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A Survey on Various Types of Chatbots

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Abstract - *Chatbots are software applications which are mainly used to perform tasks asked by the users. These are just like virtual assistants. With the increase in conversational medias, chatbot's application increased drastically. Many social media, e-commerce, banking sectors also use these chatbots for easy access to the customers. These chabtots can communicate with users anytime and they won't require more cost for maintenance. Thus many websites and conversational platforms are choosing chatbots as face of their products. The aim of this paper is to get to know in-details about various kinds of chatbots available in market and their applications in real life scenarios.*

Key Words: **chatbots, conversational media, ML, NLP, virtual assistants**

1.INTRODUCTION

Machine learning and artificial intelligence are hot topics in recent times. The growth in these domains have made huge impact in many ares. One of the major applications of these domains can be seen in chatbots. The chatbots just try to imitate human behaviour and tries to help users. The increase in chatbot can decrease work load of many industries. Say in an e-commerce website, the chatbot can interact with user and learn user's personal interests and suggest some of the product. This will make customer happy and will also help sellers to increase their profit. Some of the chatbots can also be used in health field also to boost the confidence of the users. Say if a person is in depression and is not ready to share his difficulties with family and friends, he can converse with chatbot to come out from the state of mind. Similarly chatbot's application can be seen in many areas.

1.1 Natural Language Processing

NLP is the reason which caused the development of chatbots. With natural language understanding, the chatbots will try to understand the context of the user given input and provide suitable responses for the users. The NLU can be divided into further stages namely, lexical analysis, syntax analysis, semantic analysis, disclosure integration, pragmatic analysis. Lexical analysis include splitting of user given inputs to paragraphs, sentences and words. The syntax analysis checks for logical meaning of the user given inputs. Checks if all words are correctly placed in order or not. "The good is flower" is rejected by English syntactic analyzer. The sentence is not placed in meaningful way hence it will be rejected. It will take care of grammatical part. The semantic analysis will try to understand context and tries to understand if there is any meaning for users sentence. Say if a user asks if the milk is black? The bot should reject such logic-less questions as it don't have any meaning. Disclosure integration stage makes chatbot more conversational enough for users. This will track the progress of chat and tries to link current and previous states to provide meaningful responses for users. The pragmatic analysis do real time analysis for understanding queries asked by the users. The diagrammatic representation of stages in NLU is given in Figure 1.

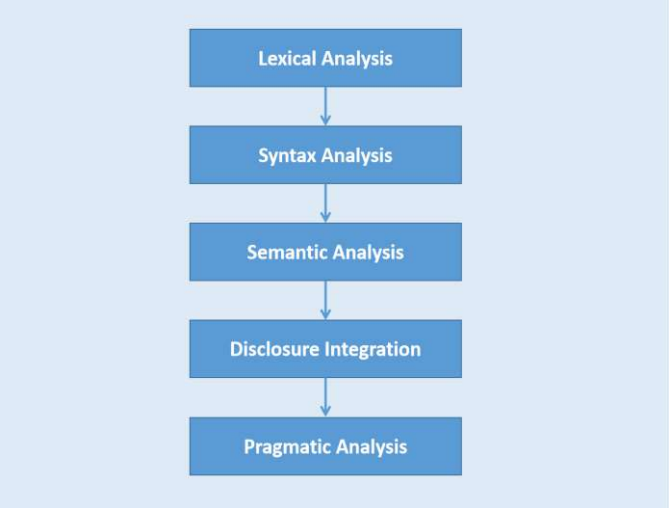

Figure 1. Stages in NLU

The organization of the report is as follows the section 2 will discuss about the various kinds of chatbots and its applications and section 3 will give conclusion followed by reference section.

2. TYPES OF CHATBOTS

Chatbots can be broadly classified into two types, they are: AI chatbots and Rule based chatbots. AI chatbots are recent developments which are using intelligent systems for giving outputs to uses. It requires more training for these chatbots to behave like humans. Some times these bots are trained in such away that it would become much difficult even for users to understand whether a other end if it is user or a bot they are conversing with. Rule based bots don't require much training, they will be having set of questions and answers they can interact only for those set of queries.

This section gives in detailed description about various kinds of chatbots with its applications. Menu based chatbots, Linguistic chatbots, ML chatbots, Hybrid chatbots, keyword recognition chatbots and Voice bots. The diagrammatic view of this is shown in Figure 2.

2.1 Menu Based Chatbots

These chatbots are initially trained with yes or no option menus. The next question asked by the bot will be linked with the answer given in the present stage. These bots will be pre-fed with list of questionnaires with its answer path for two options also. The answer chosen by user will determine next set of questions. Mainly decision tree models are used to train this type of chatbots.

