



## Enhancing The Capability of Chatbots

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**Abstract**--The usage of chatbots has increased tremendously since past few years. A conversational interface is an interface that the user can interact with by means of a conversation. The conversation can occur by speech but also by text input. When a chatty interface uses text, it is also described as a chatbot or a conversational medium. During this study, the user experience factors of these so called chatbots were investigated. The prime objective is "to spot the state of the art in chatbot usability and applied human-computer interaction methodologies, to research the way to assess chatbots usability". Two sorts of chatbots are formulated, one with and one without personalisation factors. The planning of this research may be a two-by-two factorial design. The independent variables are the two chatbots (unpersonalised versus personalised) and thus the specific task or goal the user are ready to do with the chatbot within the financial field (a simple versus a posh task). The results are that there was no noteworthy interaction effect between personalisation and task on the user experience of chatbots. A significant difference was found between the two tasks with regard to the user experience of chatbots, however this variation wasn't because of personalisation.

**Keywords:** Chatbots, Conversational interfaces, Finance, Personalisation, Usability, User Experience,

### I. INTRODUCTION

Conversational AI experiences are on the increase as tongue and machine learning technologies advance. However, enterprise chatbot failure can often emerge as a result of the restrictions of current NLP technology. Four Problems with Current NLP Solutions.

#### 1.1. The matter of Too Many Intents

The issue of intent limitations and the way many a single bot can handle well is usually overlooked when a corporation architects their bot solution. Before continuing, here are some definitions to differentiate between intents and utterances.

**Intent:** An intent is that the user's intention. For instance, if a user types "how much does the car cost?", the user's intent is to

urge pricing information on the car. Intents are given a reputation, like "GivePrice".

**Utterance:** An utterance is what the user says or types. For instance, for the above intent, there are alternative ways of posing for an equivalent information e.g., a user may type

or say "show me pricing for the car", "what does the car cost?", "how much is that the car?". The whole sentence is that the

utterance. A single intent generally has many utterances. In some business intents the number of utterances is often high,

representing the various alternative ways that different users request an equivalent information. For those beginning with a

primary bot, the quantity of intents and utterances often doesn't even arise as a problem as it's hard to even generate an outsized

number of utterances for every intent. But as intents and utterances get added over time, issues can begin to emerge. So what

percentage intents are you able to put into one chatbot? Although there's no hard and fast number and it can depend upon the NLP

engine and therefore the use case, as one bot handles up to and beyond 100s of intents it can be compared to the limit that existing

NLP solutions can support. Unfortunately, it's impossible to define the precise breakpoint at which the bot performance starts to

say no. Different use cases require different sets of intents and utterances with some intents packing during a wide selection of

various utterances. Often you won't know what's getting to happen once you add intents or utterances, until you begin to

ascertain the bot performance decline.

### **1.2. The Use Case doesn't fit in a Single Bot**

With regards to the distinctive use cases that a business has for chatbots there are shifting levels of intricacy, both from a conversational just as from a stream or excursion point of view. Frequently the business use case is more unpredictable than a solitary bot arrangement can uphold. Furthermore, on the grounds that associations are getting more modern and are pushing out an expanding number of AI bots, some are going to the acknowledgment that a solitary bot may not be adequate to address the issues of a business use case. For instance, an organization may construct an advanced AI associate to deal with basic client questions and turn this out in an underlying stage. After some time, they may conclude that the client care bot ought to likewise have the capacity for the client to execute, bring them through a multi-step venture, add greater character by means of casual chitchat, or handle setting exchanging, or a blend of every one of these abilities. By adding extra ability, you can conceivably disintegrate the limit that the bot needs to manage the genuine use case for example noting the basic questions. This we allude to as "over-tuffing". The idea of accommodating your utilization case into the bot likewise clarifies a wonder that a few organizations are seeing, where the conversational experience decreases when they grow the usefulness. So suppose that an organization chooses to add greater character to their client support bot by including some casual banter and that their casual conversation model has somewhere close to 20 and 30 aims. On the off chance that the quantity of administration expectations is now near the restriction of the NLP, the presentation of the additional 20-30 eats into the aims identified with the first use case. The experience begins to drop off. This has suggestions for how you designer your bot answer for meet the necessities of your utilization case. Will a solitary bot be adequate? If not, how might you designer numerous bots so they can be facilitated and cooperate to satisfy the need?

