Developing Scripts to Teach Social Skills:
Can the Crowd Assist the Author?

Fatima A. Boujarwah, Jennifer G. Kim, Gregory D. Abowd, Rosa I. Arriaga

School of Interactive Computing, Georgia Institute of Technology

85 5th St NW, Atlanta, GA, 30308

{fatima, jenn.kim, abowd, arriaga}@gatech.edu

Abstract

The social world that most of us navigate effortlessly can prove to be a perplexing and disconcerting place for individuals with autism. Currently there are no models to assist non-expert authors as they create customized social script-based instructional modules for a particular child. We describe an approach to using human computation to develop complex models of social scripts for a plethora of complex and interesting social scenarios, possible obstacles that may arise in those scenarios, and potential solutions to those obstacles. Human input is the natural way to build these models, and in so doing create valuable assistance for those trying to navigate the intricacies of a social life.

Introduction

How do people know the appropriate ways of behaving in different situations? Schank and Abelson present the notion that we develop scripts, or event sequences, which enable us to subconsciously know what to expect [6]. These scripts contain multiple contingencies. Research has shown that most people develop these scripts early in childhood, but that children with autism generally generate fewer well-organized scripts [7].

Autism is a phenomenon that encompasses individuals with a wide range of needs and abilities [1]. Difficulties in social skills, however, are generally considered defining characteristics of autism [3]. Difficulties in social skills interfere with the educational experiences and quality of life of individuals with autism, and interventions must be individualized to be effective.

We are interested in exploring how technology may help individuals with autism learn a wide variety of flexible social scripts. In earlier research, instructional modules were developed to help an individual with autism prepare for a particular social context by presenting them with a social situation in which an unexpected obstacle arises, and guiding them through the process of overcoming the obstacle [2]. Everyday life consists of many complex social situations within which a wide variety of obstacles may arise, and each of these obstacles can be overcome in a number of ways. The software modules were effective, but they were manually authored and required much effort to design. Since our goal is to empower parents and educators to create these modules, it is important to consider how to accelerate this authoring process.

We describe an approach to exploit human computation to develop complex models of social scripts. These models will be used to provide suggestions to non-expert authors as they create customized social script-based instructional modules for a particular child. Such a tool would address one of the most challenging aspects of teaching students with autism; the need for individualized instruction for a highly heterogeneous population.

Eliciting Social Scripts

We have developed an approach to creating the social scripts models automatically. Three types of data are desired; steps to complete the task, obstacles that may arise, and solutions to those obstacles. The goal is to use this data to create models of everyday tasks in a manner similar to Orkin and Roy's [5] *Collective Artificial Intelligence*. The data collected will be analyzed to develop a model similar to a *Plan Network* that shows probabilistically how events follow each other and all the ways in which an everyday experience can unfold.

A 6-phase process will be used to enable the collection and classification of this data (Fig. 1). The author will be

asked to specify the location and task or activity they would like to create a story about (e.g. attending a concert at a theatre), where they would like the story to start (e.g.

Figure 1. Proposed 6-phase model for automatically creating the model.
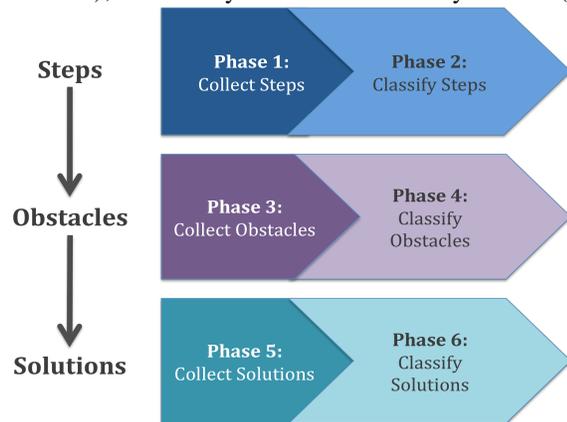
at home etc.) and where they would like the story to end (e.g. when the show ends). We will automate the transitions between phases and iterations using Turkit [4].

To explore the validity of this approach, we conducted 2 studies. The first addressed the data collection parts of the phases, and the second used Mechanical Turk to perform the classification. In the first study, we asked participants to describe the steps they take to complete everyday tasks, namely, going to a restaurant and going to a movie. We also asked participants what could go wrong at each step.

We began by manually analyzing the collected data with the goal of using it to create a model for each social script, restaurant and movie. Using the restaurant data (n= 38), we manually created a model representing the probability with which steps follow each other. We began by classifying the steps. We then used the classified steps to create a graph with weighted directed edges. Each node was a class of step, and the weight of each edge indicated the probability that the steps followed each other in the script.

We then mapped the classified steps to all the obstacles that were provided for that step. These obstacles were then classified in the same way the steps were, to ensure that statements depicting the same obstacle were consolidated. This new set of data was connected to each node. The resulting graph showed that a rich description of possible restaurant event sequences could be achieved. The information in this graph would provide useful suggestions for the author, and help keep the author on track by logging the nodes or the steps that have already been included in the scenario, and the ones that remain to be added.

We decided to use Mechanical Turk to classify the movie data. We selected all the verbs in the data, and collected the steps for those that appeared most often. Verbs that were synonyms were combined (e.g. pay, buy and purchase). In this way we were able to gather steps that were similar. We then created a HIT on Mechanical Turk for each group of steps that asked workers which of the steps represented the same action. Three HITs were

created one each for the 3 verbs or verb combinations that appeared most often in the data. Workers were paid $0.05 for each task, and 20 unique responses were requested.

We were able to conclude that in the data from 2 of the 3 HITs, choosing the steps that received at least 10 votes (or that at least half of the workers selected) enabled good classification of the provided steps. Workers were also asked to provide a phrase that they believe accurately described the action. We ranked the phrases in terms of frequency of occurrence, and chose the highest-ranking phrase as the label for the class.

Conclusion

The social world that most of us navigate effortlessly can prove to be a perplexing and disconcerting place for individuals with autism. We describe an approach to using human computation to develop models of social scripts. If executed effectively it could enable the creation of models for a plethora of complex and interesting social scenarios, possible obstacles that may arise in those scenarios, and potential solutions to those obstacles. We believe that human input is the natural way to build these models, and in so doing create valuable assistance for those trying to navigate the intricacies of a social life.

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