

A Productive Chat Bot Replacing FAQ System Using Dialogflow

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Article Info

Volume 83

Page Number: 2631 - 2636

Publication Issue:

May - June 2020

Abstract:

Chatbots are very much human-like and provide a virtual assistance to solve our queries they offer a text and voice supported user interface, permitting the user to either type or speak and the response is provided through text format. Chatbots provide a wide range of services and functionality. This chatbot technology can be integrated with many platforms and web services using the Dialogflow built-in Integrations facility. This technology would not just answer the user's queries but also learn from the user and updates its database with new strategies. This is built using Google's Dialogflow, HCI (Human Computer Interaction) technology pedestal on NLC (Natural Language Conversations). This technology supports NLP (Natural Language Processing) engine to incorporate chat context like location, dialogue history and user preferences. This System would be very helpful to easily categorize and classify large amount of data. The user must put their query to the bot and can expect a reply in less than a sec. The system will use the Google's Natural language processing algorithm and is powered by Google's machine learning which can train the bot and provide suitable responses to the client. If the response is establish invalid, then several systems to announce the response as invalid can be included. Such type of invalid answers can be removed or customized by the admin of the system. The answers to the queries are made using the general pattern matching technique, user queries are split into different parts and then they undergo the predefined pattern set to produce the result.

Keywords: Chatbot, dialogflow, APIs, machine learning, Natural language processing, Google cloud platform

Article History

Article Received: 11August 2019

Revised: 18November 2019

Accepted: 23January 2020

Publication: 10May2020

I. Introduction

The computer program with the intention of simulates human dialogue through text chats and /or voice commands. Chatbot is short for chatterbox, which is an Artificial Intelligence (AI) feature that can be embedded and used through a few main messaging applications. These computer programs are often intended to persuasively simulate how a human would behave as a conversational partner, thereby passing the Turing test. Such chatbots are typically used in dialogue systems for various practical purposes including client service or information gaining. Chatbot statistics are shown in figure 1. The word Chatbot consists of two words

chat-meant for a conversation, bot – automated environment. Chatbots are the modern sources for gathering information, aiding, keep things organised and media of communication.

Bot-hosting platforms	Extending interactions	Bot directories	Payment SDKs	Bot-building tools
• Alexa • Echo • Cortana • Line • Android • Discord • Cisco Spark • Messages • Viber • Intercom • Google Allo • Twilio • SMS • Web	• Google Cloud • Watson Conversation • Alexa Voice • Luis.ai • MindMeld	• BotList • ChatBottle • Botwiki	• PayPal • Stripe	• Api.ai • Pandorabots • Chatfuel • Rebotify • Botkit • Gupshup • OnSequel • Flow XO • Botsify • BotMock • BotMan

Figure 1: Chatbot statistics

Bot-hosting platforms: The interface on which the conversation happens, there are several platforms irrespective of a platform made by Google, Amazon, Microsoft, Cisco, discord. Currently, I use Dialogflow as a hosting platform since it can be directly embedded right after developing the Bot in it.

Extending interactions: The interaction with the bot, in general, is either by text or voice. But it can be taken to another level by image or facial detection or essence of mood.

Bot directories: These directories are like play store of bots, they have all kinds of bots varying from food ordering to money transfers. It is basically a repository for developers to put their Bots.

Payment: payments and money transactions can be done using bots through UPI, just as we have an auto-pay option we can have suggestion or recommendation from bot to pay the amount.

Bot Building tools: There are many ways of building a bot for conversation, but I use Google's dialogflow since it has analytics features, Integrations to other platforms, uninterrupted hosting, Training data is very effective.

However, for the current purpose, A Chatbot for an Education institution will be built using Dialogflow. Its primary advantage is that it supports various APIs and SDKs for development. It was Google's product and freely available to use^[3]. It works on various platforms; we can provide queries in the text as well as a voice command. Dialogflow Agent will identify this query and pass to appropriate Dialogflow Intent, which may give a static reply or perform operations. And received data will display or play on your device. This system will be a web application as well as support by other messaging platforms which will provide answers to the queries of the users. All the queries to locate faculty, classrooms, offices, electric equipment, current and future activities, office or university calendar can be embedded and many other optional features can also be added in course of time.