### **1.3. Increasing the Accuracy of your AI Bot**

Another manner by which a bot can be affected is the point at which the precision level should be raised. This may mean adding more variations of the purposes for example the more prominent the precision around certain bot abilities, the less limit there might be for other component capacities. Suppose your utilization case requires some crucial errands or you are attempting to maintain a strategic distance from bogus encouraging points in the bot's reactions. Exactness will at that point be a significant thought where you may need to compromise the quantity of expectations for the nature of reactions. Since language is liquid and has numerous subtleties, focusing on precision can burn-through extensive bot limit.

### **1.4. The Issue of Bot Maintenance**

A conversational bot is definitely not a one-and-done project nor would it be able to be left to its own gadgets. Bots should be kept up as client connections with it develop, at last creating extra expressions that may not be perceived by the bot, i.e., alleged missed expressions that the bot needs to figure out how to deal with. Language is exceptionally liquid with jargon developing constantly. With regards to discussions, the requirement for assessing and invigorating is significantly more basic contrasted and other advanced substance resources. Your advanced partner needs to keep up and to do this implies taking care of the bot more expressions and plans, growing its abilities, and revising mistakes. This requires a ton of design and whenever stories are composed it's difficult to look after them. Client requests additionally move, as work together needs. A bot addresses your organization and if not observed and oversaw it can get flat and convey a helpless encounter, possibly harming your image picture. Building a conversational AI arrangement isn't care for building an application. At any stage, a chatbot is tuned for a specific measure of information. Any progressions can possibly disturb the entire model. This a constant, continuous, and laborious assignment.

## **II. RELATED WORKS**

### **2.1 Chatbots**

A conversational interface is an interface that the client can cooperate with by methods for a discussion. This can be through discourse, yet in addition by means of composed regular language. The terms Natural User Interface (NUI) and Conversational Interfaces are here and there utilized reciprocally. A NUI is an interface where you connect by utilizing regular sources of info like: discourse, contact and hand motions (Wigdor and Wixon, 2011). Here and there, NUIs can perceive faces, their current circumstance or feelings (Kaushik, Jain, et al., 2014). A chatbot is an illustration of a conversational interface. At the point when we talk about chatbots, or conversational specialists, we mean a PC program that is composed to reproduce a discussion with the client by methods for hear-able or text-based data sources. In this investigation, we center exclusively around

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chatbots that utilize text-based sources of info. Chatbots are utilized on the web and are some of the time driven by man-made consciousness.

### 2.1.1 Implementations of chatbots

Chatbots can be utilized for a wide scope of fields, for example, training (Letzter, 2016), data recovery (Shawar, Atwell, and Roberts, 2005), business and web-based business (Chai et al., 2001), and for client care (MarutiTechlabs, 2017). In their examination, Tatai et al. (2003) thought about implementations of chatbots and distinguished three principal parts of chatbots, to be specific: • Role of a Digital Assistant; • Role of an Information Provider; • Role of a General Chatbot. (Tatai, Csordas, Kiss, Szal'ó, and Laufer, 2003) Examples of advanced collaborator chatbots are from IKEA, which was dispatched in 2005 and Niki.ai which causes you shop through talk (Niki, 2017). Chatbots can be utilized to improve the correspondence between specialist tolerant (DP) and facility persistent (CP). The scientists guarantee that utilizing chatbots for this reason (DP and CP correspondence) could diminish expenses and time on routine tasks (Abashev, Grigoryev, Grigorian, and Boyko, 2016). More usage of chatbots is: financial assessment mentor, legal counselor, individual beautician, food orderer, individual attendant, specialist, benefits or money guide, instructor, newsreader, toy, bookkeeper, and in conclusion, as an accomplice (Jee, 2017).

### 2.1.2 Chatbots in The India

In The India, companies are also starting to use chatbots for example on their Facebook pages or company websites. Gaddi Bot (Car DekhoGaadi Store), iPAL chatbot (ICICI Bank), KARL chatbot (JEEP India), TIA chatbot (TATA Capital), Travel Planner chatbot (Travel Triangle). Another example of an implementation of chatbots is Dawnbot. Dawnbot is a Dutch chatbot that helps you create a video advertisement (Dawnbot, 2017). The user answers the questions dawnbot asks by selecting the corresponding emoji. A possible advantage of communicating with emoji could be that the interaction can be quicker, and more efficient. On the other hand, miscommunications can occur between the user and the maker of the system, since emoji's can be interpreted differently (Miller et al., 2016).

