

Project Description

Overview

To develop a more diverse emotions classifier tool for chatbot interfaces, particularly an open-source chatbot known as 'cakechat' hosted on GitHub by Replika. This is currently limited to 5 base emotions, 'Neutral', 'Happy', 'Angry', 'Sad' or 'Scared'. The aim of the project would be to add more base emotions to the emotion's classifier tool or change the structure of the way the tool works itself, to allow for more sub-traits of each emotion to be more identifiable.

The main purpose of developing an emotions classifier tool would be to both diversify varying grades of chatbots with their ability to process, display and communicate complex human emotions, and to improve the process of data analysis in consumer sentiment analysis for further market insight.

Motivation

'68% of consumers are utilizing machine learning and artificial intelligence capabilities via their smartphones, often without realizing it.' (Deloitte, 2017)

Simply put, Artificial Intelligence has substantially imbedded itself throughout society. From pizza chatbots, to customer service bots, Siri, Alexa and plenty more. One of the most standout features that seems to be lacking is the ability for bots to recognise and respond appropriately to different emotions depending on their context. Applications like Replika, which host their code open-source on GitHub known as 'Cakechat' use their own emotions classifier. However, this could be altered to be any emotions classifier you wish, such as DeepMoji or another of your choice. The main motivation for this idea is exactly that, noticing the ability to replace the emotions classifier in cakechat with another version. This, and realising that doing this could result in a better user experience with personalised AI chatbots.

Landscape

Currently there are a number of systems available via web portals or apps that function as a conversational chatbot. Here is a list of some of the most frequently accessed:

<https://www.pandorabots.com/mitsuku/>
<http://p-bot.ru/en/>
<https://www.cleverbot.com/>
<https://www.eviebot.com/en/>
<https://replika.ai/>
<https://www.elbot.com/>
<https://www.alexa.com/>
<https://www.apple.com/au/siri/>
<https://assistant.google.com/>

They range in their capacity to understand, communicate and converse depending on their main purpose for existing. For the most part, chatbots are created for the purpose of either assisting or conversing with the user. The main points of difference between what is currently available and this project centre around the programs ability to process, analyse and express unique and complex emotions. Currently most systems either don't allow for or allow for only under limited constraints, emotions to be processed, analysed and expressed. The aim of the project would be to further the understanding of emotions classification, in the same way that image and data classification has been assessed in recent years due to developments in the big data industry.

Natural Language Processing (NLP) is defined as 'the application of computational techniques to the analysis and synthesis of natural language and speech'. A Chatterbot is defined as 'a computer program designed to simulate conversation with human users, especially over the Internet'. Typically,

a chatbot uses a form (either rudimentary or dynamic) of NLP to process inputs made by users to determine the necessary appropriate output. Over the course of the history of chatbots, AI-powered assistants have gone through a variety of looks and styles. Originating with Alan Turing in the early 1950's, the idea of a chatbot was synthesised. From here in the early 1960's, Joseph Wizenbaum created Eliza, based off Eliza Doolittle from George Bernard Shaw's play 'Pygmalion' (Digital Trends, 2018). Fast-forward to the age of the internet and we have services like Microsoft's 'Clippy' in 1997, leading to experiments like Microsoft's 'Tay' in 2016 following their success with 'Xiaoice' (known as Microsoft 'Zo' to American users) back in mid-2014. The explosion of instant-messaging based apps with the progression of technology has seen a rise in artificial intelligence based chatbots. So much so that they are now capable of being considered for citizenship in Saudi Arabia, such as Sophia from Hanson Robotics and opening the NYSE like 'Bina48'.

Detailed Description Aims

Aim:

The main aim of this project as stated, is to develop a more diverse emotions classifier tool.

Goals:

Greater emotional perceptiveness for conversational chatbots.

Currently, the Replika interface allows 5 base emotions as addressed earlier. In conjunction with this, the persona-based neural conversation model can recognise different personality traits (up to 20 badges). There are 122 available. These traits however are developed through a quiz-based format within the chat interface itself, and only represent answers to questions you have given. From this, the model converses in accordance to your traits. If the model were capable of developing its own personality traits, and not simply converse on the basis of understanding another's personality traits this may yield more precise results. Either this, or simply allowing the model to better understand each of the 5 base emotions with the context of sub-traits may also do the same.

