Michigan Technological University

PSY 6990

Phase I: Planning;
WOZ Study for Visual Search Application for Visually Impaired

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PSY 6990: Explanations in AI Systems

Project 2

Overview:

1. AI System
2. WOZ manipulation
3. Hypothesis
4. Dependent measures
5. Design
6. Analysis

AI system:

We propose to do a WOZ test for our visual search system for the visually impaired featured in our previous assignment.

WOZ Manipulation:

We would pre recorded some directions or use a text to speech simulation on the spot to give instructions to participants wearing Google Glass. We will explain that the apparatus- Google Glass- has been reprogrammed to act as a visual aid for the blind. In reality, we will be acting as the visual aid and the apparatus has been design to play the responses we type into it in real time. The user would then be instructed to follow tape on the floor toward obstacles course and that the apparatus will alert them when they have an obstacle in their path. They will be instructed to please keep walking until the apparatus identifies the obstacle and raise their hand and ask a question if they do not understand why or why not the apparatus is responding a certain way.

Hypothesis:

H1: If the user is given too technical or detailed of explanation as to what object they need to avoid, then they will be less likely to understand and trust the system's instructions.

Alternative Hypothesis:

H2: If the user given more in depth technical details and specifications, then they will more certainly understand the system.
H3: If the user will get different scenarios and related explanations with technical and non-technical details then this fuzziness can lead to more human like explanation.

Dependent Measures:

A survey could be appropriate to understand how the user perceived the system.

Satisfaction measures:

To measure subjective satisfaction in the explanation and system:

1. On a scale of 1-5, rate how accurate of description you felt the system gave you?
2. On a scale of 1-5, rate how much you liked using the system.
3. On scale of 1-5, Rate how hard it was for you to understand the system?

Knowledge measures:

Knowledge of the system highly depends on,

1. Prediction Ability/accuracy
2. Capability of natural description
3. Capability of identifying falsehoods
4. Capability of Justifying each step in explanation process.

Questions:

1. Can you explain how the system worked?
2. Why did it instruct you to stop walking?
3. How did system come up with the following step rather than other alternatives?
4. At macro level, what do you think as a major part of the overall system working?
5. On scale of 1-5, rate the overall robustness of the system in different scenarios.

Trust measures:

Appropriate trust in the system can be,

1. Better explanations for each case
2. Better predictions in each and every scenarios.
3. Better Justification for behavior under different circumstances.
4. Overall accuracy and robustness for usage in daily basis.

Questions:

1. On a scale of 1-5, how sure were you that the system would guide you away from obstacles?
2. On a scale of 1-5, how likely would it be that you try this system on a busy street?
3. Do you think system is trustable in different environment and scenarios?
4. Do you believe that system will behave in described manner as per justifications, rather than behaving randomly like a black box?

Usage measures:

1. Use of the system (Do they do a job better when the system has an explanation)?
2. Do you feel that the system helped you get around better than you currently do in the dark or when your eyes are closed?
3. Do you think given explanations are enough for better understanding as a user?
4. On scale of 1-5, rate the explanation of overall usage of the system.

The two researchers that are not following with the phone/speaker can write down notes on behavior such as points of hesitation, verbalizations, etc. from the user.

Design:

Each participant will participate in 5 different scenarios.Before each scenario the participant will be told/reminded that the apparatus will be explaining what it sees in their path. In each scenario the participant will be asked to follow a taped path along the floor for continuity. Participants will be instructed to stop walking and raise their hand when they don't understand why the apparatus gave the audio comment that it did.

1. They will walk down a hall with no obstacles and the apparatus will "notice all stimuli" (Floor, wall, poster, vending machine, etc.) There will be non stop explanation of the environment.
2. They will walk down a hall with no obstacles and the apparatus will say nothing
3. They will walk down a hall with a chair in the way and the apparatus will give an incorrect description.
4. They will walk down a hallway with a chair in the way and the apparatus will correctly describe it as a chair
5. They will walk down a hall with multiple chairs and the apparatus will "detect" some chairs but not all.

We will aim for 10 participants.

Analysis:

Analysis will be carried out with the each scenario. We will testify each scenario for given measures. The measures will have some weightage as per modality. Each measure effects in different manner in each environment. The prior or posterior analysis may differ in different cases so impactful analysis will be weighted posterior analysis after considering each and every dependent measures & their possible cause-effect relationships. The Overall model will get macro and micro level scores for each case and thus system will be judged based on their each level of performance. The explanation is the result of final considerations of each justifications for each step of problem solving. We can even use qualitative data for analyzing overall model accuracy and trust in each and every scenario.