Classification of Data and Activities in Self-Quantification Systems

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OUTLINE

• What is Self Quantification?
  Self Quantification is a source of ‘big data’.
  Classification of Self Quantification Systems.
  Classification of Data and Activities.
  Minimum Information about a Self-Monitoring Experiment (MISME).
• Importance of our study.
What is Self Quantification?
Self-quantification is about tracking health aspects from mental, emotional, physical, to social aspects, in relation to time, location, environmental factors, etc. All can be captured and translated into numbers.

‘Self-knowledge through numbers’.

Help self-trackers to better understand their health status and how to interact with the world around them.
Self Quantification is a source of ‘big data’
Widespread and rise of Quantified-Self community

Number explosion of mHealth apps and wearable technology

Number of QS Groups

iTunes Apple and Google Play

97,000+ mobile apps related to HEALTH & FITNESS
A self-tracker is tracking multiple health indicators.

Rising popularity of mHealth apps and wearable technology.

Image 1: Pew Internet survey showing:
- Of US adults, 69% track their health indicators.
- Of US adults living with one chronic condition, 40% track their health indicators.
- Of US adults living with two or more chronic conditions, 62% track their health indicators.

Image 2: Graph showing:
- 15M users in 2013
- 100M users in 2018

Source: Juniper Research, 2013
Self-trackers are more likely to share their collected row data with other people around the world

• 43% of trackers with 2+ conditions share their data, 71% share with a clinician (Pew, 2013).

• In our survey (2014): 74% of respondents share their data online, compared to 26% who don’t.
In our study:

- Tools and apps characteristics: Classification of self-quantification systems (SQS).
- Data and activities characteristics: classification of data and activities (CDA-SQS).
- How consumers are interacting with these systems to capture such data: proposal for a framework.
Classification of Self-Quantification Systems (SQS)

• Capture data directly from the user (Primary or Secondary)
• Sensor Location (Mobile or Fixed)
• Involve skin pricking (In-contact or On-body)
• Data type (Environmental or Touchless)
• Location of data integration (Software-based or Hardware-based integration)
• Location of data visualisation (Standalone, etc.)
Examples of primary systems

Actipressure

Zeo Sleep Manager

Mood Panda

23andMe

μBiome

Fitbit

Sensaris Senspod

iBGStar
Example of secondary systems

Image source: http://www.bodytrack.org/images/diagram.png
Classification of Data and Activities
Adapted from WHO-ICF (World Health Organization - International Classification of Functioning, Disability and Health)
<table>
<thead>
<tr>
<th>Body structures and functions</th>
<th>Body actions/activities</th>
<th>Around body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental functions</td>
<td>Learning and applying knowledge</td>
<td>Relationships and attitudes</td>
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<td>Sensory functions</td>
<td>Communication</td>
<td>Products or substances for personal consumption</td>
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<td>Sensation of pain</td>
<td>Mobility</td>
<td>Products and technology for use</td>
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<td>Voice and speech functions</td>
<td>Self-care</td>
<td>Natural environment and human-made changes to environment</td>
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<td>Cardiovascular system</td>
<td>Domestic life</td>
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<td>Haematological system</td>
<td>Interpersonal interactions</td>
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<td>Immunological system</td>
<td>Education</td>
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<td>Respiratory system</td>
<td>Work and employment</td>
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<td>Digestive system</td>
<td>Economic life</td>
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<td>Metabolic system</td>
<td>Recreation and leisure</td>
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<td>Endocrine system</td>
<td>Religion and spirituality</td>
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<td>Genitourinary functions</td>
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<td>Reproductive functions</td>
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<td>Skeletal system</td>
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<td>Muscular system</td>
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<td>Nervous system</td>
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<td>Skin</td>
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<td>Hair</td>
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<tr>
<td>Nails</td>
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<tr>
<td>Genome (DNA, RNA and genes)</td>
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<td>Microbes</td>
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### Categories in a mental function domain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Category</th>
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<tbody>
<tr>
<td>1- MENTAL FUNCTIONS</td>
<td>Appetite&lt;br&gt;Attention e.g. sustaining attention, shifting attention, dividing attention, sharing attention; concentration; distractibility&lt;br&gt;Calculation e.g. manipulation of mathematical symbols and processes&lt;br&gt;Consciousness&lt;br&gt;Emotions e.g. affect; sadness, happiness, love, fear, anger, hate, tension, anxiety, joy, sorrow; lability of emotion; flattening of affect&lt;br&gt;Intellectual growth, mental retardation, dementia&lt;br&gt;Memory e.g. remembering; recalling and learning, amnesia&lt;br&gt;Motivation&lt;br&gt;Perception e.g. recognising of auditory, visual, olfactory, gustatory, tactile and visuospatial perception, such as a hallucination or illusion&lt;br&gt;Psychomotor factors e.g. excitement and agitation, posturing, catatonia, negativism, ambitendency, echopraxia and echolalia&lt;br&gt;Psychosocial functions e.g. autism&lt;br&gt;Sleep&lt;br&gt;Temperament and personality e.g. extraversion, introversion, agreeableness, conscientiousness, psychic and emotional stability, and openness to experience; optimism; confidence; trustworthiness&lt;br&gt;Thought e.g. pressure of thought, flight of ideas, thought block, incoherence of thought, tangentiality, circumstantiality, delusions, obsessions and compulsions</td>
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<tr>
<td>2- SENSORY FUNCTIONS</td>
<td>Senses e.g. seeing, hearing, tasting, smelling, touch</td>
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Minimum Information about a Self-Monitoring Experiment (MISME)

Image source: http://biosharing.org
MISME

{1} Study Question/Experiment Hypothesis

Sample
Who? Which part? Where? When?
(e.g., time, location, etc.)

Assay
(sample, device)

Device
Technical Specs

What measurements?
(CDA-SQS) Model

SFS Taxonomy

{2} Study

{3} Data

Investigation
Importance of our study

• It introduces the self quantification practice as a ‘big data’ source for the consumer health informatics research.

• It provides tools and knowledge that a researcher need to be aware of or learn in order to be competent with self quantification research: SQS classification, CDA-SQS, MISME, etc.

• It aims to facilitate a new potential methodology in the self quantification and consumer health research.

• It is the first research of its type in the field of self quantification and consumer health research.
Key References

Thank You For Listening

For more information
Email: malmalki@student.unimelb.edu.au
http://medicine.unimelb.edu.au/hbic
http://www.scoop.it/t/selfomics
http://hbiru.wordpress.com/