

# An Analysis on the Present and Future of Chatbots

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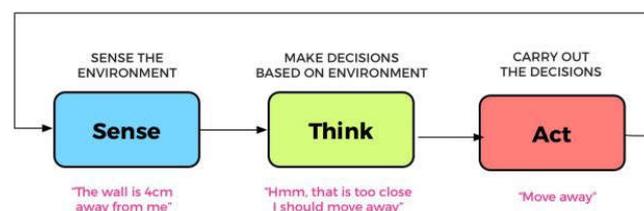
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**Abstract** - With the increase in messaging applications in the modern world, the evolution of chatbots, also referred to as chatter robots seem to have revolutionized not only the industrial sectors but also the lives of common people to a great extent. A chatbot is a computer program which performs all the tasks required by humans by applying Artificial Intelligence techniques like Natural Language Processing (NLP), Natural Language Understanding (NLU) and Natural Language Generation (NLG). For the chatbot to understand the query/request posted by the user, a technique called pattern-matching is employed. Structured Query Language (SQL) is used for pattern matching. The data to respond to the user request is made available through the chatbots databases. Artificial Intelligence Markup Language (AIML) [9] is used to build a bot which communicates with humans. This paper gives an overview of conversational chatbots in the new era of technological advancements.

**Keywords** – Chatter robots, AIML, Artificial Intelligence, Pattern-matching, Neural networks

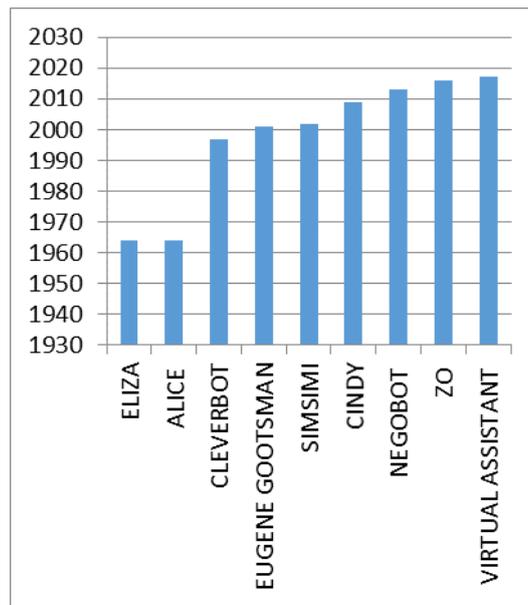
## I. INTRODUCTION

A chatbot [1] is a conversational agent which communicates with humans to respond with the best possible result from its knowledge database. [11] The response to a particular request is made by matching the user input with the stored data in the database through pattern matching technique. Initially, the user request is analyzed for any matching patterns in the chatbot's knowledge database. If the requested input sentence is not matched with the available data, then the database is to be remodelled for best results.



Phases of recognition by a Chatbot

With advancement in Artificial Intelligence, we are totally stepping into the era of chatbots. Chatbots use the three techniques, Sense - Think - Act, to understand the communication made by humans. It listens to the messages sent by the user. The messages sent are then searched in the database to find matched patterns and finally produces the required response to the user.



Emergence of chatbots [13]

## II. AIML

AIML [9] stands for Artificial Intelligence Modelling Language. It is used to build natural language software agents. AIML is easily configurable, cost efficient and can be effectively used in a variety of applications. The most popular chatbot based on AIML is the ALICE chatbot. The main process involved in creation of chatbots is pattern-matching.

### ***AIML CATEGORIES***

There are three categories in AIML[8]

- 1.Atomic categories
- 2.Default categories
- 3.Recursive categories

#### *Atomic categories*

It does not contain any wildcard symbols, \_ and \* .

Example:

```

<category>
<pattern>How are you</pattern>
<template>I am fine </template>
</category>
```

#### ***Default Categories***

It contains wildcard symbols, \_ and \*.

Example

```

    <category>
    <pattern>5*</pattern>
    <template>It is Five </template>
    </category>

    User: 5 days
    Chatbot: It is Five
    
```

**Recursive Categories**

This category contains template with <sr> and <sr> tags.

