Performance Considerations in Implementing ChatBots in Enterprise

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Abstract : The design and implementation of chatbots is getting popular day by day as most of applications both-computer and mobile based are employing them for automating messaging and customer assistance services. Although, chatbots may not replace the human aspect completely, but they sure are on their way to make our lives better. Many approaches are possible to the implementation of a chatbot system [3,4]. There are a number of unique challenges to building these kinds of programs. This paper highlights the key performance considerations when planning the implementation of a chatbot system.

IndexTerms **- Chatbot, Artificial Intelligence, Online Customer Service, Natural Language Processing.**

I. INTRODUCTION

The human and computer communication has covered the way for enormous natural language processing techniques. A chatbot is a computer system that allows human to interact with computer using natural language[1,2]. With the help of artificial intelligence (AI), a chatbot can mimic human conversations, bridging the gap between messaging and application frameworks.

The chatbots systems are widely used in various fields such as in businesses, education, healthcare and many more. Due to improvements in Natural Language Processing, Chatbots are shifting from command-driven towards more intelligent, conversational driven 'Virtual Assistants', which are much better at determining context and user intent. The design and development of chatbots involves variety of techniques. Fig. 1 illustrates working of chatbot system.

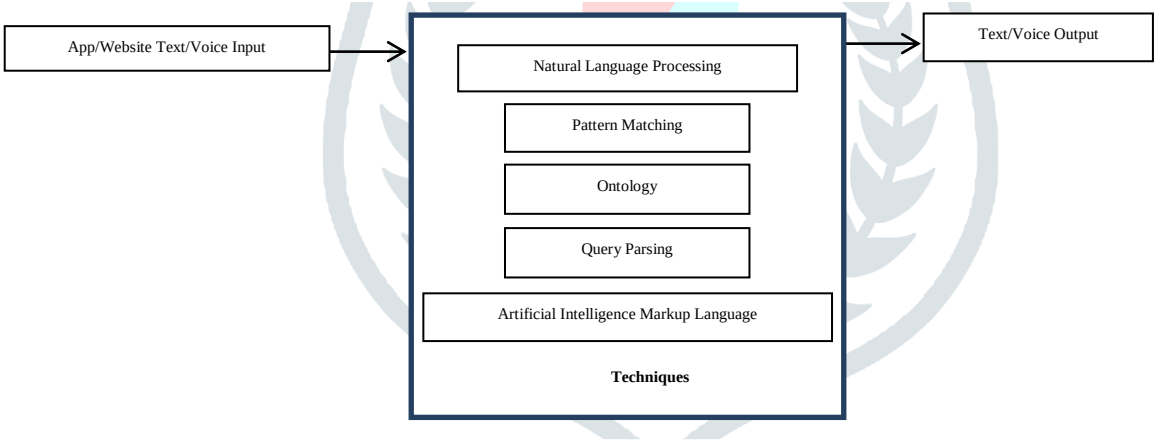

Figure 1: Chatbot Working

Currently the biggest challenge that existing chat-bots have is maintaining of the context and understanding the human inputs and its responses. Most of the existing bots still work just on the pattern matching of inputs and then trying to find a scripted response which matches the input.

This approach however cannot result in a fully satisfying conversation or lead a conversation with some specific purpose [2]. Nahdatul Akma Ahmad et. al. [4] provides the reviews that have focused on chatbot design. Further authors have also explained various chatbot design techniques. Luka Bradeško et. al. [3] have compared and discussed the different technologies used in the chatbots which have won the Loebner Prize Competition. The paper also covers language approaches and risks while designing chatbots.

Nicole M. Radziwill et. al.[6] have worked on quality issues and attributes of chatbots which can be considered during development phase of bots. There are a number of unique challenges to build these kinds of programs. Therefore, in this paper, we present the review of techniques used to design Chatbots along with performance issues in their implementation.

II. METHODOLOGY

Chatbots simulates different roles of the human brain. For designing chatbots, it is necessary to follow following steps:

2.1. Chatbot Purpose

Chatbots are often a customer interacting application, so it is important that it is designed in a proper manner. Before starting actual design, it is necessary to identify purpose of chatbot. This step also identifies the users of the chatbot and their requirements. Hence, all features of chatbot are laid down in simple and precise way.

2.2. Chatbot Category

Customer Channels can be split in three major Categories: Text, Speech and both. Text-based chatbots can live on any communication channel that can carry a dialog, whether that's a traditional mobile carrier channel (SMS, USSD), a messaging app (Facebook Messenger, WeChat, Kik, Line, Viber), certain social networks like Twitter, or chat embedded on a website.

Voice chatbot has voice as a primary mode of communication. A voice chatbot enables users to accomplish tasks on these devices hands-free. Alexa and Google Home are famous examples.

2.3. Technique Selection

A number of technical approaches and algorithms are used for designing chatbots. Some of major techniques are pattern matching, textual parsing, Markov chain models, ontologies (semantic nets), AIML etc. Further, the Bot framework & deployment platforms can be used where the bot's infrastructure as well as functionalities can be designed. This helps in user-friendly development.

