EMO20Q Questioner Agent

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Abstract. In this demonstration, we present an implementation of an emotion twenty questions (EMO20Q) questioner agent. The ubiquitous twenty questions game is a suitable format to study how people describe emotions and designing a computer agent to learn and reason about abstract emotion concepts can provide further theoretical insights. While natural language poses many challenges for the computer in human-computer interaction, the accessibility of natural language has made it possible to acquire data of many players reasoning about emotions in human-human games. These data are used to automate a computer questioner agent that asks the user questions and, based on that user's answers, attempts to guess the emotion that the user has in mind.

Keywords: dialog agents, emotions.

1 Proposed System

Emotion Twenty Questions (EMO20Q) is a variation on the traditional twenty questions game where emotions are the objects that must be guessed, instead of any arbitrary objects. It is an asymmetrical game whose players take one of two roles, questioner or answerer. For a complete discussion of the rules and intricacies of the *Emotion Twenty Questions* game please see [1], also presented at ACII. Although, with respect to the general twenty questions game, the search space of objects in EMO20Q is limited, emotions add a level of subjectivity to the game that makes it challenging for human and computer players alike.

Our objective is to study the human capabilities of describing emotions using natural language. EMO20Q provides an experimental method to observe this in a loosely controlled way [1]. We view computational modeling and simulation as an extention of our observational analysis. To this end, we use observational data derived from human-human EMO20Q games to inform the abilities of an automated agent which, in this case, plays the questioner role. The key issues that we aim to observe and model are: natural language descriptions of emotions, cooperative and competitive dialog interaction, intersubjectivity, inference with incomplete knowledge, and representations of uncertainty.

2   Technical Content

The natural language data obtained from human-human emotion twenty ques-
tion games can be viewed as a bipartite graph in which questions and answers
are connected by positive and negative edges, where $+1$ corresponds to a "yes"
answer, -1 to a "no" answer, and 0 for indefinite or unseen answers to ques-
tion/emotion pairs. In this formulation there are a number of possible ways
that an agent could ask the questions and consequently attempt to guess the
contemplated emotion.

Firstly, appropriate questions must be asked. In terms of an agent, this re-
quires that the observed questions are ranked in some way such that they are
able to help traverse the graph and discover the desired emotion. There are
many way the problem of choosing appropriate questions could be approached:
choosing at random, using spectral graph theory, using an information theoretic
approach (e.g., choose the questions that provide maximal mutual information).
Clearly a reasonable automated agent should do better than choosing at ran-
dom. Of the latter two options mentioned, maximizing the mutual information
between question was chosen in order to rank the questions such that the ones
asked by the agent provide valuable information about the most emotions while
also not offering redundant information.

Secondly, when information is obtained from the human user, in the form of
answers to the questions the agent must use this information to ascertain the
concealed emotion. Because of the sparse nature of this dataset (currently we
have 42 emotions, 431 question types, and 644 question asking events), it is
crucial that the agent is able to do some inference based upon the answers it
receives and it's prior knowledge.

3   Evaluation

We are in the process of collecting data that will help characterize the agent's
performance. Our initial experiments show that such an agent is feasible. The
method we employ to choose the questions uses actual user input, so individual
questions are very realistic, but the ordering of the questions is less natural. Our
next efforts will be to try graph-based models of inference, which we think may
be more human-like.

4   Resources

Our demo can be accessed at http://sail.usc.edu/emo20q/questioner/questioner.
cgi. We endeavor to make our data and methodologies accessible to the commu-
nity. These can be found at http://sail.usc.edu/emo20q/repos.html.

Reference

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