<sr> - simply recursive artificial intelligence

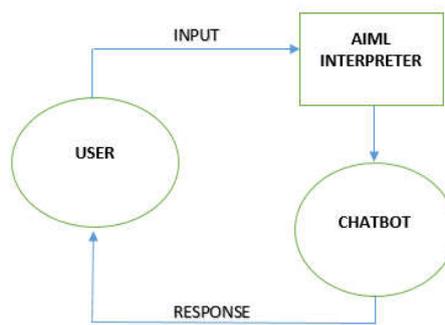
<sr> - symbolic reduction

Example

```

    <category>
    <pattern>HALO</pattern>
    <template><sr>Hello</sr></template>
    </category>
    
```

The input is mapped to another form, which has the same meaning.



Working of a Chatbot

**III. CHATBOTS - ANALYSIS**

*Types of chatbots*

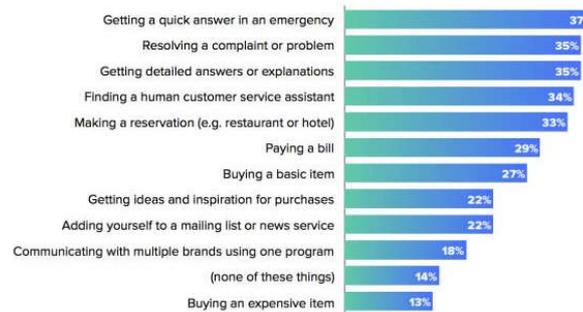
The different types of chatbots are:

- Flow Chatbots
- AI Chatbots
- Hybrids
- One-way AI Bots
- Two-way AI Bots

Many chatbots are becoming increasingly popular starting from the very first ELIZA (1966), PARRY (1972), Siri (Apple, 2011), Cortana (Microsoft, 2015), Google now (2012), Alexa (Amazon, 2015) to the latest Xiaoice of Microsoft in China. Xiaoice is found to be a chatbot for normal chatting purposes. From the Wizard-of-Oz [3] study conducted by Microsoft on young, urban Indians, the result that was found is that people wanted a chatbot which could behave in a friendly way rather than just a computer device which responds to user's query.

### Predicted Use Cases for Chatbots

What do you predict you would use a chatbot for?



From *NPR and Edison Research*, it was found that 37 Percent of Americans tend to use a Chatbot in case of an emergency.

Some of the basic requirements need to be covered by the chatbot [2]

- Chatbots must understand the request posted by the user clearly without any doubt.
- From the queries asked by the user, the chatbot should be able to update its knowledge database frequently.
- It should store knowledge in pattern-template form.
- From the user input the chatbot identifies the response to be sent, through a set of keywords identified in the user request which matches with its knowledge database.

## IV. TURING TEST

Turing test is a method of finding whether a computer/machine is capable of functioning like a human [7]. This was developed by Alan Turing in 1950s. He formulated an Imitation game from which the capability of the computer can be identified.

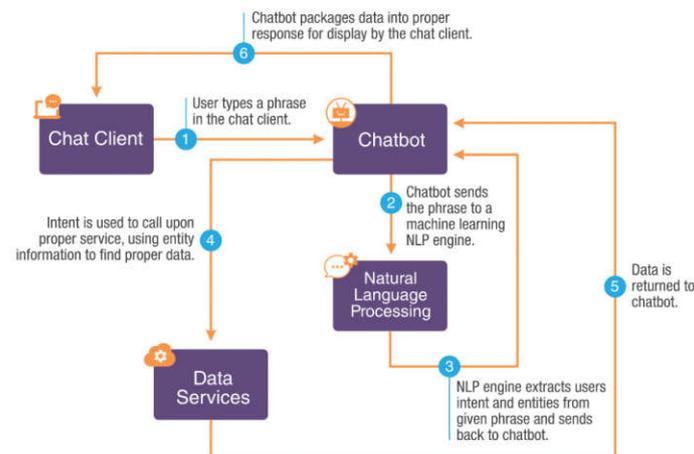
### *Imitation game*

In the Turing test, Alan Turing considered three terminals [8] – two terminals operated by humans and the other operated by a computer. One of the human operator functions as the questioner and the remaining human operator and the computer function as respondents. The response to the question provided by both the respondents (computer and human) are compared and the questioner identifies which is a computer respondent. If the questioner identifies the respondent within half of the test runs, then the computer is capable of functioning like a human. In other words, the computer is said to possess Artificial Intelligence.

## V. ADVENT OF CHATBOTS IN THE FIELD OF CRYPTOCURRENCY

With the advent of digital currency, known as cryptocurrency [15], chatbots are found to play an important role in making the people understand the basic concepts of cryptocurrency which involves another unit called blockchain [14].

