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AI BASED CHATBOT TO ANSWER FAQs

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ABSTRACT

People interact with systems more and more through voice assistants and chatbots. The days of solely engaging with a service through a keyboard are over. These new modes of user interaction are aided in part by This research will investigate how advancements in Artificial Intelligence and Machine Learning technology are being used to improve many services. In particular it will look at the development of chatbots as a channel for information distribution. This project aimed to implement a web-based chatbot to assist with online banking, using tools that expose artificial intelligence methods such as natural language understanding. Allowing users to interact with the chatbot using natural language input and to train the chatbot using appropriate methods so it will be able to generate a response. The chatbot will allow users to view all their personal banking information all from within the chatbot. In an industry with low user satisfaction rates and limited technology to increase accessibility. It is clear the chatbot overcomes the challenges that many firms face to increase the use of their services and gain a competitive edge over leading competitors. With many people adopting Smart Assistant Devices such as Google Home or Amazon's Alexa. The chatbot was tested across a range of devices such as Google Home and Assistant on android devices to outline the key differences between the two modes of interaction, spoken and text dialog. These test were carried out to identify the value in integrating such technology surrounding the recent interest in EEE521 Final Year Project 2017/18 B00659303 2 chatbots and conversational interfaces. Proving chatbots can be applied to a specific domain to enhance accessibility, reaffirming that they are more than just a passing fad and have a viable use.

Keywords : Chatbot, AI, NLP, ML, NLTK, Data set.

CHAPTER 1 : INTRODUCTION

1.1. MOTIVATION :

As we all know chatbots square measure a really fashionable approach of communication between the user the system text interface. we have a tendency to wished to use this system to implement college web site for an additional economical communication between the coed and administration. Students will use school web site chatbot for Queries rather than about to workplace or authorities directly for info. College web site based mostly bots square measure accustomed develop effective communication between different branches and facilitate management to produce innovative solutions. Our Project to create a university web site chatbot would undoubtedly have a bright scope as this could bring a modification within the approach of interaction between school and students This Project would inspire alternative schools still to develop internet chatbots to Ease the communication between Management and Students

1.1.1. CARING CHATBOTS :

In this busy world I am concerned with how infrequently I feel cared about. Now, don't take that too literally, of course there are phone calls and messages but surely there is a day (or couple of days) that go by and without being asked about my happiness. One day rolls into two days and gone are the times when a simple, "how was your day?" or "how did you sleep?" come my way. So as a little experiment I decided to get a chatbot called Pepper on my phone. Pepper isn't particularly extensive, but neither are the simple everyday questions that I am referring to. In light of my thoughts I decided to do a little experiment with myself, my rather chaotic environment and myown well-being.

Every evening, when our demanding dinner time was over (we eat at 6pm: 6pm since I was a child therefore it is 6pm for my children), the children are niggly, I am tired, my husband is tired but Pepper pops up to ask about how my day was. I monitored my reactions over a week. I noticed that even when there was whining filling my ears the notification from my phone would attract my attention and there it was, the simple question, "How was yourday?"

1.1.2. HEALTHY MINDS :

Access to mental health support is often difficult whether it be excessive waiting lists, costs or approaching the support in the first place. Seeing a need for support and counselling, notably by people who have been seriously traumatised like Syrian refugees, Michiel Rauws and Eugene Bann launched their X2AI chatbot in 2014. Rauws had his own personal reasons for taking interest in such a development as he himself suffers with chronic health issues whereby he has to manage his own stress levels in order to stay healthy."X2AI describes its bots as therapeutic assistants, which means that they offer help and support rather than treatment."Whereas a traditional councellor monitors their patient's body language and tone this chatbot detects patterns. Patterns are inclusive of phrasing, typing speed, sentence length and other parameters that correlate with a users' emotional state. Benefits include the fact that some users communicate more freely because it is not a human being on the other end of their conversation. However useful this chatbot may be, a most relevant ability is to recognise phrases in relation to self harm or intent to harm others, allows the chatbot to involve human interaction.

1.2. PROBLEM STATEMENT (Existing and proposed method) :

=> What problems do chatbots solve and what are they used for?

Figure 1: How AI Chatbots Guide Customers.

1.2.1. ELIMINATES THE ADDED COSTS TO MEET GLOBAL CUSTOMER DEMANDS :

By using a chatbot, you eliminate the need to hire additional staff to engage with these shoppers. Chatbots never sleep and they can be programmed to interact with customers in as many languages as you program them to do. They can provide that front-line support without forcing you to overextend your budget with new or temporary hires.