There are two main models for a chatbot [7]:

2.3.1. Retrieval-based model – this kind of chatbot uses a repository of predefined responses. The programmer chooses an appropriate response based on context following a given heuristic, which can be either something very simple or quite complex depending on the situation.).

2.3.2. Generative model – This model has advance capabilities. It does not use stored information from repositories. Algorithms of latest techniques like deep learning are applied for training and learning of chatbot systems.

2.4. Basic Design (Interface and Database Creation)

Chatbots can be accessed through websites or mobile apps. One of the most important components of chatbot is its interface. The design of interface depends on chatbot type of conversation- verbal or textual based. There should be anyway more human and personal touch than any other usual app. Based on the user, the required requests and responses can be stored in the database.

III. PERFORMANCE ISSUES

A lot can go wrong: from simple language errors to elaborate personality flaws, the possibility of miscommunication lurks at every corner.

3.1. Chatbot Type Selection

Text-based bots work great if there are many potential paths a user can take eg. choosing from a menu, comparing different options etc.

Voicebots are a great choice if user journey is fairly linear. For example, in a bot that helps users fix an appliance: With a voice interface, the user can be handsfree, and the bot can give out more information per step, compared to chat. The user can also simply say next to move on, versus picking up his phone and typing it at every step.

Chatbots leverage chat mediums, such as SMS text, website chat windows, social media (Twitter, Facebook), or instant messaging platforms (Whatsapp, Wechat, Messenger) to receive and respond to the messages. Choosing the right type of chatbot and platform for any application depends upon a number of factors, which may range from business size, customer base to purpose of deploying a chatbot. Building a chatbot in a messenger first will be beneficial as there are a lot of people using them already, so chatbot service will be able to receive the recognition it deserves.

3.2. Chatbot Usability

When the users chat with the bot they expect straight and clear answers. Users can interact well with a person whom they know and hence the Chatbot needs a personality. Like Facebook's weather chatbot- "Poncho", has a persona: knowledgeable, trustworthy and friendly. Chatbots are usually text-driven, with images and widgets, which makes a smooth start to the interaction with the customer. Simple interface and easy to use features makes a Chatbot effortless to use. Simplicity and easy to use features will make the chatbots to boom in near future. Chatbots will help to move from UI filled with graphics to a UI of simple texts. Eventually, chatbots have switched to a hybrid experience of messaging, GUI (Graphic User Interface) and voice.

3.3. Vulnerable to hackers

One of potential problem faced while working with chatbots is these are vulnerable to hackers, which can result in dire consequences [2]. Recently, social networking platforms have incorporated their messaging channels with this capability to

protect themselves from cyber-attacks. If enterprises can incorporate this major security practice in chatbot platforms, it will be one of the most robust methods to ensure significant chatbot security.

3.4. Response Generation

From a high level, the job of a chatbot is to be able to determine the best response for any given message that it receives. This "best" response should either (1) answer the sender's question, (2) give the sender relevant information, (3) ask follow-up questions, or (4) continue the conversation in a realistic way. The chatbot needs to be able to understand the intentions of the sender's message, determine what type of response message (a follow-up question, direct response, etc.) is required, and follow correct grammatical and lexical rules while forming the response. Discovery is one thing chatbots are not great at. So, it is recommended to prepare chatbot with intelligence features. The first order of business for any conversational interface is to ensure every sentence; every response a bot gives is clear. There should be no sign of ambiguity, any word, any emoji that can lead to misinterpretation. From start to finish, branch by branch, a conversational interface should form one, cohesive whole.

3.5. Customizable

A product is built with the intention to meet the objectives that are either to drive businesses, make money, add value, or delivers a great customer experience, as per the situation. Therefore, it becomes the key point to think how users are going to use it and customize it to achieve business goals before building a useful chatbot that will revamp all their users' lives. The user metrics may change over time, depending on markets and other upcoming new technologies, so bot should be "ever-improving". Changes can be applied by taking time-to-time feedback from users.

3.6. Chatbot Strategy

The third key consideration is to ensure that the chatbots have full support from the internal systems and are aligned properly with the processes. Choose the right internal systems like API integration so that the chatbots service are available effortlessly across multiple platforms and help users with their support queries. Having multiple-task chatbot services will help the enterprise to automate the processes and facilitate both internal and external users for other productive work.

IV. CONCLUSION

Not all chatbots are created equally [5]. Chatbots today come in all shapes and sizes and have varying levels of capabilities. While basic chatbots may be adequate for most scenarios, some scenarios require more advanced chatbots. Due to the obvious drawbacks of scripted responses, developers and researchers kept adding new functionalities to the existing ways how chatbots works, converging mostly to the use some sort of ontologies and remembering facts from the conversation. While these improvements made chatbots much more successful, at the same time introduced a number of different approaches, systems and solutions to the same problem. A final approach preferred by most researchers is designing chatbot based on user and application goals.

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