Embodied Conversational Agent for Emotional Recognition Training

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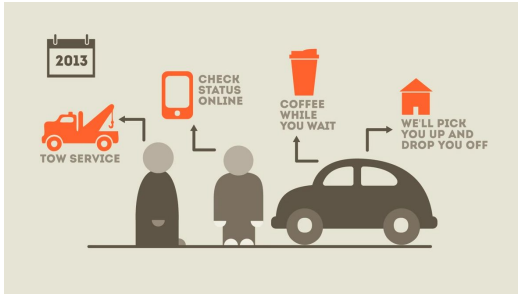
Resume of the presenter

Karl Daher - PhD candidate at the University of Fribourg in collaboration with the HumanTech institute from the University of Applied Sciences and Arts Western Switzerland. Co-creator of Empathic Labs. Main interest is empathy in human computer interaction and the application of empathy in real-world scenarios to improve human mental and physical well-being. Other interests: technology, innovation, development, conceptualization and collaborations.

HumanTech Institute Research Interest

- Technology for human well-being
- Smart Societies
- Advanced Interfaces and smart spaces
- Information management and intelligent data analysis
- Product and service design



Conversational Agents and Avatars

1997 - Gandalf a simple conversational virtual humanoid with hand and face [1]

1997 - Real Estate Agent (Rea) share information from a database [2]

Emotional avatars have been lately an important matter in the research world.

Empathy

https://www.psy.lmu.de/exp/bilder/web_bilder_m/oswald.jpg

- Father of the scientific theory: **Theodor Lipps - 1903** [3]

Empathy = “in-feeling” or “feeling into”

- 43 Distinct definitions for empathy!! [4]
- ”It is an interaction between two individuals who share each other’s experiences and feelings” - **Seïler & Craig 2016** [5]

Emotions

Everyone knows what emotion is until asked to give a definition! – Fehr and Russell

Ekman's six basic emotions model [6]:

Anger Disgust Fear Happiness Sadness Surprise

Empathy types

Affective and Cognitive[7]:

Affective empathy: recognize another person's emotion and respond emotionally to it

Cognitive empathy: understand another person's feelings by taking their perspective

Will empathy one day exist in Chatbots? Under which form?

Types of empathic responses

Evaluating empathic responses by Seehausen et al. (2016) [8]

Both cognitive and affective empathic response have a positive effect

- Emotion mirroring
- **Supportive responses** are more common than emotion mirroring
- Paraphrasing can be good for showing cognitive empathy

Emotion Recognition Training Applications

From the small screen to the big world: mobile apps for teaching real-world face recognition to children with autism (Sung et al., 2015) [9]

- Autimo
- CopyMe
- Emotions 2

Avatars, Empathy and Emotions

Newest avatars starting to include emotions and empathic behavior

2003 - Beun, DeVos and Witteman, showed that conversational agents can be more efficient as a tutor instead of simple chatbot [11]

2005- An empathic companion to assist the user in the setting of a virtual job interview [12]

2005- Greta, a virtual talking head capable of conducting social conversations. Utilise factors like personality, culture, emotions, and age. [10]

Avatars, Empathy and Emotions

2012- Pedagogical agent uses mouse-clicking to interact with the avatar to motivate while reading [13]

2014- Samuela another avatar created to be part of the “home of the future” can respond to questions and expected to have human behaviour [14]

Facial expression, body language, voice and text are the major interaction components.

In our prototype we will be taking into consideration facial expression, body language and text to teach cognitive empathy where the user will need to share and understand ACERs feelings

Drawbacks and Challenges

- Shortage in quality training data
- Randomization of the training data
- Multicultural - Multilingual traning datasets
- Balance between emotions dataset : A lot of happy and shortage in disgust
- Content level responses, especially on emotional type.
- Modelling emotions throughout conversations

Concept

A chatbot called ACER

Anthropomorphic Chatbot for Emotion Recognition (ACER)

Have a conversation with him and guess his emotions!