1.2.2. AUTOMATES REPEAT CUSTOMER SUPPORT ENQUIRIES :

Many customer support teams are bogged down with repetitive tasks to answer the same versions of FAQs over and over again. It can lead to burnout and job dissatisfaction that ultimately brings down the level of quality care your brand stands behind.

1.2.3. ENDS SALES ACTIVITY ONLY TAKING PLACE DURING WORKING HOURS :

Again, let's go back to the international example. If you have shoppers visiting your website from another part of the world, they need the same level of service that local shoppers demand. But if your sales team works standard 9-5 hour days, they might not be available for those shoppersvisiting from another time zone.

Chatbots provide 24/7 real-time support for all buyers, regardless of language barrier and geographic location. If sales teams are not available to those international visitors, a chatbot can provide that exceptional level of service without question. This way, you avoid missing out on potentially lucrative visits from international buyers.

1.2.4. REDUCES ABANDONED CARTS :

In March 2021, nearly 80% of all online orders were abandoned. There are many reasons that people may abandon carts without completing a purchase, but the common denominator is that you lose out on revenue for every abandoned shopping cart.

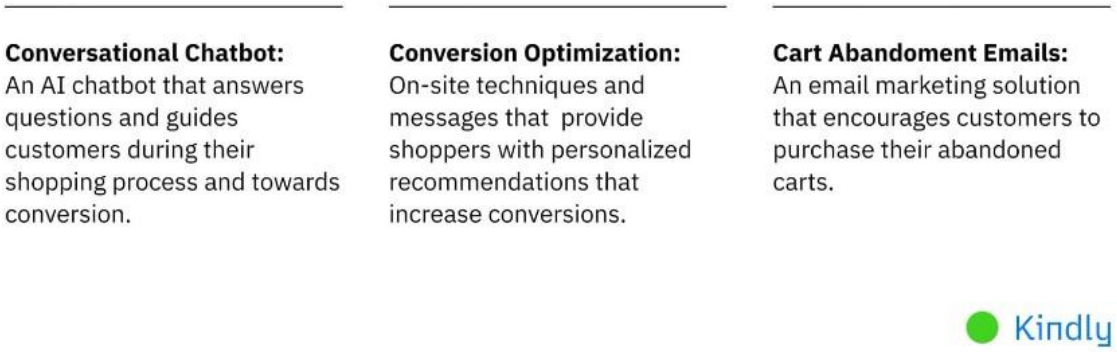


*Figure 2 : S*hows how carts are abandoned.

With AI chatbots, like those powered by Kindly, you have the means to reduce abandoned cart rates and win back some of those shoppers to your website. To take things a step further, by integrating with Kindly's Nudge conversion rate optimization software, your chatbot carefully recommends the products that are most likely to excite the buyer and motivate them to complete a purchase.

1.2.5. GIVES CUSTOMERS AN ACCESSIBLE CHANNEL TO FIND ANSWERS TO THEIR QUESTIONS :

If people feel their needs are not being met by your brand, they'll abandon your website and give their business to someone else.

Chatbots are always available to customers, and they can have a coloured design to stand out on the page when not in use. Buyers can easily click on the chatbot pop-up to bring up the conversation and interact with the bot as their needs require. They can do this while shopping through a number of different pages and receive answers to pressing questions without having to go digging for those responses on their own.

1.3 OBJECTIVES :

1. Cost efficiencies

It costs very little to set up a chatbot and start experimenting. Better still, this minimal upfront investment can be quickly offset by using your chatbot to help optimize the cost of running your contact center.

While keyword chatbots can help optimize costs for your contact center, sentiment analysis chatbots can help generate revenue for your business. Natural language processing (NLP) bots can have conversations with potential customers and provide a conversational customer experience from start to finish.

2. Increased customer satisfaction ratings

Improving customer satisfaction is challenging over traditional channels. Customers will typically abandon calls after waiting between 45-95 seconds
– and a customer with an unresolved inquiry will not typically be very satisfied.

3. Superior customer experience

Chatbots help creates a better customer experience in several ways. First, there's the presence across all popular chat apps and channels.
This means that customers can reach your business to get immediate answers to their questions over the chat app they prefer and in an environment, they're comfortable with.