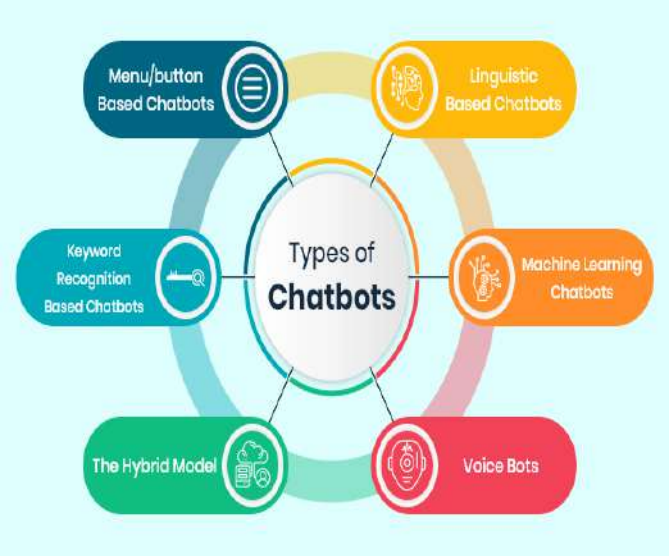

Figure 2. Types of chatbots

2.2 Linguistic Chatbots

Many linguistic chatbots can be seen now-a-days. A wide range of applications are based on this type of chatbots. Many social media platforms like facebook, messenger will be having a number of linguistic chatbots. These bots will attract large audience because many users will not be aware of English language. Adding linguistic chatbots will attract more customers for a given website and finally increasing the profit of the organizations. Many times these bots are created for language learning and language translation purpose also. These will help to learn new languages by giving translations in user asked languages. In a place where we don't know native language, I would be beneficiary

2.3 ML chatbots

The ML chatbots will be properly trained bots. These will be trained for intent entity selection and response giving methodologies. Many platforms will provide open source tools to develop these chatbots. Some of the very famous platforms where one can develop these kinds of chatbots are DiaglogFlow, RASA, gupshup interface, BotKit etc. These will be having template for chatbot development where one can create bots according to their needs. They also provide integration with other messaging platforms like whatsapp, facebook, telegram etc to deploy build chatbots. One can select any ML models of their interest to develop chatbots here. Some of the models that can be used are RNN, Neural network modes, DIET classifiers, CNN models etc. According to users comfort they can choose any model to train the chatbots.

2.4 Voice Bots

The main advantage and growth of chatbot was seen once voice based chatbot were developed. Because large number of audience don't wish to type or some people don't know how to type. With the voice bots, all these challenges are solved. This chatbot will be having an additional feature of text-to speech or speech-to-text conversions. Many API's will help to enable this feature. The main usecase of this chatbots can be found for specially visualized persons also. They can give input to the bots by voice and the chatbot will respond back with voice outputs. Thus they can b used even as assistants by specially visualized persons. Some of the additional functionalities like sending e-mail, voice messages can also be possible using these bots.

2.5 Keyword Recognition based Chatbots

These are requirement specific chatbots. Say if a user asks "book a movie ticket", the chatbot will try to retrieve keywords such as book and movie ticket. It will first collect the keywords from the queries and then process it. If a bot can't understand the keyword then proper output can't be given and sudden stop or no response from the bot could be observed. Hence in these cases proper training of chatbots are very much essential. More the training lesser will be non reorganization of keywords.

2.6 Hybrid Model Chatbots

These bots will be having both features of menu drive chatbots and AI enabled chatbots. These are growing chatbots now-a-days. In real time scenarios may people will be lazy enough to type and answer all the queries asked by the users, So if in another flow, a set of questions with list of options are provided, users can switch the way of answering according to their convenience. Many of the well developed e-commerce websites will use this hybrid bots for their websites. They will provide set of products as menu driven and sometimes they will also converse contextually with users to engage them more with their products. Hence this bot is a milestone in chatbot history.

Table 1 will give comparison of types of chatbots.

Table 1 Comparison of types of chatbots

Chatbot	AI/ Rule Based?	Time for Response giving and Training	Advantages	Limitations
Menu Based Chatbots	Rule Based	✧ Less Training. ✧ Less Response time.	✧ Quickly response will be obtained. ✧ Less ambiguity as paths are pre defined.	✧ Limited usage. ✧ Only used for Yes/No type of questions.
Linguistic Chatbots	AI Based	✧ More Training. ✧ More Response time.	✧ Helpful for language learning. ✧ Can be integrated with multiple messaging platforms	✧ More training is required. ✧ Sometimes more training may lead to overfitting.
ML Chatbots	AI Based	✧ More Training ✧ More Response Time	✧ Conversational bots just like humans. ✧ Context preserved.	✧ More training is needed to get accurate results. ✧ As it needs processing response time is also more user needs to wait to get response.
Voice Bots	AI Based	✧ More Training ✧ More Response Time	✧ Helpful for specially visualized group. ✧ No typing is required.	✧ Extra step of text-to-speech or speech-to-text. ✧ Difficult to understand the accent of users correctly.
Keyword Recognition Based Chatbots	Rule Based	✧ More Training ✧ More Response Time	✧ Easy for pre-trained data ✧ Fast response.	✧ More training. ✧ Limited set of queries can be answered.
Hybrid Chatbots	AI & Rule Based	✧ More Training ✧ More Response Time	✧ Interactive ✧ Gives personalized outputs	✧ Much time for training. ✧ Complex architecture.