The user will get the appropriate answers to the query made, if there is no answer in the database user can reach out to feedback section and send a request to admin regarding his query. By this system, students wouldn't have to go to any sort of helpdesk or FAQ sections^{[1] [2] [13]}. The source of help is right in their hands using mobile.

The system replies using an effective Graphical user interface or with existing applications which replicates as if a real person is talking to the user^[2]. The user can use it through their mobile or browser since it is platform independent and can be Integrated even to other social media platforms of the university so that user can reach out his help using official Facebook page, Official Slack, Official twitter handle, Skype, telegram and many more^{[2][5]}^[13]. The user can ask about the related activities such as dates of fests, sports days, special events, meetings, conferences, and other cultural activities^[1]^{[2] [13]}. This system helps the user to be updated with all activities. It is also capable of notifying users easily with the updates or the important notices which are to be reached to users instantly will be displayed by the bot whenever necessary^[1].

The answer to the query will be answered based on the knowledge base. The knowledge base consists of Intents, training phrases (which are frequently used queries), Entities, fulfilment requests, Responses^[4]. Easily speaking this converts the user's query into different parts and it classifies them into different keywords which should match up with existing intents and after matching the answer will be displayed as per knowledge parameters to the query^[6]. If the match is found, the relevant answer will be provided to the user or the system will respond you differently where natural language understanding comes in to respond you.

The working system can be classified in two ways:

1. **ADMIN:** - The knowledge base and its total privileges are under this body. Admin-control is responsible for updating, making changes, modifying, and adding datasets.

2. **USERS:** - The users are the beneficiary and reason for making this system. The queries are made by users and one additional feature is the bot not just answers users but also learns from the user's queries. The strategies of asking queries are always new in the real world. So, the system learns to understand and respond to request made.

The entire project will be hosted on a cloud platform. The response time to the queries of the user will depend upon the internet speed of the user.

II. Related Work

1. Siri from the Apple Inc uses natural language processing to listen and break the user's queries and produce results ^[3].
2. Alexa is a voice service from the Amazon Echo device. Alexa uses natural language processing algorithms for voice interaction ^[3]. Have the ability to making to-do lists, music playback, setting alarms, playing audio books, streaming podcasts, providing weather, traffic, and other real-time information ^[2].
3. Mitsuku uses a programming language called AIML to understand and respond to people. Her intelligence includes the ability to reason with specific objects. It was a two-time Loebner Prize winner in 2013 and 2016 as well as the 2015 runner-up ^{[3][11]}.
4. Artificial Linguistic Internet Computer Entity (ALICE) which is an award-winning open source natural language artificial intelligence chat robot which utilizes AIML (Artificial Intelligence Markup Language) to form responses to queries. Alicebot engine and AIML are freely available under the terms of the GNU (General Public License) used by GNU/Linux and thousands of other software projects). The A.L.I.C.E. project includes hundreds of contributors from around the world. This is the general Chabot available in the industry which can be used for various purposes. ^{[2][3][11]}.

III. Proposed System

First create an Agent that initializes the process of making a bot and giving description and name to a bot in figure 2 shown. Agents are finest explains as Natural Language Understanding (NLU) modules. All these information can be included in your product, APP, service and transform natural user requests into actionable data ^{[6][8]}.

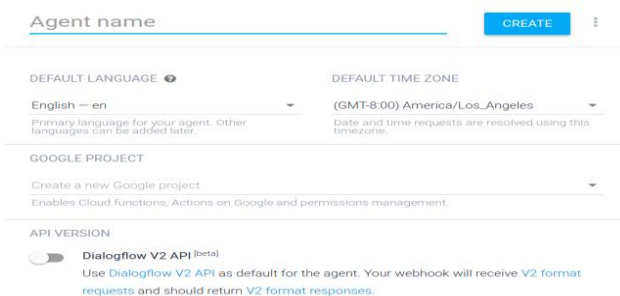


Figure 2: create an Agent at initializes the process of making a bot

Creating entities for corresponding intents that are made or to be made, each entity acts as a group which makes a bot to classify data easily. The Dialogflow agent needs to know what information is useful for answering the user's request. In figure 3 shown these pieces of data are called entities. Assume them to be dynamic variables.

