

What did others like me do to reach their health goals? EventAction for event sequence recommendations

Position paper for Valuable Visualization of Healthcare Information – an AVI2016 workshop

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ABSTRACT

Recommender systems can be used to assist people in making decisions, for example, recommending things to buy or videos to watch. Nevertheless recommending series of actions (as temporal sequences) has not been studied. We are developing EventAction, a first attempt at a prescriptive analytics interface designed to present and explain recommendations of temporal event sequences. At the workshop we will discuss how EventAction could be expanded and used for personal training or health management. We will describe a visual analytics approach to (1) identify similar people based on their health and behavior history, (2) recommend temporal event sequences that might help achieve the users' health goals, (3) identify key steps in the recommended event sequences that are most important, and (4) interactively assist users as they define a personalized action plan associated with a probability of success.

CCS Concepts

Human-centered computing. Visualization. Visualization theory, concepts and paradigms.

Keywords

Recommendation; Event Sequence; Similarity; Action Planning

1. INTRODUCTION

The growing interest in event analytics has resulted in a flurry of novel tools and applications using visual analytics techniques to tackle varied problems in healthcare [1, 2], customer service, education [3], cybersecurity, etc. Commonly studied tasks include describing, summarizing or comparing collections of event patterns, searching event sequences to find records of interest or build cohorts, predicting the outcome associated with patterns of events, studying variants from established workflows, etc. We believe that the next breakthroughs for event analytics will come by going beyond the usual descriptive and predictive analytics to develop actionable guidance by way of prescriptive analytics. In layman's terms, prescriptive analytics for event sequences consists of recommended actions (what and when) that would lead to a desired outcome, based on the history of similar archived records.

2. SCENARIO OF USE

For the purpose of the VVH2016 workshop discussion imagine the following scenario: I have been trying to loose weight for 3

months and meet a health coach. I wish to loose 10 more kilos in the next 3 months and wonder what other people like me (i.e., those with a similar 3 month history) did. How many lost 10 kilos, how many abandoned? Did they go to the gym? How often? Did they get a personal trainer or not? What program did they sign up for? When did they join a support group? Did they stop going? The system pulls a set of people from the archive who are similar to me based on their demographic and past history. I see the distribution of 6-month outcomes. Then, we look at those who succeeded in reaching the goal I'd like to achieve. We review the recommendations, and discuss together an action plan combining the wisdom of the coach and the system's recommendations based on events and timings identified as correlated with reaching the desired goal.

3. OPPORTUNITIES AND CHALLENGES

The main research question is to determine what combination of algorithmic analysis and interactive visual exploration can augment analysts' ability to review recommended actions and improve outcomes? Recommender systems can be used to assist people in making decisions, for example, recommending things to buy or videos to watch. The novelty of the approach proposed is that it uses event sequences as features to identify similar records and appropriate recommendations. Recommending series of actions (as temporal sequences) has not been studied.

While traditional product recommendations can be described with simple explanations such as "customers with attributes like yours also looked at this product; or also watched this movie", our approach can be summarized by the following statement: "Based on what happened to customers who started with an event sequence similar to yours [4, 5], what the sequences of actions and their timings are that might lead to the outcome you want." Properly selecting similar records, and presenting and explaining recommendations is critical to the effectiveness of recommender systems and decision support tools in general, as it helps develop users' trust in the system and motivate users' actions. EventAction [3] is a data driven and evidence based framework for the recommendation of event sequences. We will discuss how this framework can be applied in the personal health domain to help health coaches make recommendations to help individuals set action plans to reach their goals.

4. ACKNOWLEDGMENTS

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5. REFERENCES

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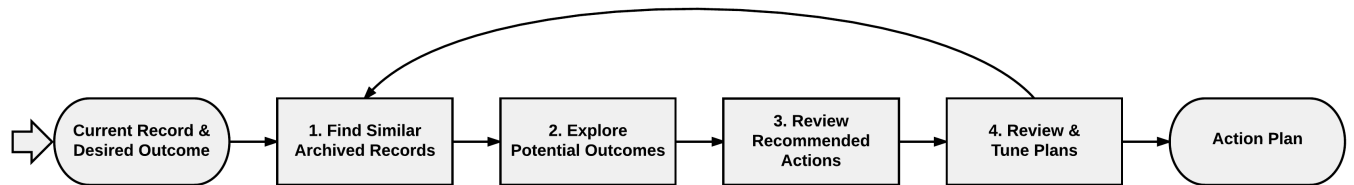


Fig. 1 The workflow of EventAction.

