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BIGDATA: DATA MANAGEMENT DATA ANALYSIS IN MEDICINE AND PRODUCTION

THE TASK

Data management and the responsible handling of information are an important topic of our time not only in the fields of medicine and life sciences. The management of medical data such as the results of medical tests, takes researchers up to one quarter of their time. Furthermore, the various diagnostics and laboratory machines generate different data types, which quickly adds complexity.

Within large and complex medical datasets are important information, which cannot be extracted with common techniques and analytical processes. The term "BigData" describes data structures that are so large, diverse and complex that their analysis requires new data processing and analytical methods. Such BigData solutions are explored during laboratory operation at the Fraunhofer IWS Dresden.

In medical and treatment research medical routine data are a valuable resource to better understand treatment and risk patterns based on which one can develop individualized preventive and therapy strategies. Large amounts of data require new technical possibilities for storage, processing and analysis in order to advance medical research. BigData processes offer especially for treatment research and personalized medicine new possibilities and can deliver important and so far unknown information about the risks and development of illnesses as well as the therapeutic responses to medications.
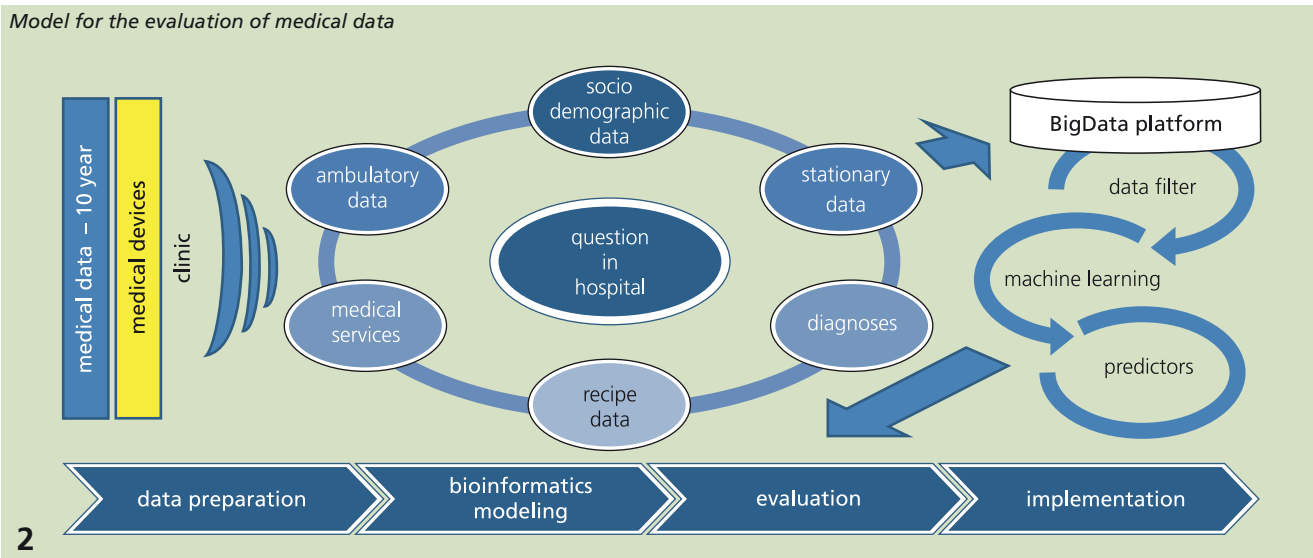
OUR SOLUTION

For the first time researchers at the Fraunhofer IWS Dresden are working on several publically funded projects to use BigData analysis methods in the processing and scientific analysis of routine data from hospitals and health insurers. The aim is to identify indicators in routine medical data that can predict illnesses. To do so multi parametric methods of machine based learning are used already. Now, for the first time, BigData methods of bioinformatics are applied for pattern recognition.

Cooperation partners are the university clinic Carl Gustav Carus Dresden and the Society of University Clinics in Germany e. V. The researchers explain to users the concepts of BigData, implement the methods and demonstrate practical examples.

The Fraunhofer IWS BigData group has the following competences:
- research using the BigData platform and adaption to applications,
- process optimization for database management and storage,
- visual analytics,
- multiparametric and statistical data analysis, visualization, management,
- automated real-time data processing and management,
- image processing and 3D visualization,
- development of biomedical image formats,
- software development for planning, modeling, architecture, analysis,
- development of technology and data standards for the management of digital images and meta data,
- professional software development and consulting with respect to object oriented programming languages, professional project management and modeling of IT and software infrastructure.

Model for the evaluation of medical data

RESULTS

The use of BigData in medical studies serves as a source to generate new hypotheses for risks and development of illnesses. It also provides new hypotheses about causes, causalities and consequences of such illnesses. Individualized measures for prevention and therapy are developed based on these hypotheses. BigData can also be used to determine predictors for the efficient and safe application of medicines and treatment paths for patients, which in the end improves the treatment.

The new approach to apply pattern recognition methods of bioinformatics research in medical routine data can be adapted to numerous other illnesses and questions in treatment research. New and so far unknown causalities between target variables and studied impact factors (exposition factors) are researched with non-parametric processes using machine learning methods.

Very many different initial data are bundled in groups and compared to find similarities. This approach can also be adapted to examples in industrial manufacturing and analytics.

1   *Cluster server for BigData platform*

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