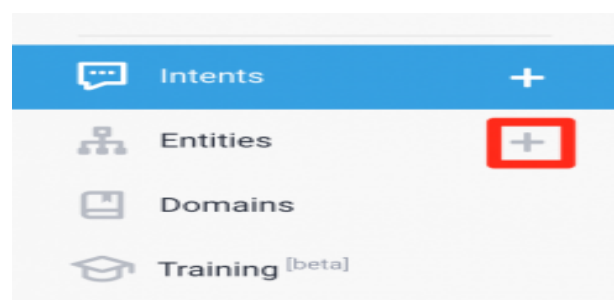


Figure 3: Creating entities for corresponding intents that are made or to be made

The main feature of a bot building service is to look at the words typed (or said) by the user and map it to a list of expected phrases ^[3]. This is called intent mapping.

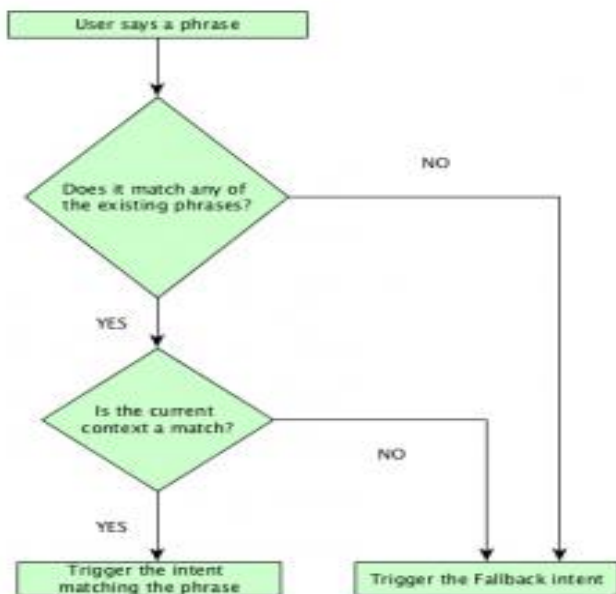
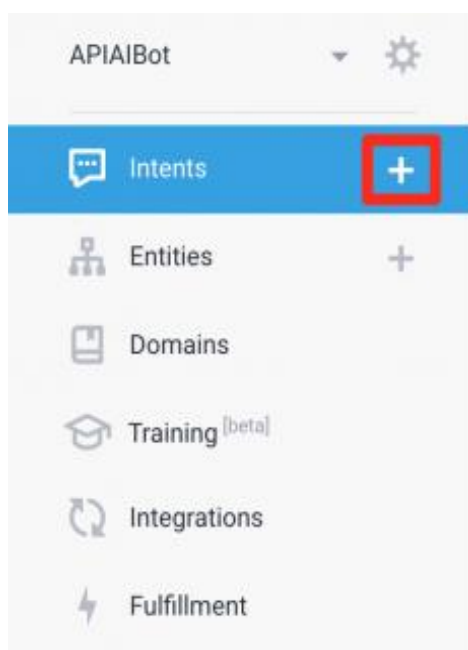


Figure 4: Dialogflow agent

Since the agent is fresh and of no knowledge base lets create a new intent and name it. You can also go ahead and add existing intents so that knowledge of the bot can be better. Whenever the user asks a question, it tries to match in corresponding Intent. In figure 4 Dialogflow, Intent houses elements and logic to parse information from the user and answer their requests. To understand the question better by intent we need to feed as much as data we can. The developer needs to think of different variations of the same question.



Action & parameters

send_message

REQUIRED	PARAMETER NAME	ENTITY	VALUE	IS LIST
☐	name	@sys.given-name	\$name	☐
☐	text	Enter entity	\$text	☐

+ New parameter

Figure 5a and 5b: Making a bot

An action corresponds to the step your application will take when a specific intent has been triggered by a user's input is shown in figure 5. In figure 5b represent an actions can have parameters for extracting information from user requests and will appear in the following format in a JSON response [6][8].

```

{
  "action": "action_name",
  "parameter_name": "parameter_value"
}
  
```

Parameters are elements generally used to connect words in a user's response, to entities.