3. APPLICATIONS OF CHATBOTS

The applications of chatbots can be seen in many areas. Some of the area of applications of chatbots are discussed in this section. The diagrammatic representation of chatbot's application is shown in Figure 3.

3.1 CUSTOMER SUPPORT

Whenever a user is having any issues or doubts he usually calls to toll free numbers of customer care. They need to wait for long period to get their turn. It would be tedious even for users and also forth person who needs to answer these calls.

If a chatbot is given training for answering these questions it would be easier. Much of time is not wasted on repetitive tasks. Moreover chatbots wont get tired and they can be made available 24/7 with less maintenance cost.

3.2 SOCIAL MEDIA

These bots will be incorporated in social media for engaging people. Sometimes the chatbots can be harmful also in some social media platforms. Say in Instagram people may create fake bots to increase popularity of a person. They may fake like and comment using chatbots. Similar cases were found in Twitter also where people will buy bots to change the mindset of people. Some chatbots are also used in creating fake profiles just to give fake follower numbers for users in many social media platforms.

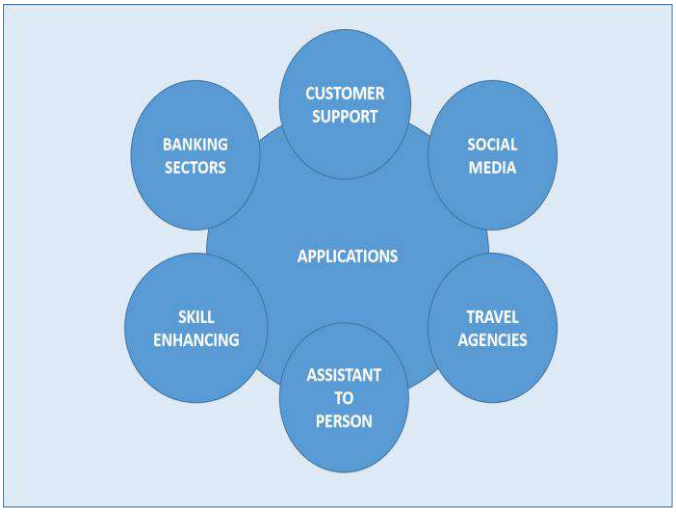

Figure 3. Applications of chatbots

3.3 TRAVEL AENCIES

Many travel agencies use chatbots in their websites. These bots will help in finding customized hotels, restaurants also. The bots will take care of finding the tickets in different modes like planes, trains and also help to get booking in good hotels and restaurants. This will make bookings easy for users and increase the profits of the agencies.

3.4 ASSITANT TO PERSONS

The bots can also be used as personal assistants. Some of the famous personal assistants are Siri, Alexa, google's assistant. These can be used for entertainment purpose also. They help to engage users by giving some activities or recommending some personalized music, comedies, news etc. They can also be used to track the day-to-day activities of users and can also be used to get alert reminders.

3.5 SKILL ENHANCEMENT

Many chatbots will help in skill enhancements by giving personalized recommendation systems for users' interest. They will collect users interests and give more training regarding skills such as poster making, digital drawings and video editing and makings.

3.6 BANKING SECTORS

In recent days all banking sectors have moved to online platforms. With this advancement they have also included chatbots in their website to guide users of all the benefits they offer. The bots will also suggest the type of account users can open, the interests in different accounts, interests offered by the bank and loan facilities. It will help users as they need not wait in long queues inside bank to get all the details. In online only users can understand all the facilities of banking sectors. It will reduce time of users also and reduce burden on bank employees.

4. CHALLENGES OF CHATBOTS

There are some challenges wile implementing of the chatbots. Some of them are:

4.1 SECURITY

AI chatbots needs to collect information and data which are needed to transmit over Internet. The bots must make sure that the confidential information about the users are not shared with anyone and help to maintain privacy of users.

4.2 UNDERSTANDING EMOTIONS

There may be cases where user my give abbreviations as inputs, and sometimes bot needs to consider redundant words, and negative words to understand exact context of the request asked by the users. Proper training of chatbot is needed to overcome these challenges.

5. CONCLUSIONS

With growth in technology many of the platforms have included chatbots inside their applications. A large number of chatbots are already developed in health, e-commerce, social media, customer service and educational sectors. The main aim of this paper is to understand various types of chatbots and the areas in which they can be used for. From the analysis it could be seen that almost every field is incorporating chatbots based on their requirements. Thus in coming days once can see major increase in number of chatbots and its applications, One need to understand both its drawbacks and applications and try to use this chatbot as in favour to help others.

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