**Chatbots playing games – master thesis (preparatory work)**

Akira BAES **-** [akirbaes@ulb.ac.be](mailto:akirbaes@ulb.ac.be) - 09/03/2018

**Result from first meeting with Tom LENAERTS and Elías FERNÁNDEZ on 06/03/2018**

**General direction**

In the context of playing game theory games, there is the idea of creating an agent to play a game and send the agent to play for us remotely.

A chatbot could intervene in three diferent areas of that idea:

a) Creating the game

b) Creating the agent

c) Playing the game

a) Creating the game could go from:

1. (« Game master » admin tasks unrelated to the game itself but for interface like creating a room, inviting people… [choice parsing interface])
2. Human selecting one existing social game by name and giving its parameters [choice parsing interface]
3. Human describing rules and constraints of a new type of game [rules parsing interface + understanding of rules]

b) Creating an agent could go from:

1. Player inputing preferences into an existing agent [pameters parsing interfaces based on game type]
2. Player describe the game to the agent and have it understand them and make propositions [rules parsing interface + understanding of rules]
3. Player express strategies for the game (guesses on the adversary's preferences etc.), with the bot reacting in case of trivial result [parsing of strategies + understanding of game theory]

c) For playing the game it is not always possible to use a chatbot but depending on the type of the game, the chatbot could:

1. Ask its player how to adapt the strategy between rounds on round-based games [interface]
2. Counsel the player on how to adapt the strategy [game theory]
3. Negotiate verbally against another player based on the strategy given to it [game theory + negotiation theory]

There is also the idea of having it work orally rather than textually (voice recognition and generation), or having it go trough a specific system (amazon echo…), making the human interface the most natural possible.

**Tasks**

The primary task of the chatbot is to provide an interface to the underlying system. (a.1, a.2, b.1)

The usual way to do that would be to write many lines of rules for a chatbot doing the required tasks in one of the modern chat scripting langages.

There is a second layer where the chatbot is capable of understanding and recognise simple rules of game theory and arrange them in a way that makes them useable by a game theory AI. (a.3, b.2)

Understanding player preferences and strategies in a natural-sounding way would be also interesting. (b.3, c.1, c.2)

Having a game theory AI be able to output its results in a chatbot is also part of it. (b.3, c.2)

There is a third layer where the chatbot is negotiating with a player to try to convince them of something. This is highly game-dependent but could also be interesting. (c.3)

My primary task for the preparation would be to learn and report on the state-of-the-art of chatbot AI to provide a basic interface of a game-playing system. (a.1, a.2, b.1)

My further task would be to translate game logic to something that a chatbot can manipulate. (a.3, b.2, b.3, c.1, c.2) Either by using an overrarching « game logic langage », or limiting the chatbot to a few select games genres.

**Overall academic motivations:**

Having an interface that can help in making social game experiments

Study the concept of remote agent for such games

Having a base for more complex game playing AI (negotiation)

**My preferences/personnal motivations:**

I want to learn more on how to create a chat bot

(for the far end that could be used as characters in a videogame mixing chat and action)

so the chatbot implementation part is interesting.

Making it interface with a voice-to-text, then a physical machine seems more daunting.

I feel slightly interested in the concept of how to generalise mathematical games and how to describe it to a AI trough a set of rules.

I would be a bit disappointed if my work on chatbots finally only served as a simple « interface » for interacting with an underlying logic (no real plus-value of using a chatbot instead of a GUI for example).

I feel interested in working with games theory games to play that are more complex than the prisonner's dilemma.

Example: a game where you select a subset of items you want from a list, based on your secret preferences and strategy, while another player will have their own subset. Negotiation on how to change the subsets ensue.

**Directions to dig in:**

Modern Chatbot scripting langages. AIML, ChatScript, Riverscript seems favored in the amateur world.

In the professional world, premade packages with simplified interfaces seems more favored.

For academic purposes, I should probably favor a scripting langage with total control.

The first thing to do is to measure faisability with the different technologies.

Look at a few other service chatbots that would be similar, and review their implementations. This will also serve as a state-of-the-art.

**Direction to look at after:**

Game theory and compact strategies that work on few data

Maybe: Negotiation theory

**Directions that were interesting but not directly related:**

Knowledge representation (Cyc, Wordnet) might not be necessary in this scope

Creating new types of games for chatbots to play (more adapted for chatbots than usual games)

Making the chatbot produce voice sound, interface the chatbot with different sites

Automatic or efficient content generation (writing the rules by hand is time-consuming)

**Directions to avoid:**

Advanced Natural Language Processing techniques (we mostly want simple commands)

Conversation bots like Cleverbot, Microsoft TAY that work on saving many answers

Deep neural network AI like Deepmind's Alpha Go Zero and other bot-vs-bot games