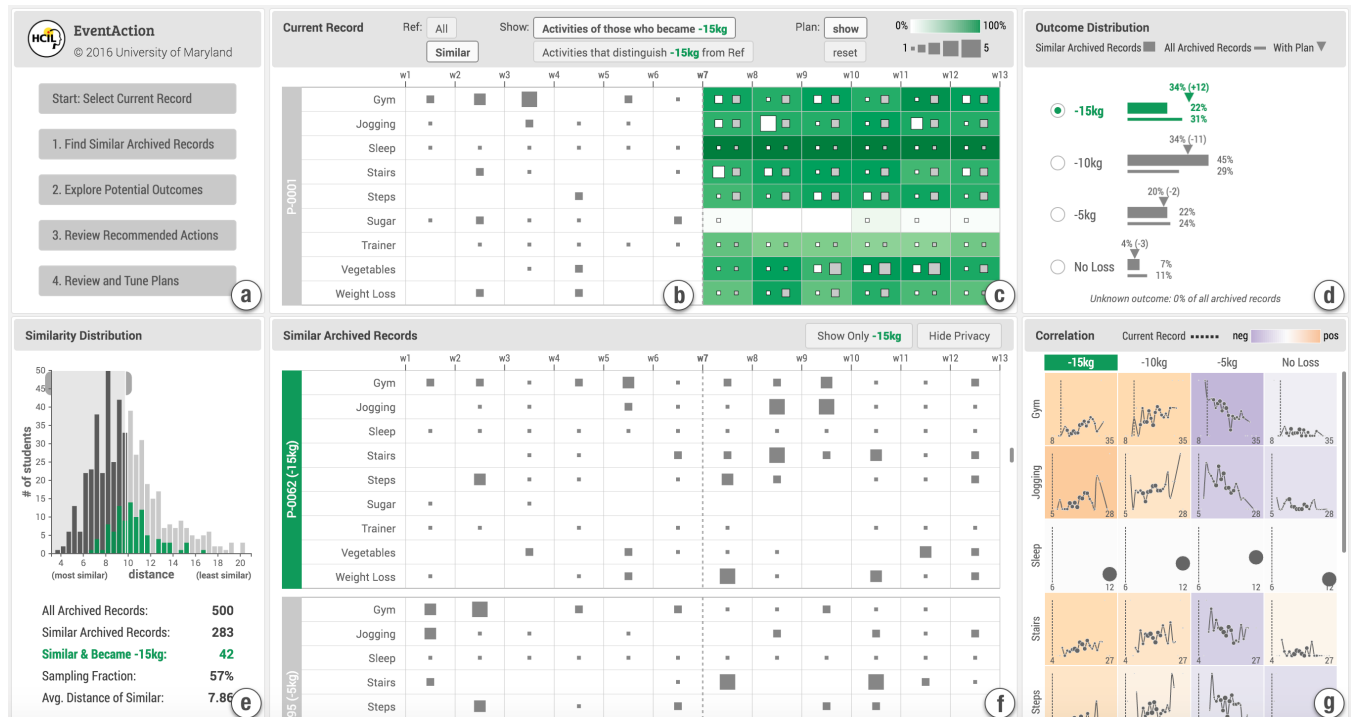


Fig. 2: A mockup of the possible interface (modified from the original design that used student record data)

EventAction provides a visual analytics approach for helping a health coach recommend actions to improve patient outcome. The user interface consists of seven coordinated views, opening progressively as the analysis progresses: (a) workflow control panel, (b) current record timeline, (c) activity summary view, (d) outcome distribution view, (e) similarity distribution view, (f) similar archived record timelines, and (g) correlation view. The Figure uses a synthetic dataset.