Visualizing Electronic Health Record Data
IEEE VIS 2014 Workshop
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Figure 1. Participants’ techniques [1-4] ranged from visualizations to analytical techniques as they were applied to various fields, including pediatrics, pharmacy, and aging for exploring single records (e.g., for physicians making life-critical decisions from complex patient histories), as well as collections of records (e.g., cohorts of clinical trial patients, or entire data warehouses of patient records).

Abstract
Electronic Health Record (EHR) databases contain millions of patient records including events such as diagnoses, test results, or medication prescriptions. The use of EHR databases could be dramatically improved if easy-to-use interfaces allowed practitioners, clinical researchers and analysts to explore complex patterns. In this workshop, participants will present ongoing work with short papers and demonstrations and discuss user needs and challenges.

Keywords: Medicine, Health, Electronic Health Records, Epidemiology, Visualization, and Visual Analytics

1 Background
Electronic Health Record (EHR) databases contain millions of patient records including events such as diagnoses, test results, or medication prescriptions. The use of EHR databases could be dramatically improved if easy-to-use interfaces allowed practitioners, clinical researchers and quality improvement analysts to explore complex patterns in order to build and test hypotheses regarding the benefits, risks, effectiveness, and appropriateness of treatments or medication regimens.

These records are an invaluable data source for clinical research and improvement of clinical quality, as they provide longitudinal health information about patient populations. Novel strategies in information visualization and visual analytics are needed. The analysis of EHR data includes many specific visual analytics challenges:
- Interactive patient summaries for clinical use [5–9]
- Temporal pattern analysis [10, 11]
- Dealing with unstructured data (e.g., natural language)
- Comparison of treatment options (for physician or patients) [12, 13]
- Cause and effect analysis
- Temporal querying and data wrangling [14–16]
- Scalability [17]
- De-identification issues
- Case studies [18]

Rind et al. [19] provided a detailed survey of the area. The interest in this topic is growing at very rapid pace and is very interdisciplinary by nature, both in terms of field (medicine and computer science) but also of research environment (academic research as well as industry and government agencies).

Because of the European location of the conference, we had the unique opportunity to create bridges and explore new collaborations between groups that would have never met otherwise.

We welcome discussions of the use of visual analytics approaches, interaction design, statistical methods, machine learning, and related fields.
2 WORKSHOP DETAILS

This will be a full day workshop on Sunday, November 9. We received 16 submissions in total, and were able to accept a total of eight papers for long presentations and five papers for short presentations (10 to 20-minute presentations accordingly), followed by ample time for discussion and demonstrations in the afternoon.

Participants’ submissions addressed the needs of a variety of users: clinical researchers, physicians and nurses, epidemiologists, public health analysts, and insurance claim analysts (Figure 1). Techniques ranged from visualizations to analytics as they were applied to various fields, including pediatrics, pharmacy, and aging. These techniques addressed the tasks of exploring single records (e.g., for physicians making life-critical decisions from complex patient histories), as well as collections of records (e.g., cohorts of clinical trial patients, or entire data warehouses of patent records).

Website: http://www.cs.umd.edu/hcil/parishrvvis/

3 RELATED WORKSHOPS

In the past, Jesus Caban and David Gotz have organized a related workshop called VAHC (for Visual Analytics in Healthcare). That workshop was very successful the 2 years it was organized at VIS with a large number of presenters and participants. Last year they moved VAHC to the AMIA conference (the medical informatics conference) and it will take place at AMIA again in Washington, D.C. on November 15, 2014.

Website: http://www.visualanalyticshealthcare.org/

The Knowledge Representation for Health Care (KR4HC) workshop was first held at the 12th Artificial Intelligence in Medicine (AIME ’09) conference, and has continued at other venues such as the European Conference of Artificial Intelligence (ECAI) and Process-Oriented Information Systems in Health Care (ProHealth). This year, KR4HC 2014 was held in conjunction with the 14th International Conference on Principles of Knowledge Representation and Reasoning (KR ’14) in Vienna, Austria on July 21, 2014.

Website: http://banzai-deim.urv.net/events/KR4HC-2014/

Since 2008, Ben Shneiderman and Catherine Plaisant have held workshops on Electronic Health Records Informatics at the yearly University of Maryland HCIL Symposium in College Park, MD. The most recent event was held on May 29, 2014 and topics included the use of visual approaches, statistical methods, and machine learning to study temporal patterns in patient histories, where the goals may be to find common patterns, rare events, or matches to a given patient.

Website: http://www.cs.umd.edu/hcil/eventflow/workshop2014/

REFERENCES


