Establishing intrinsic motivators through smartphone-based sensing

Background

Intrinsic motivation relates to our execution of activities for our own personal satisfaction (i.e. interests) rather than reward or consequence [3]. Assessing interests with question-sets (inventories) is common in psychology [1, 4], but these are burdensome to individuals who must respond to prompts. In most cases, these intrinsic interests are demonstrated in an individual's daily activity.

Smartphone sensing has been used to determine individuals' activities in real-world settings [2] -- this includes identifying daily routines, social interactions, and instances of physical activity. Thus, I propose leveraging these smartphone sensing techniques to establish activities, and in turn to infer intrinsic motivators. To the best of my knowledge, this latter inference has not previously been attempted.

Proposed Research

My research will establish the extent to which the intrinsic motivations of normal healthy adults can be detected unobtrusively through smartphone sensing. I plan to structure this research around two key research questions:

1. What measures or constructs of human motivation can be mapped to one or more sensable features?

2. How can these features be measured, combined, and weighted to produce a set of individual motivations?

Approach, Methodologies

My first year will lay the foundations for the research in two key areas.

1. Human motivation -- I plan to (a) Establish a theoretical grounding for the research based on literature from psychology and related disciplines. (b) Identify a set of established motivational elements that may be amenable to smartphone sensing. (c) Esablish an appropriate inventory/tool for capturing baseline measures of intrinsic motivation (to be used in the evaluation of my work.

2. Smartphone sensing -- I plan to (d) Select an appropriate mobile sensing platform from those available. (e) Develop a prototype instance of that platform (i.e. an app) for future studies. (f) Determine the process by which data will be returned to me (and stored) for study.

In year two and three, I plan to conduct iterative trials of my sensing app using a growing set of smartphone sensors and a variety of algorithms. I anticipate that these trials will have relatively few participants, but the data captured for each participant will be substantial. In each trial, I will measure motivations using established tools (see Y1 activity 1a) and compare this with those established by my sensing app. I intend that at least one study be longitudinal (>3 months).

Contributions and Impact

I anticipate publishing the above research at conferences/journals in mobile systems (e.g. ACM MobiSys/Mobicom, IEEE Percom, PACM IMWUT) and human-computer interaction (ACM CHI, IJHCS). Specifically, I envisage a *minimum* of one full paper that demonstrates the overall approach is viable, with a more ambitious *target* of three full papers (one for the overall approach, two further papers establishing the efficacy of different sensors as data sources). I am also keen to seek community feedback throughout my research and therefore hope to submit to PhD forums, poster and WIP sessions, etc.

I believe that my programme of work will contribute to the discipline by promoting alternative to activity-sensing that focusses on *why* rather than *what*. Understanding *why* a human acts the way they do will enable novel applications, particularly in the domain of behaviour change (e.g. for health, environmental or societal benefit). For example, consider how a goal to `move more' might be supported by a mobile application that can target prompts to the individual user's interests -- instead of "Only 125 more steps to reach 250 this hour", the application might say "Here's a three-minute audio summary of last night's football -- why not listen and walk to get your steps in?".

References

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