Prototype Architecture

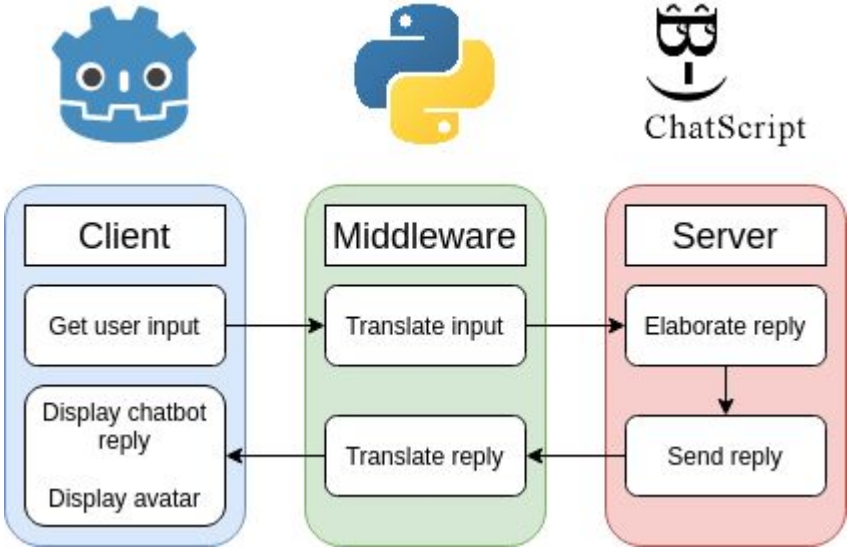
Linux operating system

Local server to host the chatbot

Client middleware to communicate between server and client

TCP for communication

Server Chatscript engine: Host the chatbot



Features

Embodied chatbot

Textual interaction with the user

Body language to reflect the emotion transmitting

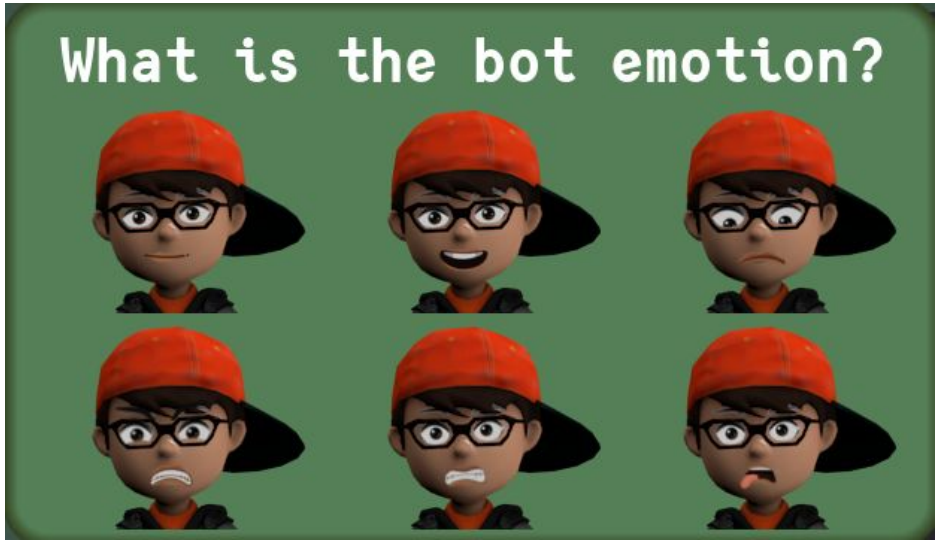
Facial expressions for the emotion recognition quizz

ACER


Score: 0/0
bot: Hi! Welcome!
you: Hi
bot: I'm Acer! What's your name?
you: My name is Zeno
bot: Nice to meet you Zeno! What do you want to talk about?
I'd like to talk about chatbo

Experimenting with users

- 20 users
- between 21 and 30 years old (to evaluate the first prototype)
- experiment via video conferencing software (due to pandemic and lockdown)
- 5 minutes with two different modes (only chat, and with emotion recognition)
- qualitative and quantitative analysis



Results

Qualitative Analysis

Sentence to agree with	No Avatar	Avatar
Learning from ACER has a positive effect.	35%	90%
The interaction with ACER is natural.	55%	80%
ACER has personality.	35%	95%
ACER looks clever and competent.	35%	75%
ACER is boring.	50%	5%
ACER looks emotionless.	75%	20%

Quantitative Analysis

- meCue 2.0 questionnaire (part 3)
- 2.0/5 for the text-based only version, 2.9/5 for the embodied ACER

Conclusion

Avatars are becoming an important research topic, and being included in our everyday's life.

Empathy is an important factor in the human interaction as well now with machines.

Empathic avatars that can express emotions through verbal and non verbal communication are a must.

ACER is an easy to use and understand virtual avatar that can have a positive effects on the human machine interaction.

Future work

- Having a bigger human sample testers
- Testing the avatar on kids to observe and analyse the modifications to be made
- Develop chatbot conversational skills
- Speech synthesis
- Speech recognition
- Use a real 3D model for the avatar for virtual reality to enhance interaction
- Include more type of quizzes and games

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