutschland.de/en>
 - <https://gesund.bund.de/en/the-e-prescription>
 - <https://gesund.bund.de/en/digital-health/guide-to-e-prescriptions>
 - <https://www.gematik.de/newsroom/news-detail/aktuelles-beeintraechtigungen-beim-e-rezept-durch-stoerung-bei-medisign>



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F: Digital Health Data Sources for Research and Science

- Real-world data is crucial for the development of high-quality AI models. However, access to (open) digital health data source is still limited.

■ Topic:

- Investigate what sources of (open) digital health data exist currently or might be available in near future
- Compare federal / international sources, e.g. access models / limitations
- What kind of data is shared, what kind of data is not shared

■ Literature:

- <https://www.healthdatalab.de>
- <https://www.ghga.de/about-us/mission>
- <https://www.bfdi.bund.de/DE/Buerger/Inhalte/GesundheitSoziales/Allgemein/MedizinischeForschung.html>
- <https://forschen-fuer-gesundheit.de>



https://www.systembiologie.de/lw_resource/datapool/systemfiles/elements/files/0C889846C583667AE0637E695E864BE2/live/document/PTJ-010_gesundhyte_14_2022_engl_Online-ISSN_2748-3533_231213_WEB.pdf

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Do Not Forget to Enroll for the Lecture!



We want you!



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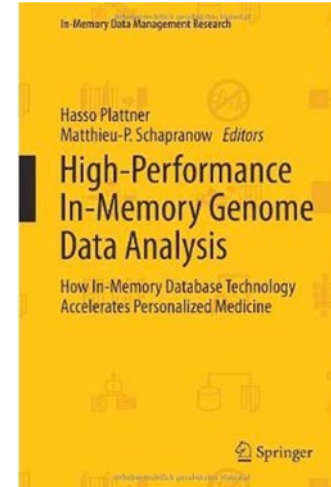
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