Human-Robot Interaction

Elective in Artificial Intelligence

Use of Large sample Size and Multiple Evaluation Methods in Human Robot Interactions

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Readings

Use of Large Sample Sizes and Multiple Evaluation Methods in Human-Robot Interaction Experimentation

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Overview

- Introduction
- Survey of Human Studies for HRI
- Planning and Study Design
- Methods of Evaluation
- Study and Planning Protocols
- Conclusions

Inspired by the slide hierarchy of Prof.Iocchi

Introduction

- HRI is an rapidly advancing research area.
- Evaluation of the robot interaction with users is not easy, because it always involves some subjectivity
- Two Main Issues:
  - Lack of significant size of participant pool to represent the population
  - Lack of comprehensive assessment methods to obtain convergent validity

Survey of Human Studies

- Mainly the self Assessments being involved
- Kulic and Croft has done largest survey in 2006, they recommended psychological signals should be studied for HRI
- Mutlu et al. (Mutlu et al. 2006) make groups to study the Humans (ASIMO robot game)

- Sample size are relatively small, therefore effects the results.

Planning and study design

1. Type of study (within subjects, between subjects, mixed)
2. How many groups.
3. How many participants in each group.
4. Evaluation methods and techniques
5. What type of task the participants perform
6. Environment and space.
7. Equipment needed and types
8. Assistance needed to conduct the study
9. Participants to be recruited
10. How contingencies and failures be handled

Methods Of Evaluation

- Four primary methods:
  - Self Assessment
  - Observational or behavioural measures (Hawthorne effect)
  - Task performance
  - Psychophysiological (cannot be manipulated)
- They are used In combination for better results
- Information prior to experiment should be Recorded
- Team performances are measured
- Some times non verbal , non facial recordings.

Psychophysiological Signal

- EKG
- Skin conductance response
- Abdominal respiration
- Thoracic Respiration
- Blood Volume pulse

Correlation can be down to determine the validity

Camera can be used to record behaviours

Study Protocol

- Determine the process from start to end (IRB) paper work.
- Trail Runs should be done to see everything is working
- Study Location and Environment (Urban search and Rescue)
- Robots and Other equipment
- Conducting the Study
- Recruiting participants
- Failures and Contingencies

Conclusions

- HRI is still growing research area
- Planning and design the human study is very complex.
- There are two main improvements :
  - Have large sample size to represent population
  - The use of multiple methods of the evaluation to establish the accurate and results that have convergent validity
- Analysis of results with proper statistical tools