Ben is a chatbot which makes people identify the importance of cryptocurrencies through a chat interface. Crypto, a cryptocurrency information bot, tells the prices of cryptocurrencies if asked for. It also tells the price at any time of the day and servers as a reminder if there is a rise or fall in prices of cryptocurrencies. It has been estimated that, by 2020 about 80% of human communication will be with chatbots because of their incredible services to humans.



Working of a chatbot [13]

## VI. VERBOT ENGINE

Verbots (Verbally Enchanted Software Robots) [6] work only on windows platform. Verbots are computer chatbot programs for windows for the web. The Verbally Enchanted Software Robots were deployed in fall 2000. ELIZA was the chatterbot to be discovered (in 1966). However, Michael Mauldin introduced the term “Chatterbot” in 1994. He created the first Verbot named Julia .

## VII. CONSTRAINT

Inspite of all the services provided by the chatbots, there are still certain limitations in their implementation. Some of them are

- Lack of intent classification approach in Machine learning techniques
- When the conversation becomes complex the level of understanding by the chatbot may decrease

## VIII. CONCLUSION

Artificial Intelligence is slowly becoming the future of every field. With the advancement in technology, people are becoming more dependent on conversational bots for majority of their day-to-day activities. Although chatbots possess some limitations, researches are upgrading these chatbots step by step. With chatbots being trained for providing emotional support in addition to business and other field, no wonder that these chatbots are likely to replace humans in all sectors. The future scope of chatbots is limitless. [12] With many chatbots making their appearance in the world and many of them winning the Loebner prize (competition in the field of AI, where awards are given for the best human-like chatbots) for their efficient performance, the emergence of these human-like chatbots will be very useful for everyone.

**REFERENCES**

- [1] AM Rahman, Abdullab Al Mamun, Alma Islam- *Programming challenges of Chatbot: Current and Future Prospective* , IEEE (International Islamic University) Region 10 Humanitarian Technology Conference (R10-HTC) 21 - 23 Dec 2017.
- [2] Bayu Setiaji, Ferry Wahyu Wibowo - *Chatbot Using A Knowledge in Database : Human-to-Machine Conversation Modeling – IEEE 2016 7th International Conference on Intelligent Systems, Modelling and Simulation* .
- [3] *How do you want your chatbot? An exploratory Wizard-of-Oz study with young, urban Indians-* Indrani Medhi Thies , Nandita Menon , Sneha Magapu , Manisha Subramony , Jacki O’Neill, Microsoft India Development Centre, Hyderabad, India
- [4] Prof.Nikita Hatwar, Ashwini Patil, Diksha Gondane - *AI Based Chatbot* , *International Journal of Emerging Trends in Engineering and Basic Sciences*, 2016.
- [5] *Verbot engines:* <https://en.wikipedia.org/wiki/Verbot>
- [6] Gilberto Marzano, Rezekne Academy of Technologies, Rezekne, Latvia - *The Turing Test and Android Science*, *Journal of Robotics and Automation*, 2018.
- [7] *Turing A (1950) - Computing machinery and intelligence.* *Mind* 59: 433-460.
- [8] Md. Shabriare Satu , Md. Hasnat Parvez , Shamim-AI-Mamun - *Review of integrated applications with AIML based chatbot*, *1st International Conference on Computer & Information Engineering*, 26-27 November, 2015
- [9] Vaishali Singh, Sanjay K. Dwivedi - *An Integrated Pattern Matching and Machine Learning Approach for Question Classification (2015)*.
- [10] *Externalization of Tacit Knowledge in a Knowledge Management System Using Chat Bots*, IEEE, 2017 .
- [11] *Anatomy and Utilities of an Artificial Intelligence Conversational Entity*, IEEE,2015
- [12] *Types of chatbots -* <https://www.mlveda.com/blog/tag/types-of-chatbots/>
- [13] *Wikipedia-list of chatbots year-wise*
- [14] Tiago M.Fernandez-Carames, Paula Fraga-Lamas – *A review on the use of Blockchain for the Internet of Things*, IEEE, 2018.
- [15] Ujan Mukhopadhyay, Anthony Skjellum, Oluwakemi Hambolu, Jon Oakley, Lu Yu, Richard Brooks – *A Brief Survey of Cryptocurrency systems*, IEEE, 2016