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Human Resources Analytics Dashboard for Healthcare Volunteer Retention

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Prototype Demonstration

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Abstract

This demonstration features a human resources (HR) analytics prototype designed and developed for a large volunteer services program at a major healthcare provider. The dashboard presents vital statistics about the life-cycle of volunteer management, including on-boarding, training, assignment placement, and helps the volunteer coordinator predict the likelihood of volunteer retention, and identify volunteers with high potential for long-term volunteerism.

Keywords

Volunteer management, volunteer retention, human resources analytics, machine learning, dashboard

Introduction

Healthcare organizations rely significantly on the contribution of volunteers as vital human resources for operations. Although there is no payroll cost for having volunteers, volunteers are vital to hospital operations, which can be interrupted severely without volunteers. However, they are often faced with the challenge of recruiting and retaining those who are willing to volunteer their time and expertise (Claxton-Oldfield & Jones, 2013; Weeks & MacQuarrie, 2011), and finding a good fit for the volunteer that meets the volunteer's needs (Kim, Chelladurai, & Trail, 2007).

Although the research literature offers potential recruiting and retention strategies in general, it is often difficult for volunteer managers at individual organizations to diagnose and identify the specific issues and solutions that are unique to their particular situations. To understand the nature of the volunteer base, maximize retention and minimize turnover, the volunteer manager can gain valuable insights from an analytics tool that describes volunteer statistics, and predicts key retention outcomes.

We will share a prototype of such a tool designed and developed for a large volunteer services program at a major healthcare provider in Southwestern United States, as part of an INFORMS Pro Bono Analytics[1] engagement. The dashboard, built with open-source tools, visualizes vital statistics about the life-cycle of volunteer management, including on-boarding, training, assignment placement, and helps the volunteer coordinator predict the likelihood of volunteer retention, and identify volunteers with high potential for long-term volunteerism.

Method

To determine requirements for the design of the dashboard, we conducted a series of discussions with the organization's volunteer coordinator (i.e. "the client"). Based on these discussions, and datasets provided
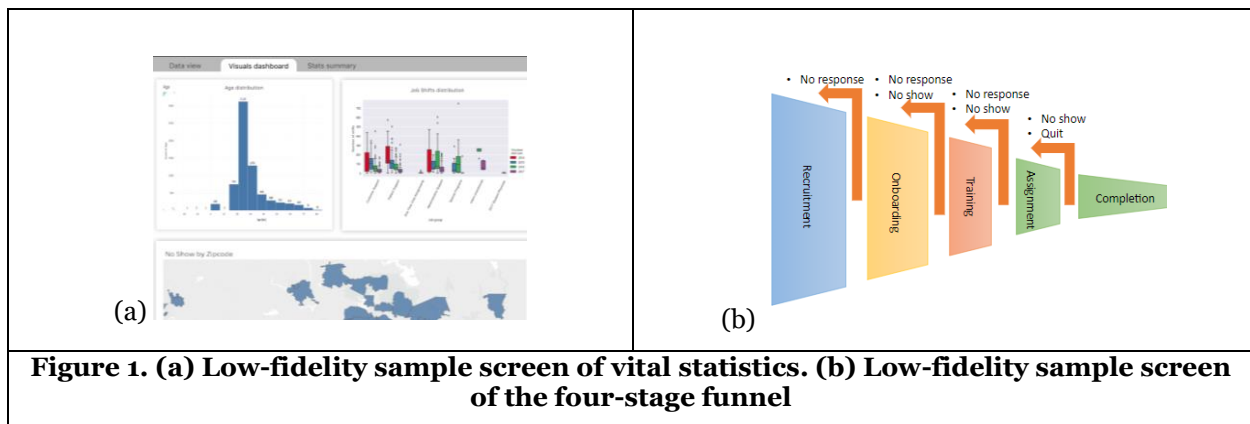
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[1] http://connect.informs.org/probonoanalytics/home

by the client, we wire-framed low-fidelity prototype screens and reviewed them with the client for feedback iteratively. Two datasets available from the client: The volunteer dataset, and the job assignments dataset.

The volunteer dataset includes 7599 unique intake records of demographic and volunteer job group data on individual volunteers from year 2008 to 2018. This dataset includes both active and inactive volunteers. Demographic features include age, gender, the number of days volunteered. Volunteers work for one of several job groups. The top three most common job groups are customer support, patient support, and administrative support.

The job assignments dataset includes 221973 records of volunteer shifts representing 1052 unique volunteers. No ID or key is available to link the job assignments dataset to the individual records in the volunteer dataset.

Based on the client's needs, we are building a web-based prototype using the Python library Scikit-Learn, D3 for visualization, and Flask as a standalone webserver for presenting the dashboard through a desktop web browser. The first major functionality of the prototype is to visualize vital statistics (see Figure 1a) about the life-cycle of volunteer management as a funnel (see Figure 1b) with four stages: recruiting, on-boarding, training, assignment and completion. We will display enter versus exit rates at each stage. The second functionality is to help the client predict the likelihood of volunteer retention using several different models and all demographic features available during each of the four funnel stages. The models will be validated using 10-fold cross validation. The hospital's IT department provides technical support, and will integrate this prototype into the hospital's current IT infrastrature when the prototype is complete.

Figure 1. (a) Low-fidelity sample screen of vital statistics. (b) Low-fidelity sample screen of the four-stage funnel

Conclusion

This demonstration features an HR analytics dashboard prototype which visualizes vital statistics about the life-cycle of volunteer management, including recruiting, on-boarding, training, assignment placement, and helps the volunteer coordinator predict the likelihood of volunteer retention, and identify volunteers with high potential for long-term volunteerism.

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