Supporting Clinical Decisions with Intelligent Information Access

Project
Mobile Measurement and Motivation: A Feasibility and Pilot Study of Smartwatches for Health

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Health informatics research

Applications for healthcare

Information search and management

Data mining and pattern recognition
Health applications

• Medical images search (e.g. radiology, dermatology)
• Walking gaits
• Speech therapy

• Research topics:
  • Image and audio analysis
  • Engagement and motivation
  • Pervasive devices to reduce disruption
  • Clinical decision support systems
NovaMedSearch

- A search engine to improve access to the bio-medical literature (PubMed)
  - Covers over 1 million articles and 3 million images
  - 3 year project supported by industry and PT/EU funds

- Case-based search with medical images, medical terms and textual descriptions

- It was evaluated at NIST and it was ranked among the top 3 clinical-decision support systems (out of 26 teams)
  - Diagnosis: What is the patient's diagnosis?
  - Test: What tests should the patient receive?
  - Treatment: How should the patient be treated?
Goal: mine cross-media relations in the medical literature to improve searches and perform a better patient diagnostic.
1. Market analysis and literature review of wearables and smart watches including demographic or geographic differences among users.

2. Systematic testing of selected smart watches among members of the research team.

3. Collecting mixed data collection on smart watches with diverse consumers to assess their needs and preferences related to specific health behaviors.

4. Implementing pilot tests of the feasibility and acceptability of smart watch use among diverse consumers focused on one or more health areas.

5. Pilot research on wearables and smart watches led by our research partners in Portugal.
Multidisciplinary team

• We are software and data scientists
  • Expertise in processing health data/sensors and tracking data patterns

• Our technology needs to:
  • be “informed” by domain experts;
  • answer a real-world need;
  • be adopted by end-users!

• Multidisciplinary (and pragmatic) teams are great to achieve these goals!
Workplan: Pilot research on wearables

- Compare Google, Microsoft and Apple devices
- Collect data from wearable devices
- Mine wearable data patterns
- Match collected data to user surveys to detect user idiosyncrasies
Wearable’s sensors

- Optical heart rate sensor
- 3-axis accelerometer/gyro
- Gyrometer
- GPS
- Ambient light sensor
- Skin temperature sensor
- UV sensor
- Capacitive sensor
- Galvanic skin response
- Microphone
From sensor data to health data
Health applications

• There are many health and activity logging apps.

• Is monitoring the best we can do?

• How can wearables innovate health applications?
Wearables for health diagnostics

- Monitoring post-stroke subjects
- Diabetes
- Heart conditions
- Kidney diseases (hemodialysis)
- Different gait patterns
Impact

• Pervasiveness of wearable technology will change the way people “see” their health

• A key question is “when will wearables have the same penetration rates as mobile phones?”

• The greater impact of this technology will arise from the populations’ health data.

• Impact will be on both end-consumers and health professionals.
NovaMedSearch

The health-data lifecycle
NovaMedSearch

The health-data lifecycle

• Collect data to observe health behaviors

• Link health-behaviors to the bio-medical literature

• Provide health professionals with patient information
  • Support better clinical decisions
  • Allow them to personalize information provided to end-consumers

• Observational study to monitor actual health improvements
Summary

• We can do more than just showing statistics to users!
  • Explore the social connectivity of wearable technology.

• Explore the law of large numbers to get strong statistics!
  • Collect data from several people.

• Improve health in a pervasive way...
  ... causing few disruptions on the user’s life!
Thank you!

Sponsors

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