### 2.1.3 Customer Service

Finance & Insurance Chatbots Chatbots can be found in different domains such as: customer service, e-commerce, insurance, healthcare, retail and more. 95% of the respondents of a chatbot survey believed that the customer service domain is going to be 'the major beneficiary of chatbots' (Mindbowser, 2017). We choose this field to illustrate the financial and insurance field specifically. In the field of insurance, we also see a rise of chatbots. Lemonade is an insurance company from the US. Lemonade claims that they transform the business model of insurance by: "injecting technology and transparency into an industry that often lacks both". They say that they provide a fast, affordable and hassle-free insurance experience (Lemonade, 2017). The expert virtual insurance agent Evia was released last year (2016). Evia is created by Insurify, a spinoff company from MIT (Buhr, 2016). Evia tries to find you a car insurance by using a photo of your license plate.

### 2.1.4 Conversational aspects

Human-framework exchange comprises of the inquirer (the client), searching for data, and the master (framework), giving data. There are two different ways that chatbots can banter with clients. Framework started chatbots, where the framework drives the discussion, and client started chatbots, where the client drives the discussion. Frameworks that contain the two strategies for commencement, are called blended activity frameworks (Hung, Elvir, Gonzalez, and DeMara, 2009). To see how a conversational interface ought to be addressed, it is essential to explore how human discoursed work. Quarteroni, et al. (2006) investigated the perspectives and issues identified with human discoursed and they proposed a rundown of fundamental things for an intelligent inquiry and noting framework:

- Context Maintenance: using the setting of the discussion to effectively decipher the client's information. This is significant for follow-up inquiries, or for explanation.
- Utterance Understanding: the discovery of follow-up and explanation inside the setting of the past discussion.
- Mixed Initiative: the client ought to have the option to step up to the plate inside the discussion (by stopping, or posing inquiries).
- Follow-up Proposal: implying that the framework propels the client to offer input on the responses that the framework gives (if the client is fulfilled or not). Until the client has accomplished their objective.

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- Natural Interaction: covering and producing an assortment of expressions to make a smooth discussion and to keep the exchange dynamic. (Quarteroni and Manandhar, 2009) McTear (2016) checked on key highlights of discussion in part 3 of his book on conversational interfaces. He depicts that the accompanying angles are significant when planning conversational interfaces:
- Conversation as activity: implying that expressions of clients could be viewed as activities that speakers do to accomplish an objective.
- The design of discussion: with respect to how expressions from a discussion identify with one another. Instances of approaches to perceive structure in exchange acts can incorporate contiguousness sets, trades, talk portions and conversational games.
- Conversation as a joint movement: depicts how two gatherings alternate and diminish the danger of a miscommunication by utilizing the establishing cycle in their discussion.
- Conversational fix: a fixing cycle that can be started by one of the two gatherings in the discussion. Now and then the speaker fixes his own expressions before the collector has the opportunity to fix it.

The language of discussion: the manner of speaking in an expressed content can be an approach to pass on extra data, for example, feelings and influence. For instance, when people speak more loudly when they are irate. For composed content, feelings and influence can likewise be passed on, for instance by utilizing emojis or capital letters. (McTear, Callejas, and Griol, 2016) Incremental preparing is a significant cycle in human-to-human discussion (McTear et al., 2016). Steady handling implies that cover happens inside a discussion. In human-machine association, an inertness between turns is available. This is one motivation behind why human-PC connection can once in a while feel less normal than human to human communication. Another advantage of gradual handling is that the discourse turns out to be more familiar and effective (McTear et al., 2016). Google search applies steady handling by finishing the client's inquiry during composing and in Voice Search by indicating the perceived words while the client is as yet talking.

### 2.1.5 Dialogue Management Strategy

McTear (2016) depicts that one of the center parts of conversational interfaces is the plan of the discourse the board technique, wherein the framework's conversational conduct is characterized. The plan of exchange the board system was done physically before, however the examination local area has discovered approaches to robotize this cycle via preparing the model with genuine discussions (McTear et al., 2016). Two emerging plan methodologies of discoursed in chatbots are the connection methodology and the decision of an affirmation technique (McTear et al., 2016). Programmed discourse acknowledgment isn't generally exact, yet by asking the client for affirmation or re-prompt them, a few mistakes could be evaded. An excessive number of affirmations asking can likewise be irritating. There are three sorts of communication methodologies in chatbots, to be specific: client started, framework started or blended activity. Limits of client started exchanges are mistakes in discourse acknowledgment and comprehension, since clients can say anything they need.

