MUNI

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University

Applicant	RNDr. Martin Komenda, Ph.D., MBA
Habilitation thesis	Empowering a Data-Driven Approach in Medical Education and Healthcare
Reviewer	Prof. Moreno Falaschi
Reviewer's home unit, Institution	Department of Information Engineering and Mathematics University of Siena

This thesis introduces a data-driven approach applied both to medical education and healthcare. The thesis explains how to create and how to exploit the data necessary for objective and qualified decision making and presents an infrastructure and a platform for handling the required data. The thesis refers to two main domains: Medical and Healthcare Education (MHE) and Health Information and Statistics (HIS). The thesis describes the definition and construction of an educational platform for MHE and discusses how to handle critical data for healthcare.
The author illustrates an impressive amount of work of research and development of computational tools that he has done with a team of collaborators on the two main domains in the period from 2008 to 2024. The author was involved in a wide range of research and development, education, coordination and management activities in the academic and public sectors. The author has contributed not only to the research and design of computational tools based on solid software engineering principles in the two main domains, but his work has also contributed to the development of strong communities of interested users coming from different social environments.

Regarding MHE, the MEFANET project (MEdical FAculties NETwork) represents the cooperation between eight Czech and three Slovak medical faculties. The author has contributed to develop an original educational web portal platform for publishing and sharing teaching content among them. The new tool allows sharing and managing the information about the curriculum available in medical faculties. The author has also realized a platform for visualizing all information about a medical curriculum, and for optimizing the curriculum structure. Problems of security of data (in the designed databases), privacy, visibility of data with different access rights are some of the technical computational questions which have been addressed when designing and realizing the implemented solutions. Strong tools (interactive algorithms) for improving teaching and learning have also been designed, implemented, and made available by a web portal. Documents for improving learning and teaching can be easily created and shared.

Regarding HIS, several computational tools have been designed and realized. A new web portal entitled the Czech Childhood Cancer Information System provides information on childhood cancer epidemiology in the Czech Republic. A major project has involved designing tools for dealing with the Covid-19 pandemic. For instance, the author has contributed to realize a web portal to share critical information regarding the evolution of the pandemic. Another tool has been designed for regular online updates and overall monitoring of free capacities in hospitals (health care technology/medical devices, beds, staff) in real time, and a module for online entering and overall record-keeping of requirements on medications for COVID-19 patients.

In conclusion, this habilitation thesis has presented a long list of important research projects with direct impact on the society. The author has attached to the thesis 8 full papers which have been published in top international scientific journals and has listed many projects that the author has led, besides the work he has done to train students involved in his research projects. The author has also contributed to form multidisciplinary communities of interested users who can actively share the data made available by the tools and work together for improving the methodologies realized and improve further teaching and research in medicine.

Reviewer's questions for the habilitation thesis defence (number of questions up to the reviewer)

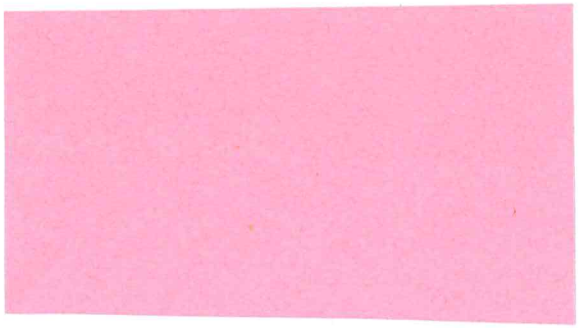
A critical issue nowadays is the impact of Artificial Intelligence (AI), in particular the algorithms of Deep Learning in the field of medicine. AI is having a revolutionary impact on medicine. For applications of AI, the availability of (anonymous) data regarding patients, including the evolution of their diseases, the drugs administrated along time, the analyses performed, etc, creating a network of databases which includes the whole country or better the entire Europe would be essential. Can you describe if and how your platforms could be used or extended to achieve this ultimate goal?

Conclusion

The habilitation thesis entitled "Empowering a Data-Driven Approach in Medical Education and Healthcare" by RNDr. Martin Komenda, Ph.D., MBA, fully satisfies the requirements of a habilitation thesis in the field of Informatics.

Date: 24.2.2025

Signature:



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