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Cognitive Chatbot

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Abstract: ***In this modern era of technology, chatbots are proving to be the most useful tool in the field of conversational services. Basically, a bot is a software application that is used to run automated tasks over the internet. Typically, bots perform tasks that are simple as well as structurally repetitive, at a rate that is much higher than would be possible for a human alone. The current situation of social media platforms is worsened by people by posting nasty comments or photos. To eliminate this issue, the idea of building the chatbot as a solution to this issues is what our project idea aims on. In our proposed system, chatbot is a virtual person who can effectively monitor human activities on social sites using, Natural Language Processing and Visual Recognition. In short, chatbot is another way of humans interacting with software. A chatbot can take decisions on its own as well. The following idea gives an overview of IBM Cloud based chatbot technology and how a chatbot can be cognitive as well.***

Keywords: Chatbot, Natural Language Processsing, Visual Recognition, IBM Cloud

1. Introduction

Recent success in the field of Natural Language Processing and Visual Recognition have proved out to be enhancing the technological field of chatbot very widely. The Visual Recognition technique uses deep learning algorithms for analyzing images. Natural Language Processing (NLP) is the way in which cognitive systems extract meaningful data out of plain text. NLP is a combination of art and science, and may seem difficult to test using automation. Rude behavior, angry or inappropriate messages, explicit images; all of these things are used daily on social media platforms. So it has become a necessity to filter out these issues. This can be done by building a chatbot that monitors messages and images. You can use this chatbot monitoring in a chat room like website or a slack that allows reviews, and it can remove inappropriate text or explicit images.A chatbot is an artificial intelligence software that can simulate a conversation with a user in natural language with the help of messaging applications, mobile apps, websites or through the telephone. A chatbot is described as one among the most advanced and promising expressions of interaction between machines and humans. However, from technological point of view, a chatbot only represents the natural evolution of a Question Answering system that uses Natural Language Processing (NLP).

2. Related Works

Our proposed idea is inspired by Dongkeon Lee-The ChatBot Feels You – A Counseling Service Using Emotional Response Generation[1]. This system understands the content of conversation based on recent natural language processing (NLP) methods with emotion recognition. It senses emotional flow through the continuous observation of conversation. Also, a personalized counseling response from user input is generated. To do this, use of additional constraints to generate a model for proper response generation is done which can detect conversational context, user emotions and expected reaction. Another inspiration is by Godson Michael D'silva-Real World Smart Chatbot for Customer Care using a Software as a Service (SaaS) Architecture[2]. In this system, a chatbot based on LUIS and cognitive services is used to analyze a customer's response and accordingly decide whether to respond or not. The ejabberd server handles the chatting part, the AWS web services analyse the messages to check whether any actionable message has come and the Chatbot acts as a customer representative to resolve the issues the customer has been facing. The main inspiration is by AM Rahman-Programming challenges of Chatbot: Current and Future Prospective[3]. Here, the author has mentioned many cloud based Chatbot services which are available for the development and improvement of the chatbot sector such as IBM Watson, Microsoft bot, AWS Lambda, Heroku and many others. In this system, the Intent classification module identifies the intent of user message. Structured bits of information from the message are extracted by the Entity recognition module. The candidate response generator does all the domain-specific calculations to process the user request. The response selector just scores all the response candidate and selects a response which works better for the user.

Inspired by these systems, our idea is to make a cognitive chatbot. This chatbot uses Artificial Intelligence features such as Natural Language Processing and Visual Recognition. When the chatbot recognizes any such word that is inappropriate to use while texting, the chatbot will recognize it and send a warning message to the user saying "Please be more polite". Similarly, in case of an explicit or unwanted image the chatbot will recognize the image as inappropriate or explicit and will automatically delete the image before it is delivered. IBM Watson Visual Recognition quickly and accurately tags, classifies and trains visual content using machine learning. IBM Watson Natural Language Understanding analyzes text to extract meta-data from content such as concepts, entities, keywords, categories, sentiment, emotion, relations, semantic roles, using natural language understanding. The bots enable conversations of users with apps in Slack by building bots.

3. Approach

We have created a chatbot using IBM Watson service and IBM Cloud Functions. We enhanced the chatbot using

Natural Language Understanding and Visual Recognition services provided by IBM Watson service, to detect rude and ugly messages and to identify and remove explicit images. Architecture of our proposed chatbot as shown below.