### 2.1.6 Maturity Model

ChatbotsSmiers (2017) describes some levels of maturity of chatbots based on three categories, namely: interaction, intelligence and integration. The interaction area describes that the user experience of chatbots is different than the user experience of websites, since the interaction with chatbots is done through textual input. The intelligence area describes the capability of the chatbot to understand and provide a relevant utterance which is in line with the intent of the user. The integration area is about the back-end of the chatbot and how well it is integrated with other websites, servers or services from other websites and applications (Smiers, 2017).

## 2.2 User Experience

ChatbotsSmiers (2017) depicts a few degrees of development of chatbots dependent on three classes, in particular: association, insight and incorporation (see Fig 1). The collaboration zone portrays that the client experience of chatbots is not the same as the client experience of sites, since the cooperation with chatbots is done through text-based info. The knowledge territory depicts the ability of the chatbot to comprehend and give an applicable expression which is in accordance with the purpose of the client. The combination territory is about the back-finish of the chatbot and how well it is coordinated with different sites, workers or administrations from different sites and applications (Smiers, 2017).

### **2.2.1 Usefulness**

The Technology Acceptance Model (TAM), is created to test the client acknowledgment of data frameworks. Inquiries of the normalized TAM survey measure the apparent convenience and the apparent usability of data frameworks (Davis, 1985). The 10 things that measure convenience are:

Utilizing this item improves the nature of the work I do. 2. Utilizing this item gives me more noteworthy command over my work. 3. This item empowers me to achieve errands all the more rapidly. 4. This item bolsters basic viewpoints. 5. This item builds my efficiency. 6. This item improves my work execution. 7. This item permits me to achieve more work than would somehow be conceivable. 8. This item upgrades my adequacy at work.

## **III. WAYS TO IMPROVE CHATBOTS AND BOOST CUSTOMER SATISFACTION**

### **3.1 Put an Escalation Path in Place**

Where chatbots add most an incentive for organizations is in addressing routine inquiries rapidly. In the event that the scrutinizing turns out to be more unpredictable, the business needs to have an alternative to raise the collaboration to a human guide. That counselor ought to have the option to get the string of what has gone previously and, where fundamental, change the call from a talk window to a voice connection. This acceleration way is basically significant since, in such a case that the client is left inclination their question has been deficiently taken care of, they may quit working with the brand. It's likewise significant that organizations set up adequate assets to deal with any accelerations, guarantee clients' holding up occasions are kept to a base and that proper help level arrangements are executed and consistently met.

### **3.2 Keep Feeding Chatbots With New Information**

While chatbots do satisfy an important job inside many contact places, organizations need to understand that executing and afterward working them can be a significant responsibility. As opposed to prevalent thinking, chatbots are not modest to run, they can be tedious to keep up and they should be taken care of persistently with constant pertinent data to keep awake to date. On the off chance that an association disregards its chatbots, neglects to furnish them with adequate information, instruct them or give them what they need to realize and develop, those chatbots will get repetitive, similarly that a site that has not been refreshed will. Along these lines, the exercise for organizations is clear: keep your chatbots took care of consistently.

### **3.3 Make Chatbots More Empathetic**

Chatbots are usually efficient and a tremendous help in a variety of cases. But, as with any other automated systems, customers engaging with a chatbot can sometimes feel a lack of empathy or find it a struggle to express their emotions during conversations. As Genesys recommend, contact centers should aim to make chatbots much more empathetic. They need the

- ability to capture customer sentiment throughout the conversations, without explicitly asking (implicit measure)
- ability to adapt the conversation flow and the responses to sentiments
- ability to explicitly ask at the end of the conversation how the customer feels (explicit measure)
- ability to compare implicit and explicit measures to improve sentiment capture over time.

### **3.4 Use Them to Collect Information in the Initial Part of Conversations**

The key to improving CSat of chatbots is realizing when and how to execute them. On the off chance that the contact community has as of now effectively actualized self-administration, and improved CSat thusly, at that point it very well may be the ideal opportunity to add bots to the blend. Start with existing live talk contributions, or online media informing applications – like Facebook Messenger, and afterward present bots. Whenever bots have been presented, use them to computerize the monotonous undertakings of gathering data toward the beginning of any exchange and, at last, guiding the guest to another self-administration choice or a live counselor.

