HPI Digital Health Center:
Research Group of Prof. Dr. Erwin Böttinger

Molecular Tumor Board

Motivation & Goal

Cancer is one of the most challenging diagnoses for doctors, patients as well as family members and friends. Since every tumor has its unique molecular profile, it is impossible to fight cancer with a classical one-size-fits-all approach. Today, each patient case is presented in a so-called

tumor board, which consists of multiple experienced oncologists. The members of the tumor board evaluate treatment alternatives and discuss jointly individual treatment options combining their personal knowledge and experience for the patient's sake.
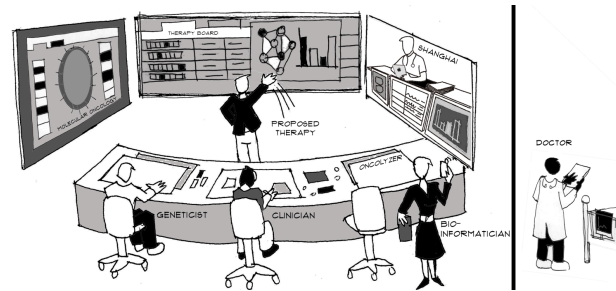
Personalized medicine is a current trend to incorporate all available data, e.g. patients specifics, similar patient cases, molecular tumor data from biobanks, to derive a meaningful decision based on statistical data analyses. However, medical doctors require adequate software tools to combine and analyze fine-grained data to support their work in an interdisciplinary molecular tumor board.

The goal of the project is to create specific software artifacts implementing personalized medicine approaches tp assist oncologists during their work in the tumor board. Therefore, the oncologists require holistic access to patient specifics of the current patient cases and linked details from similar historic patient cases. For example, data-driven assessment of treatment options is beneficial, e.g. by incorporating medical publications, latest clinical guidelines, and application of latest deep learning approaches. In addition to the treating oncologists, medical researchers should be enabled to test research hypotheses on observed real-world data.

Your work will help to improve the quality of medical services in Germany!

Project Partners

You will have regular contact with our cooperation partners, e.g. to acquire knowledge in the specific medical field. All software artifacts will be designed, tested, and validated together with subject-matter experts from our cooperation partners. Our partners collaborate together in context of the BMBF Medical Informatics consortium HiGHmed.

What we expect from you

We are looking for motivated students interested to enter new research areas, e.g. big medical data analysis, machine learning, personalized medicine. We expect you to be able to apply software modeling, e.g. UML or FMC, to create a shared understanding of design decisions. You should also have strong communication skills, e.g. to exchange with non-IT experts. In addition, you should be experienced in using at least one programming language, e.g. Python or Ruby on Rails, and one database query language, e.g. SQL. A strong understanding of database concepts is beneficial.

What you can expect from us

We will provide introductions to the relevant fields of research, e.g. life sciences, biology, medicine, genomics, and hands-on experiences, e.g. in-memory database technology. You will have access to latest multi-core server hardware. You will obtain insights in specific software development processes as well as project management and self-organization methods. Furthermore, you will interact with experts and partner in the corresponding fields of research. As a result, you will even be able to extend your expertise beyond the scope of software engineering.

Setting

Together with subject-matter experts from our cooperation partners, we will define real-world software requirements, design, create, and validate regular software prototypes. We will be able to build on existing functionality of our cloud platform https://we.analyzegenomes.com and extend it. Proof-of-concept prototypes will be engineered and evaluated with subject-matter experts in the course of this project.

The project team will work at the newly established HPI Digital Health Center at HPI Campus III. Due to our cooperations with hardware and software vendors, we are able to access high-end hard- and software before it is available for the public market. For example, the in-memory database "SAP HANA" will be available as technology foundation for development of real-time analysis use cases.

Contact

If you have any open question, please do not hesitate to contact us.

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