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Highlights

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Data science and artificial intelligence to improve clinical practice and research

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Pattern recognition using machine learning methods is an area that exploded in recent years, given the increasing amount of available data. *JAMIA* has published an increased number of articles in this area in the past few years. In this issue, Zhang (p. 1351) reports on a data resource for sleep research, Feller (p. 1366) proposes a visual analytics approach for pattern recognition in personal health records, while Xiao (p. 1419) reports on a systematic review of deep learning models applied to electronic health record (EHR) data. Machine learning models to detect pulmonary nodules in CT scans are described by Grutzemacher (p. 1301), while models to predict adverse drug events are reported by Davazdahema (p. 1311) and Mower (p. 1339). Albers (p. 1392) provides a broad perspective on mechanistic machine learning using physiologic knowledge, while Pencina (p. 1273) simulates models to predict incremental value of biomarkers.

Developing new approaches to facilitate automation of clinical research is another area in which informatics has evolved considerably in the past few years. In particular, biomedical natural language processing and other methods to structure narrative text and voice recordings have motivated informatics research. Sarker (p. 1274) reports on systems for medication-related text classification, Zamjahn (p. 1284) proposes a method to streamline the evaluation of video recordings, and Parr (p. 1292) describes the automated mapping of laboratory tests to standardized codes in EHRs. Algorithms and tools for processing and linking EHRs are reported by Hoopes (p. 1322) and Klann (p. 1331). Sinnott (p. 1359) proposes a method to improve the power of genetic association studies, while Aronson (p. 1375) describes how the eMERGE consortium established data flows that are particularly relevant to genomic medicine.

Some new modalities of health data are not yet integrated into EHRs though are increasingly being used in research. Streaming data from sensors, for example, in the form of continuous heart rate, activity and location tracking is becoming more common. Donevant (p. 1407) reviews the literature on mHealth studies, Speier (p. 1351) evaluates utility of activity-related data, while Goldenholtz (p. 1402) proposes a way to utilize location data without compromising privacy.

Regardless of their area of sub-specialization, informaticians worldwide now have a wealth of opportunities ahead that were not available to their predecessors. The rapid accumulation of data and knowledge due to new techniques and approaches brings opportunities as well as challenges related to the protection of privacy, inadequacy of computational resources to store, process and integrate large amounts of multi-modality data, antiquated regulatory frameworks, and a relatively low number of trained professionals. However, recognition of the value informatics brings to clinical practice and research has been facilitated by general understanding of the value of data science and artificial intelligence that is now pervasive in our daily lives. These are exciting times and we have a unique opportunity to make a difference towards better health for all.