In the Response section, you can add tabs for some of our supported integrations. This allows you to define a default or integration-specific responses. In each tab, you can add up to 10 of the same or different message types. The DEFAULT tab and the integration tabs offer different message types. The integration tabs allow you to add images, cards, and quick replies. Contexts represent the current context of a user's request. This is helpful for differentiating phrases which may be vague or have different meanings depending on the user's preferences, geographic location, the current page in an app, or the topic of conversation. If a user is listening to music and finds a band that catches their interest, they might say something like: "I want to hear more of them". As a developer, you can include the name

of the band in the context with the request, so that the agent can use it for other intents.

- Machine learning feature provides natural language understanding which updates INTENTS of ENTITIES ^[14].
- User feedback is easy and convenient.
- The bot can represent as a social entity to outside world.
- Statistics of the bot usage is available.
- The knowledge base can be easily updated, changed using the excel sheets.
- It is easier to scale the people's requirements by their feedback

IV. Results

As a part of the proposed chat bot for a university the following are the results/outputs that are taken from third party API telegram shown in figure a and b .

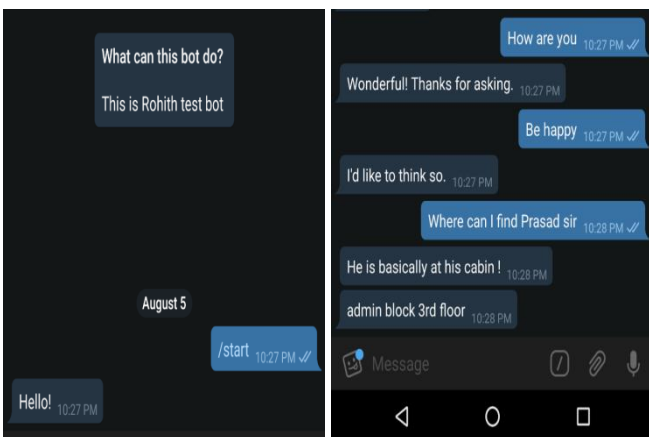


Figure 6a, 6b User A to User B Chatbot details

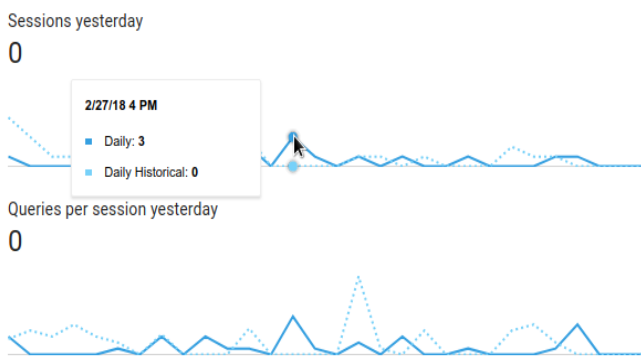


Figure 7 : Analysis report of bot usage

In figure 6a and 6b shown the complete bot with favoured results can be seen based on user's queries.

It also tends to understand the user's side of questioning. Intent creation, adaptation, and modification also take place automatically due to the concept of machine learning.

1.The analytics page gives your insight into how well your agent is performing, so you can work to further improve the user experience you're providing .It is shown in figure 7.

We show two types of data related to the agent and the conversations it's been a part of:

Usage data: The number of sessions and queries per session.

NLU data: Most frequently used intents and exit percentages.

2. Decide how much custom code you need Because you can often realize the limitations of a bot building platform such as API.AI and decide how much of the code you wish to move outside of the agent and into your custom code

3. Reverse engineering the agent to improve performance. This knowledge will also help you tweak some settings which are at your disposal. Machine Learning, which usually powers these Chatbot systems today, is something of a black box. But you can still reverse engineer a few things to improve the results.

In this system, we developed an intelligent and interactive Chatbot that would solve most of the frequently asked questions by the users of a certain system.