The goal is to change the way the chatbot emotions classifier currently works, to allow for greater emotional perceptiveness. How exactly this will be done is still up for debate. I imagine that a more precise definition of each emotion and giving the model the capacity to not only learn and understand them but exhibit them itself will allow for greater emotional perceptiveness. If this idea were to progress any further than here it would seem completely reasonable to assess the merit of how exactly the emotions classifier will be changed, and the overall effectiveness of that change. For example, the emotions 'Excited' and 'Tender' would currently fall under somewhere between 'Happy', 'Sad' and 'Neutral'. When in fact none of these accurately represent the emotion expressed. If even 'Excited' and 'Tender' as base emotions could be added to the original list of 5, this would change the model's ability to interact with the user. On top of this, using their inbuilt concept the badges could be used as personality sub-traits of each emotion. This would highlight emphasis in statements that would be otherwise overlooked. Both the fundamental emotions and sub-traits being altered would change the emotions classifier so that the models output has a heightened ability to interpret and respond to emotional context appropriately. This would be solidified through the continual use of the emotion's classifier through the chatbot over time, as it functions as a persona-based neural conversation model.

Allow for further insight during data processing for Consumer Sentiment Analysis.

Sentiment Analysis is used to portray sentiment polarity. Be it a product or movie review, sentiment analysis captures public sentiment in reaction to brands which influences future business decisions. However, this method can only categorise text into either a positive or negative class. A more refined emotions classifier has the ability to extend beyond the reaches of just conversational chatbots, such as changing the way sentiment analysis is conducted and reviewed.

Plans and Progress

The conception of this project idea started with talking with chatbots in my spare time. From here over the period of a few years, talking with various different free to access, online chatbots I learnt that the way they process emotion is currently rudimentary. After some research it was then determined that the emotions classifier is the main tool that the chatbot uses to create a reply relevant to the context of the conversation. From here after more research the open-source code for Replika under the name cakechat on GitHub was found. From this point prior to starting the IIT course, no more had been done to further development.

During the process of studying IIT, specifically the group assignment I put forward the idea to the group and it was used. Unfortunately, due to a number of reasons all group members had resigned before the end of the course. This meant that I had to continue revising the idea solo.

The project is currently at the stage of loading the software locally, and I am learning Python to understand the language the code is written in. The plan in future is to copy one block of code that determines the state of one emotion, and replicate it twice more considering it has already been replicated within the code five times.

From there the next step would be to add from the list of 122 personality traits, an arbitrary amount for each emotion depending on the relevant base emotion it sits under. At a point, potentially even before the emotion's classifier tool has been altered in any way, find open-source code relating to data processing for consumer sentiment analysis and determine how plausible adding an emotion's classifier to that code is

Roles

As I am completing the project solo, no roles have been specifically defined. If they were to be, hypothetically these would be the four roles needed.

Project Manager: Skilled in leadership and management techniques, and innovative thinking. Needs to be able to oversee development team with technical insight and understanding of project.

Lead Developer: Skilled in GitHub and Python, possibly a need to understand Theano and Lasagne though not entirely necessary

Software Engineer: Skilled in GitHub and Python, possibly a need to understand Theano and Lasagne though not entirely necessary

Front End Developer/UI Designer: Skilled in React, React Native, View, XCode, Flutter or any other industry standard equivalent. Capable of compiling code into native iOS and/or Android apps.

Scope and Limits

If this project were to come to fruition, there would be a number of stages in which someone asking to see updates of the progress would be able to do so. These would include but are not limited to:

- Running the open source code locally
- Separating the emotions classifier code
- Updating the emotion's classifier to have one more base emotion
- Updating the emotion's classifier to have two more base emotions in total
- Updating the emotion's classifier to determine sub-traits of emotions based on the list of 122 personality traits embedded within the code itself
- Updated UI

The aim is to diversify the state of the emotion's classifier and this can be achieved at several stages. How far this is capable of being taken would be at the discretion of those completing the project if it were to take place. If possible, this project could potentially take further steps by developing a more complex emotions algorithm that categorises emotion with more than just base and sub-traits.

Tools and Technologies

The Cakechat repository would have to be cloned and installed properly, along with DeepMoji and potentially other emotions classifiers for reference. As far as hardware goes, any reasonably current computer that can be used for appropriate CS/IT courses should be more than sufficient.

