

Overview of Visualization Dashboards in Healthcare System

Survey Project

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Description of Task

The mass of data available to clinicians, administrators, and researchers in the healthcare system is growing at an unprecedented rate; similarly, the variety and velocity of healthcare data continues to expand, with the types of data ranging from patient data to clinical trials data. Because of the sheer volume of healthcare data generated, this has presented many challenges for healthcare workers as they try to make sense of the data in a given context and make decisions grounded in data. The explosion of generated information has shown that static performance reporting systems are no longer able to completely satisfy healthcare workers' decision-support needs. Hence, more interactive tools need to be employed to transmit, organize, analyze, and display data. As a result, dashboards are becoming increasingly popular as a visualization tool.

Dashboards were originally developed in the business sector as a method of summarizing and integrating key performance information into a visual display as means to support decision making. Healthcare organizations are introducing visualization dashboards as an interactive performance management tool that present, on a single screen, key information enabling healthcare workers to visualize their data more effectively. These dashboards also use data visualization techniques to reduce the cognitive effort needed to evaluate information.

Dashboards are designed with optimal end user experience as one their features. The content displayed on dashboards also require careful consideration and is usually dependent on user needs. At the same time, dashboards require appropriate evaluation criteria in order to build or select an adequate dashboard for operational use.

The goal of the proposed survey is to provide an overview of how visualization dashboards are used in healthcare settings today, their contents (key performance indicators), their benefits, their evaluation criteria, and challenges in their broad implementation.

Personal Expertise

I have a background in life sciences, starting with my undergraduate degree in Biochemistry from the University of British Columbia. Although I have limited knowledge and experience in dashboards, I am very interested in how interactive visualization dashboards are being used in the healthcare system.

Milestones

Week of November 4 – finalize project topic

Week of November 11 – Approximately 10 hours may be spent collecting research material regarding information on dashboards in visualization and visualization dashboards in healthcare. Read through gathered sources.

Week of November 18 – Approximately 15 hours may be spent preparing project update based on papers. Continue reading and searching if necessary.

Week of November 25 – Approximately 20 hours may be spent writing the paper and looking for more resources if necessary.

Week of December 2 – Approximately 25 hours may be spent continuing on writing the paper.

Previous Work

Application of visualization dashboards to the medical domain is gaining momentum to support clinical activities and decision making. These dashboards provide visual and interactive data visualization features that can better deal with large quantities of data and provide insights from them. Visualization dashboards generally use different idioms to illustrate different objectives [1]. For example, in a paper by Maktoobi *et al.* [1], the author notes that some dashboards use bar charts as their analytics tool to show proportions of patients successfully treated and cost per patient, others use scatterplots to present objective data on the patients expressed by key performance indicators like acuity, health status, or total charges.

Some health sectors have also been building their own dashboards to evaluate key performance indicators such as patient satisfaction, clinical outcomes, or employee satisfaction [2]. A paper published by Swaminath *et al.* [2] analyzes how building a visualization dashboard for a cardiovascular center of excellence has improved quality of care. On the same note, Huber *et al.* [3] have developed an interactive data visualization dashboard to assess the impact of decision support on clinical operations.

There also exists some published literature reviews on hospital performance dashboards such as [4]. This proposed survey is unique in that it will focus on five aspects of visualization dashboards in healthcare: how they are used, their contents, their advantages, their evaluation criteria, and their implementation challenges.

References

[1] Maktoobi, S., & Melchiori, M. (2016). A brief Survey of Recent Clinical Dashboards. *VVH@AVI*.

[2] Swaminath, Deepak & Sivakumar, Pradeepkumar & Parker, Ahnna & Funderburk, Mark & Magers, Brent. (2015). BUILDING A DASHBOARD FOR A CARDIOVASCULAR CENTER OF EXCELLENCE. *Physician leadership journal*. 2. 40-6.

[3] Huber, Tim & Krishnaraj, Arun & Monaghan, Dayna & Gaskin, Cree. (2018). Developing an Interactive Data Visualization Tool to Assess the Impact of Decision Support on Clinical Operations. *Journal of Digital Imaging*. 31. 10.1007/s10278-018-0065-z.

[4] Buttigieg, Sandra (Alexandra) & Pace, Adriana. (2017). Hospital Performance Dashboards: A Literature Review. *Journal of Health Organisation and Management*. 31. 10.1108/JHOM-04-2017-0088.