Demonstration of Visualization of EHR and Health Related Data for Information Discovery

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Introduction

In this demonstration we present research we are conducting in response to a program announcement solicited by the Assistant Secretary of Defense for Health Affairs, Defense Health Program. We have developed visualization prototypes for multivariate heterogeneous data along with visualizations of retrospective data queries from DEDUCE, an electronic health record (EHR) query tool developed at Duke University.

Our current approach involves incorporating data queries of Duke's EHR system to help identify what data elements are used in queries and classify them according to what types of information users were seeking (e.g. queries searching for outcomes, or outliers of treatment methods). Eventually groups of related data elements will be incorporated into a visualization that allows a quick comparison of the data from a large population with the ability to view trends over time within a chosen measure.

Methods

We have developed two interactive visualization prototypes, one a radial coordinates visualization (Figure 1, left) based on parallel coordinates techniques, and one a force-directed node-and-link network visualization (Figure 1, right). Our radial coordinates visualization is a multivariate visualization suitable for heterogeneous data that incorporates multiple supplemental scatterplots, direct visualization of axis correlations, and a novel technique for spreading lines to enable improved visualization of individual lines and line clusters. Our force-directed network visualization enables the interactive selection of nodes to see relationships between groups of nodes.

In our demonstration we will show how various relationships in the data are reinforced between the two views, and how different visualizations can be more adept at showing different relationships in the data. We will also apply these visualization techniques to publicly available EHR data from the NHS.
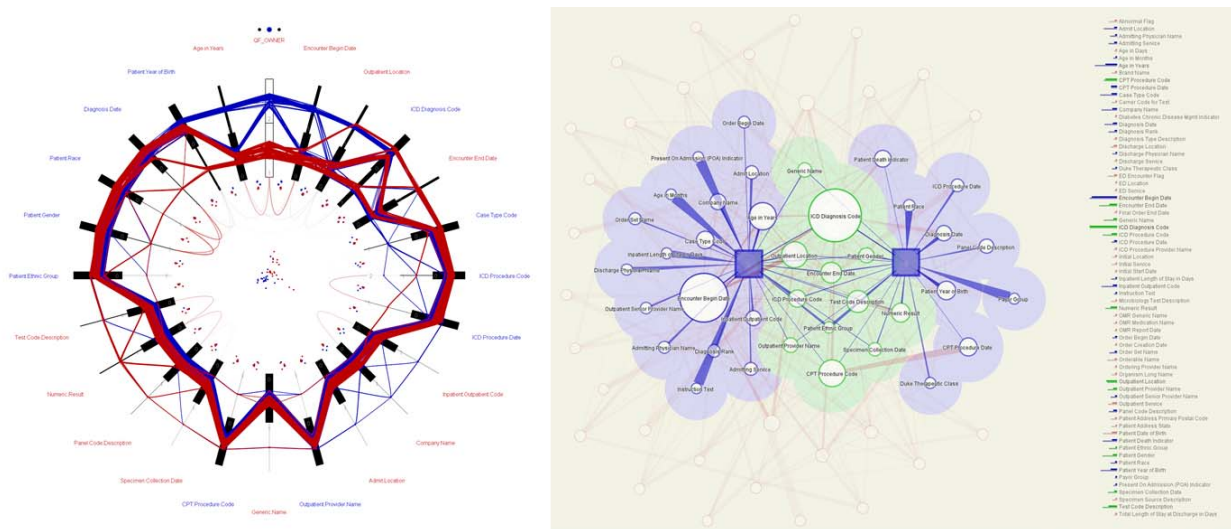

Figure 1: Radial coordinates (left) and force-directed network (right) visualizations of the same EHR query data

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