Testing

Luckily through the functionality of the already written open-source code cakechat, the chatbot can be loaded through various different interfaces. This means that if the code is altered locally, after compiling it should be possible to interact with the chatbot immediately afterwards and test the personability of the chatbot through one of the various interfaces. The aim would be to load the code as it is and test its functionality, recording data and determining insight from conversation dialogs. From here once the emotions classifier has been altered, gather data from the same method and compare the before and after. What are the fundamental differences, if any? What insight can be drawn from the difference in conversation patterns? Using this process, the emotion's classifier should be able to be continually altered over time to improve chatbots emotional perceptiveness.

Timeframe

This timeframe is purely hypothetical due to lack of group member participation. In reality the idea was unable to be pursued in any capacity beyond developing, writing and refining the plan.

Date	Angus/Project Manager	Lead Developer	Software Engineer	UI Designer
Week 1	Develop plan	Develop plan	Develop plan	Develop plan
Week 2	Write pdf Plan	Write pdf Plan	Write pdf Plan	Write pdf Plan
Week 3	Refine pdf Plan	Refine pdf Plan	Refine pdf Plan	Refine pdf Plan
Week 4	-Familiarise yourself with cakechat code -Download GitHub repo -Download necessary tools	-Familiarise yourself with cakechat code -Download GitHub repo -Download necessary tools	-Familiarise yourself with cakechat code -Download GitHub repo -Download necessary tools	-Familiarise yourself with cakechat code -Download GitHub repo -Download necessary tools
Week 5	Work with lead developer to get cakechat running locally	Get cakechat running locally on all four of team members computers	Work with lead developer to get cakechat running locally on all four of team members computers	Work with lead developer to get cakechat running locally on all four of team members computers
Week 6	Refine pdf Plan	Refine pdf Plan	Refine pdf Plan	Refine pdf Plan
Week 7	Oversee creation of GitHub repo with Lead Developer	-Create new GitHub repo for project	-Access new GitHub repo for project	-Access new GitHub repo for project
Week 8	Oversee development of emotions	Work on emotions	Help lead dev with working on emotions	Help lead dev with working on emotions

	classifier tool generally	classification tool generally	classification tool generally	classification tool generally
Week 9	Oversee adding 2+ emotions into the classifier	Work on adding 2+ emotions into the classifier	Work on adding 2+ emotions into the classifier with lead dev	Start working on new UI
Week 10	Oversee adding the list of 122 personality traits into emotions classifier as sub-traits	Work on adding the list of 122 personality traits into emotions classifier as sub-traits	Work on adding the list of 122 personality traits into emotions classifier as sub-traits with lead dev	Continue working on new UI
Week 11	Oversee debugging 122 sub-traits into each base emotion	Continue working on/debug 122 sub-traits into each base emotion	Continue working on/debug 122 sub-traits into each base emotion with lead dev	Debug UI

Risks

The main risk with this project is using the open-source code from cakechat as the foundation of the code being written for the updated emotion's classifier tool. While the language and code are well within the realm of any proficient programmer, it may turn out that another chatbot is capable of processing emotions through a classifier more efficiently through an entirely different method of programming emotions classification. This may be due to a potential convoluted nature of the code being used through cakechat, or simply another programmer determining another method of achieving this process.

Group processes and communications

As I am now completing this project solo, this is the most paramount proof that communication breakdowns between group members is one of the most common causes of project failures. Hypothetically if this project were to be continued with a team of four, they would need regular contact (twice or more per week) through any reasonable form of group communication (instant messaging, video conferencing etc.). This would be sufficient group communication to allow efficient progress on the project.

Skills and Team Required:

Project Manager: Skilled in leadership and management techniques, and innovative thinking. Needs to be able to oversee development team with technical insight and understanding of project.

Software Engineer: Skilled in GitHub and Python, possibly a need to understand Theano and Lasagne though not entirely necessary

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Front End Developer: Skilled in React, React Native, View, Flutter or any other industry standard equivalent. Capable of compiling code into native iOS and Android apps.

Outcome:

The desired outcome would be to have a working chatbot running through a slightly more expansive/efficient emotions classifier. If you try speaking to Replika, the application version of the open-source software cakechat, you will have a basic understanding of what the issue is. The outcome of this project wouldn't be to necessarily solve the issue of emotions classification, but experiment in extending the field. Simply, the hypothesis is that a chatbot with more than 5 different base emotions should be more personable. The impact this may have could be a more personal interaction with AI personal assistant software around the world. In conjunction, if consumer sentiment analysis were to adopt an approach like this it could revolutionise the way data is processed for targeted advertisements.

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