Title

ANALYTICAL INNOVATIONS TO ACCELERATE ACTIVE LIVING RESEARCH RESULTS

Authors and Affiliations

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Abstract Body (500-word limit, excluding headings)

BACKGROUND

Active living research (ALR) involves interactions between behavioral, environmental, and physical datasets, measured by different scales and analyzed in different ways. Because of analytical complexity resulting from these interactions, datasets must be free of problems in order to uncover clear results. The interface between behavioral, environmental, and physical ALR datasets provides opportunities for triangulating to identify deviant values within each dataset. For example, reported high physical activity from someone whose behavioral and environmental profile would strongly suggest otherwise should raise questions.

Despite high analytical complexity, pressure is mounting to deliver ALR results in a timely and affordable fashion. As matters stand, the analysis of ALR datasets take so long that results could become obsolete before being reported. Moreover, substantial study funds that might be better spent to meet high-level needs must instead be spent on data cleanup using labor-intensive methods.

OBJECTIVES

This paper demonstrates an automated monitoring software system with the potential to add substantial ALR value. The system is called "brain-like," because it updates learned parameters continuously and automatically, much like animals continuously habituate to background stimuli. The brain-like system continuously monitors individuals' data to find substantial differences between observed values and expected values. When such differences are found, they often point to problems that can be fixed immediately. For example, individuals that have relatively high non-response rates, response bias rates, or response variation levels can be immediately identified as such and corrective action can be taken accordingly.

METHODS

The brain-like system was applied to Neighborhood Quality of Life Study (NQLS) data. Preliminary analysis of first-wave NQLS data focused on identifying individuals producing unexpected profiles. The system was initially tested on survey data, but future applications will include GIS-based variables and accelerometer data. Future applications will also include detecting "conditional outliers," such as cases where accelerometer values are unexpectedly low

for an individual whose behavioral profile and residential community would strongly suggest otherwise.

PRELIMINARY RESULTS

Among 976 individuals that were monitored, 17 produced profiles that substantially exceeded deviance significance levels at the .001 level. Most of these deviant profiles were easily identified as having clear causal patterns. Typical deviant profiles included consistent survey item responses at the bottom of the scale, significantly high missing value rates, or highly variable, random responses. If such deviance patterns had been observed during or immediately after data gathering, problems such as respondee attention deficits or surveyor communication difficulties might have been resolved on the spot. Preliminary analysis also identified distinct survey subscales as dominant sources of individual deviance. Further analysis of such responses might point toward specific subscale weaknesses that could be corrected by replacing or eliminating deviant items. Such corrections could be immediately made for the remainder of the study, rather than awaiting end-of-study analysis for future action.

CONCLUSIONS

This preliminary analysis has examined the feasibility of a system for using monitoring results during the gathering of large scale study data, rather than awaiting end-of-study analysis for future action. Preliminary results indicate that such a system may indeed be feasible and useful.

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