Methods and tools for health data transparency and integrity that allow trusted open secondary usage and big-data analysis of health data

Summary

To develop and justify the possible methods and tools that ensure data transparency and integrity (issue is also stated in the IMI future research topics) in the open secondary usage and big-data analysis of health data.

Research field:	Information and communication technology
Supervisors:	Gunnar Piho Peeter Ross
Availability:	This position is available.
Offered by:	School of Information Technologies Department of Health Technologies
Application deadline:	Applications are accepted between June 01, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

Description

The routine clinical data is considered precious[1], and their secondary use[2] is considered beneficial for policymakers, public health officers, scientists, clinicians, citizens and industry[3]. Different initiatives, including European Health Data Network[4] and Clinical Trial Data^2 initiative, initiated by the European Commission and the EFPIA (European Federation of Pharmaceutical Industries and Associations), are searching for the possible solutions. However, as stated in a recent survey[5], due to semantic heterogeneity of health data, we still do not have a unified approach and use divide-and-conquer instead. The review[6] conducted a year later, concludes that no big-data analytics will happen without optimised data sharing and reuse, what we still lack despite for different interoperability standards in the medical domain. When using data from different data controllers in a big-data or any analysis, we must ensure data transparency and integrity to trust the conducted results. To find, and evaluate appropriate data transparendy and integrity methods and tools is the main aim of this PhD project. Results are utilized in collaboration projects with TEHIK and international partners[7].

Responsibilities and tasks: To investigate the state of the art of the data transparency and integrity in general and in the context of healthcare systems and big-data analysis. Based on the acquired knowledge, propose, deploy and evaluate appropriate methods and tools in the context of open secondary usage and big-data analysis of health data. To evaluate the proposed from the perspectives of medical science, software dependability, interoperability and from the possibility to change software evolutionary.

The applicants should fulfil the following requirements:

- MSc in Software Engineering or related fields like Informatics, Computer Science or Medical Informatics.
- Excellent software engineering skills.
- Competence in medical informatics and healthcare systems interoperability is a plus but not mandatory.

[1] T.D.Wade, Refining gold from existing data, Curr Opin Allergy Clin Immunol, 2014; 14(3): 181-185

[2] PricewaterhouseCoopers, 2009, Transforming healthcare through secondary use of health data.

[3] W.O.Hackle and E.Ammenwerth, SPIRIT; systematic panning of intelligent reuse of integrated clinical routine data – a conceptual best-practice framework and procedure model, Methods of information in medicine, vol 55, no 02, pp.114-124.

[4] IMI (Innovative Medicines Initiative), 2017, 12th Call for Proposals, document reference IMI2/INT/2017-02169

[5] B.Shickel, P.J.Tighe, A.Bihorac, and P.Rashidi; Deep EHR: A Survey of Recent Advances in Deep Learning Techniques for Electronic Health Record (EHR) Analysis, 2018, IEEE Journal of Biomedical and Health Informatics, vol 22, no 5, pp 1589-1604

[6] X, Gansel, M. Mary, and A. van Belkum; Semantic data interoperability, digital medicine, and e-health in infectious disease management: a review; 2019, European Journal for Clinical Microbiology and Infectious Diseases, 38: 1023-1034

[7] Prof. Martin Leucker (https://www.isp.uni-luebeck.de/leucker, Institute for Software Engineering and Programming Languages at University of Lübeck; google hi – 35), Prof. Yngve Lamo (https://www.isp.uni-luebeck.de/leucker, Department of Computing, Mathematics and Physics at Western Norway University of Applied Science; google hi – 16), University Medical Centre of Schleswig-Holstein (Germany), Houkeland University Hospital (Norway), and Zealand University Hospital (Denmark)