

TJHSST Computer Systems Lab Senior Research Project Human Cognitive Emulation 2006-2007

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November 2, 2006

Abstract

Attempting to recreate accurate human responses to stimuli is something that man has been working on since the dawn of computers. While doing so would require a lifetime of research and work, bits and pieces can be attempted by individuals. Using a survey format, this experiment hopes to produce a unique response to a stimuli based on information gained about the user. While alone, the ramification of this lab can perhaps draw broad conclusions about groups of people and how they respond, combined with other techniques of emulating human thought patterns, computers can become closer and closer to accurately representing a real human.

1 Introduction - Elaboration on the problem statement, purpose, and project scope

1.1 Scope of Study

This lab is designed to take in specific information from multiple users and eventually produce typecast that users can be put under. Using the typecast, a response to stimuli will be produced that hopefully matches what the user would do in real life.

Be as specific as you can about what you want to develop. Think of drawing a boundary around the area of study that you think you can finish. If your project idea is too extensive, select a more modest piece of your original project idea to work on. An iterative development plan will help, one in which you start with what may be a relatively simple program you know you can write, then expand on this step by step throughout the year, adding more complexity as you go along.

1.2 Expected results

The optimal results would be to put each person in his or her own typecast, with similarities to and differences with other users. Then when a stimulus is given to the "computer" user the response will match, within a certain error bound, the reaction the user would give. More likely the user will be put with a group of other users who share similar traits with the user. Then the program will analyze the responses of all the users in the group and determine a response to a given stimuli. Chances are that this result will be less accurate, but more feasible.

I hope to learn more about both Psychology and Statistics. I have always had an interest in cognition and what makes people think what they do. Also, without statistics my data will be rather pointless, so because I am not actually taking statistics this year I will have to learn a large portion of it anyway.

1.3 Type of research

My project would fall under pure basic research. It is always possible that people could use it to find patterns within a population or attempt to predict what someone would do. Mostly, though, I intend to use my results purely for research purposes.

2 Background and review of current literature and research

Sandia National Labs have been experimenting with the same type of research that I am doing. I have contacts within the program and they have agreed to assist me in my project as it unfolds. Some of those projects are

the following:

Forsythe, C., Xavier, P. (2002). Human emulation: Progress toward realistic synthetic human agents. Proceedings of the 11th Conference on Computer-Generated Forces and Behavior Representation, Orlando, FL.257-266. <http://www.sandia.gov/cog.>

Project Title: Extensible Knowledge-Based Agents for Simulation An essential step in developing agent-based simulations for any application involves the representation of knowledge for the application domain. This project was undertaken with the objective to expand existing capabilities for human modeling and simulation to facilitate their application to new domain problems. Specifically, this project has emphasized the development of techniques for knowledge elicitation and modeling to support creation of individualized models of naturalistic decision making processes.

Forsythe, C. (2001). Toward a human emulator: A comprehensive representation of human cognition. Presentation at ATEDS/SA, March 13-15, San Diego CA. <http://www.sandia.gov/cog.systems/documents/ForsytheATEDS.pdf>

3 Procedures and Methodology

Thusfar I have written a survey program that prompts the user with various stimuli. I have limited the responses that the user can give to about 10 different colors. Currently I am working on storing the entire data for all users in an external file. It has been recommended to me that I use MySQL to store the data and during the second quarter I will look into that. Right now my entire program is written in Python, simply because I like the language and speed isn't an issue for this program.

By the end of the second quarter I hope to be able to produce visual maps representing the connections between groups or individuals. This map will be iterated over to determine the proper response from the computer.

To test the data, obviously I must conduct a large enough survey on a large enough population. Currently testing is on a bit by bit debugging basis. Once my program is ready and I have access to a large enough population, I will be able to statistically analyze the data as well determine whether or not my results are statistically viable.

To begin with, structural and functional testing will be implement to insure that the program is working properly. Later dynamic (user) testing will take place followed by process modeling to determine how accurate my results are.