V. Conclusion

As per international survey on mobile applications usage, people tend to use <10 different applications per week. So, the introduction of Chatbots into all messaging platforms creates ease of things, consider ordering pizza from Chatbot, taking doctor's appointment. It is uninterrupted customer support. Help to automate fraud prevention process. This bot compatible on all platforms and can be integrated to other existing platforms using APIs.

VI. Future Scope

- Companies can utilise the Chatbot to receive feedback.
- IRCTC world's largest railway system is adding a service based Chatbot to its web UI to solve customers' queries.
- 24x7 stable services at almost zero costs, error-free.
- Accessing government portal data through Chatbots.
- Gathering information and emotions through face detection and pictures.
- An assistant for elderly people or people with medical aids.

References

1. Content-Oriented User Modelling for Personalized Response Ranking in Chatbots Bingquan Liu, Zhen Xu, Chengjie Sun, Baoxun Wang, Xiaolong Wang, Member, IEEE, Derek F. Wong, Senior Member, IEEE, and Min Zhang, Member, IEEE, DOI-10.1109/TASLP.2017.2763243.
2. Chatbot for University Related FAQs, 978-1-5090-6367-3/17 2017 IEEE, authors-Bhavika R. Ranoliya, Nidhi Raghuwanshi, and Sanjay Singh.
3. Survey on Chatbot Design Techniques in Speech Conversation Systems, Sameera A. Abdul-Kader, Dr John Woods, (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 6, No. 7, 2015
4. Automated FAQ Answering with Question-Specific Knowledge Representation for Web Self-Service-Eriks Sneiders, 978-1-4244-3960-7/09/ 2009 IEEE.
5. A New Chatbot for Customer Service on Social Media Anbang Xu, Zhe Liu, Yufan Guo, Vibha Sinha, Rama Akkiraju IBM Research – Almaden, CHI 2017, May 6–11, 2017, Denver, CO, USA.
6. Boosting a Rule-Based Chatbot Using Statistics and User Satisfaction Ratings Octavia Efraim¹, Vladislav Maraev, and Joao Rodrigues- A. Filchenkov et al. (Eds.): AINL 2017, CCIS 789, pp. 27–41, 2018.
7. Conversation Strategy of a Chatbot for Interactive Recommendations-Yuichiro Ikemoto¹, Varit Asawavetvutt, Kazuhiro Kuwabara, and Hung-Hsuan Huang- N. T. Nguyen et al. (Eds.): ACIIDS 2018, LNAI 10751, pp. 117–126, 2018.
8. The Necessity of New Paradigms in Measuring Human-Chatbot Interaction Leon Ciechanowski¹, Aleksandra Przegalinska, and Krzysztof Wegner. M. Hoffman (ed.), Advances in Cross-Cultural Decision Making, Advances in Intelligent Systems and Computing 610, DOI 10.1007/978-3-319-60747-4_19
9. Chatbot-based healthcare service with a knowledge base for cloud computing Kyungyong Chung, Roy C. Park - <https://doi.org/10.1007/s10586-018-2334-5>
10. Accessing Government Open Data Through Chatbots Simone Porreca, Francesco Leotta, Massimo Mecella, Stavros Vassos and Tiziana Catarci- https://doi.org/10.1007/978-3-319-74433-9_14
11. An Overview of Open-Source Chatbots Social Skills Agnese Augello, Manuel Gentile, and Frank Dignum- https://doi.org/10.1007/978-3-319-77547-0_18
12. Android Based Educational Chatbot for Visually Impaired People Naveen Kumar M, Linga Chandar P C, Venkatesh Prasad A, Sumangali K 978-1-5090-0612-0/16/2016 IEEE
13. College Enquiry Chat Bot, Pratik Salve, Vishruta Patil, Vyankatesh Gaikwad, Prof. Girish Wadhwa ISSN: 2321-8169 Volume: 5 Issue: 3, 463 – 466
14. Rich Short Text Conversation Using Semantic Key Controlled Sequence Generation Kai Yu, Zijian Zhao, Xueyang Wu, Hongtao Lin and Xuan Liu - 2018 IEEE.
15. Software Bots, Carlene Lebeuf, Margaret-Anne Storey, and Alexey Zagalsky -0740-7459/18/\$33.00 © 2018 IEEE