### **3.5 Use Natural Language Processing (NLP) to Make Chatbots Seem Friendlier**

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Make your chatbot more amicable without being meddlesome. It is essential to broadcast a fitting vibe for your crowd. Through Natural Language Processing (NLP), the framework figures out how to perceive genuine language. This commitment with language permits the product to use information to furnish clients with customized data. Likewise, the product can dissect the client's tone, permitting the chatbot to associate and connect conversationally. Much of the time, clients have felt that they are getting correspondence from a genuine individual, as opposed to mechanical programming. With this more everyday tone, the product will expand the brand into an intelligent encounter for purchasers. The twofold advantage of this for the organization is that records of discussions can be effortlessly overseen and investigated. Giving further client bits of knowledge, the product permits the organization to comprehend what kind of clients are visiting their site, what they are searching for and repeating issues that need settling.

### **3.6 Use Interaction Analytics to Make Chatbots More Conversational**

Make your chatbot more amiable without being meddling. It is essential to send out a proper vibe for your crowd. Through Natural Language Processing (NLP), the framework figures out how to perceive genuine language. This commitment with language permits the product to use information to give clients customized data. Likewise, the product can examine the client's tone, permitting the chatbot to cooperate and connect conversationally. By and large, clients have felt that they are accepting correspondence from a genuine individual, instead of mechanical programming. With this more casual tone, the product will expand the brand into an intuitive encounter for buyers. The twofold advantage of this for the organization is that records of discussions can be handily overseen and examined. Giving further client experiences, the product permits the organization to comprehend what sort of clients are visiting their site, what they are searching for and repeating issues that need settling.

### **3.7 Leverage Data**

With Gartner foreseeing that by far most of client associations will be fueled by chatbots in 2020, it is a higher priority than at any other time for associations to venture up their game regarding gaining from client collaborations. Present day advances, for example, AI and neural organizations can help utilize the information, gain from it and use it to educate how a chatbot ought to respond to new cooperation types. Utilizing innovations like this will lessen the remaining task at hand for consultants, leaving them an opportunity to commit consideration regarding more perplexing, nuanced and human issues. Chatbots like Zendesk's Answer-bot offer a high-level information base arrangement that uses NLP to shrewdly present pertinent issue goals to clients' most regular questions.

### **3.8 Understand Their Limitations**

While bots can be "prepared" in sympathy and amicability, clients will consistently value the human touch when managing more perplexing inquiries, where compassion and comprehension can have a significant effect. While chatbots are very much positioned to manage the most widely recognized issues, similar to bundle following and data demands, there are issues that actually need the human touch, as bespoke item counsel. We see chatbots working best when they're working inseparably with counsels. Managing immense amounts of low-unpredictability issues is the place where chatbots sparkle, especially when they're enabled to consistently hand off cases to a consultant when required. Take the Christmas shopping season, for instance – Black Friday, Cyber Monday, Christmas – when retailers are at their busiest

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## **IV. CONCLUSIONS**

The fame of utilizing chatbot's is expanding, anyway while applying another innovation like chatbots, it is essential to do this successfully. An approach to gauge effectivity, is to examine the client experience. Hence, we explored the impact of personalisation on the client experience of chatbots. The examination question of this investigation is "What is the additional estimation of personalisation for the User Experience of chatbots?". The relating theories are:

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- H10: Personalisation has no effect on the User Experience of chatbots.
- H11: Personalisation has a positive effect on the User Experience of chatbots.
- H20: The User Experience is the same for simple and complex tasks.
- H21: The User Experience is different for simple and complex tasks.
- Hinteraction: Personalisation and Tasks have an interaction effect.

In the wake of directing a two-way ANOVA test, no huge principle impact was found between the two chatbots as for personalisation. Along these lines, we acknowledged our H10 and dismissed our H11. This implies that personalisation has no critical impact on the client experience of chatbots. There was a critical fundamental impact between the various errands regarding the client experience. This implies that the client experience score for the primary undertaking (impeding bankcard) was evaluated altogether higher than the subsequent assignment (monetary counsel). Consequently, we acknowledged the H21 and we dismissed the H20. At the point when we researched the impact of undertaking on the builds of client experience (convenience, ease of use, fulfillment), we found that the greatest impact of assignment was by Usefulness, at that point Satisfaction and afterward Usability. No critical communication impact was discovered (Task \* Personalisation) regarding the client experience of chatbots. Accordingly, we need to dismiss our Hinteraction. Furthermore, we can reason that our fulfillment build was profoundly solid. We can reason that a straightforward assignment with an unmistakable objective (issue based) gets an essentially higher client experience score than a more perplexing undertaking with a more dubious result (opportunity-situated) in a chatbot. Ultimately, we can presume that we made a brief, yet solid, poll to gauge the client experience of chatbots.

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