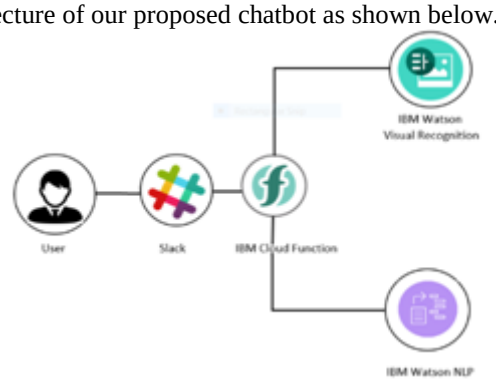

Figure 1: Architecture Diagram

3.1. Create Natural Language Processing and Visual Recognition service using IBM

3.1.1. Watson Visual Recognition:

The IBM Watson Visual Recognition service analyzes images scenes, objects, faces, and other content using deep learning algorithms. Visual Recognition understands the contents of images, analyzes images for scenes, objects, faces, colors, food, and other subjects that can give you insights into your visual content. There is a set of built-in models in Watson Visual Recognition that provides highly accurate results without training:

- General model — General Classifier categories
- Face model — Locate faces within an image, gender, and age.
- Explicit model (Beta) — Whether an image is inappropriate for general use.
- Food model (Beta) — Specifically for images of food items.

With a custom model, we can train the Watson Visual Recognition service to classify images to suit our needs (if it doesn't provide highly accurate results using the General/Face/Food/Explicit model available in Watson Visual Recognition service)

3.1.2 Watson Natural Language Understanding

Natural Language Understanding may be an assortment of API's that provide text analysis through linguistic communication process. This set of API's will analyze text to assist you perceive its ideas, entities, keywords, sentiment, and more. Additionally, you can create a custom model for some APIs to get specific results that are tailored to your domain. More precisely, Natural Language Understanding includes a set of text analytics features that you can use to extract meaning from unstructured data. We have created the above mentioned two IBM Watson services and saved the service credentials while creating those services. Later, we have used those services when creating a function.

3.2Slack App

Slack is a collaboration hub where conversations happen, decisions are made, and information is always available. Slack apps can customize functionality for our own workspace or build a bot to share with the world. It Provide your ingenious integrations with a suitably configurable container. Slack bots enable conversations between users and apps in Slack by building bots. A bot is a type of Slack App which is designed to interact with users via conversation. A bot is similar to regular app, it can access APIs as well as it can do things which Slack App can do.

We have created a slack app and installed it in our workspace. After the installation process, we have configured the slack app and noted down the verification token for further use in the function. We have then created the bot user and saved its OAuth Access Token for later use by the IBM cloud function.

3.3 IBM Cloud Function

IBM Cloud Functions is a functions-as-a-service(FaaS) programming platform for developing lightweight code that scalably executes on demand. IBM Cloud Functions provide access to the Apache OpenWhisk ecosystem in which anyone can contribute their action code in the form of building blocks to the expanding repository. IBM Cloud Functions accelerates application development, which enables developers to build apps quickly with action sequences that execute in response to our event-driven world. By offering easy access to IBM Watson APIs within the event-trigger-action workflow, IBM Cloud Functions, makes cognitive analysis of application data inherent to your workflows.

We deployed our own function in IBM Cloud Functions with all necessary credentials and created the Function's API. Using the API's URL, the slack communicates with the Function's API.

4. Result

The result of our proposed system is as follows:
If a rude message is sent, the bot will show up a message saying "please be more polite…". In case of images, normal image without any explicit(pornographic) content will be accepted whereas if an image is identified as explicit, it will be automatically deleted by the bot.

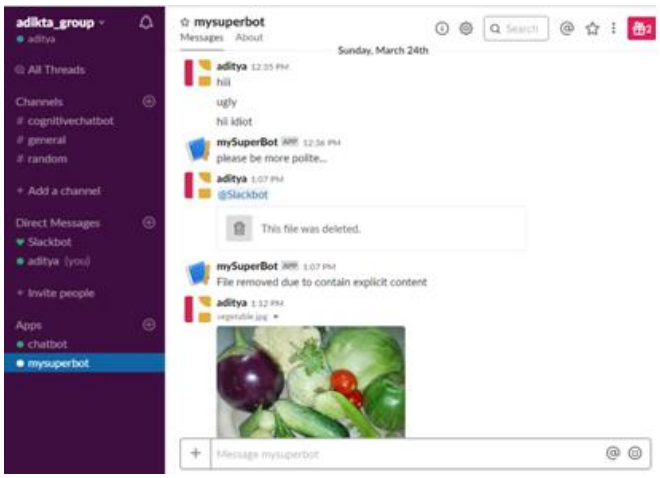

Figure 2: Response of chatbot on explicit image and text

5. Conclusion and Future Work

In our system, the user interacts from the Slack app and either sends a text or uploads an image. The text or image is then passed on to an IBM function API by a bot. The API is a call to an IBM Function that categorizes the images or text based on the response of Watson Visual Recognition or Watson Natural Language Processing. Watson Visual Recognition categorizes the uploaded image by using default and explicit classifier. Watson Natural Language Processing categorizes the text, if text is sent as a part of slack communication. The IBM function then gets the response and if the text is not polite, a message is sent by the bot to the Slack user to be more polite using Slack post message API. Similarly, in case of images if the image used is explicit, the image will be deleted by the IBM function using Slack files delete API. Furthermore, it will be interesting to see how one can enhance the intelligence of chatbot that it can even detect and delete an explicit video.

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