1.4. ORGANISATION OF THESIS

The following demonstrates the chapters of this thesis and their contents:Chapter 2 : Literature

Survey on Chatbots

Chapter 3 : Concept of ChatbotsChapter 4 : Technologies Used

Chapter 5 : Design and ImplementationChapter 6 : Code and Output

Chapter 7 : Conclusion and Future Scope

CHAPTER 2 : LITERATURE SURVEY

2.1 CHATBOT IN DIFFERENT DOMAINS :

2.1.1. CHATBOT IN BANKING :

The banking industry has multiple electronic delivery channels in use to distribute technology assets and services for the benefit of their customers. Online banking is a commodity of commerce within financial services as well as banking industries (Ajimon and , G. G.S. Gireesh K,. (George and Kumar, 2013)). Advancements in technology has transformed many of our services into the digital era and the banking industry is one of the primary industries to avail of these advancements to improve their services. Currently within the UK two paradigms are available for online banking. One of which is an integrated internet bank which still operates through the branch but has an online presence. The other, a stand-alone internet bank, that operates completely independently and its only existence is solely through the internet (MarketLine, 2017). Banks implement technology to strengthen their processing capacity, acquire a larger customer base and expand the services they could offer (Consoli, 2005).

2.1.2. CHATBOT IN INDUSTRY :

Most businesses and organisations are understanding the potential benefits of machine learning and artificial intelligence to have a positive change on how they perform business. Artificial intelligence has progressed to allow the development of more sophisticated chatbots. Organisations are focusing on specific areas of user engagement that take up a lot of time but can be replaced through the use of a chatbot. Chatbots can understand what the customer needs from a single text instead of the customer having to follow a process of multiple steps. Chatbots are used to automate customer service and reduce manual tedious tasks performed by employees so they can spend their time more productively on higher priority tasks. Establishments that regularly deal with its customers have discovered the potential of chatbots as a channel to distribute more efficient and immediate information to customers in comparison to a customer service representative regarding queries and issues (Onufreiv, YY. , 2017). HDFC Bank has merged with Niki.ai an artificial intelligence company to develop a state of the art conversational banking chatbot ((HDFC Bank,. , 20177)).

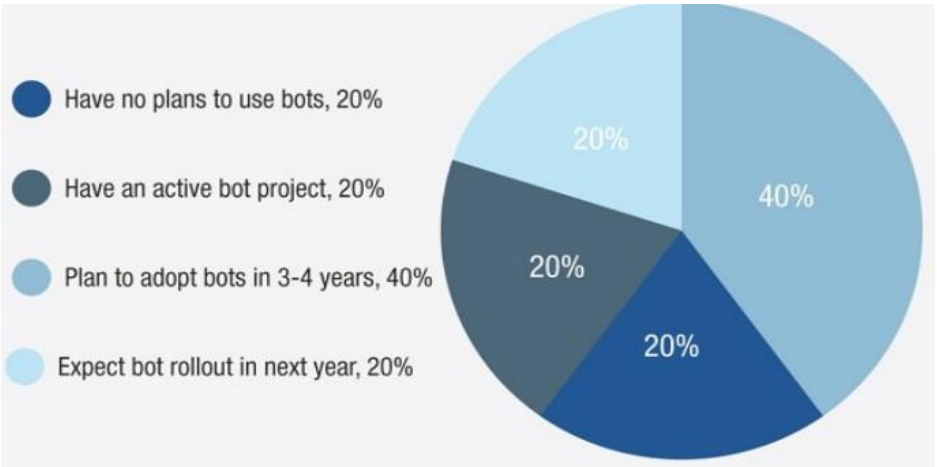


Figure 3 : Interest in chatbots within the Financial Industry

Mark ZuckerBerg CEO of Facebook, believesC chatbots provide more personal and immediate ways for customers to communicate with an organisation allowing them to provide consistent and appropriate customer service at scale (Conversational Business, 2017). Facebook has now released its own Messenger Bots, which allows organisations to develop their own Chatbot through Messenger to deliver their services. Facebook are also developing AI methods to obtain specific information related to users across relevant topics. The acquired information is used as a dataset to develop and improve their Artificial Intelligence so they can analyse, group and rate each user post (Rossmann et al., 2017). "44% of US consumers prefer to interact with a chatbot compared to a human in relation to customer queries" (Wellers et al., 2017). This is evident as Chatbots are also becoming more prevalent in other industries such as; insurance, recruitment, media and pharmaceuticals.

2.2. CHATBOTS :

A chatbot is a software tool that utilises natural language processing (NLP) for human machine interaction (HMI) and Machine Learning (ML). "The complexity of a chatbot is directionally proportional to the scope of the domain". An open domain requires a larger knowledge base, whereas, a closed domain has a more specific knowledge base that was developed to achieve a specific goal (Gregori, E. , 2017).

Chatbot technology initially began in the 1960s to determine whether a chatbot could be portrayed as a human. Throughout the 1980s there was an elevated amount research carried

out on natural language interfaces which lead to the development of sophisticated chatbot architectures such as

A.L.I.C.E. This chatbot architecture is one of the earlier chatbots developed in 1995 by Dr Wallace which is now opensource, the acronym stands for Artificial Linguistic Internet Computer Entity. This is a chatbot you can create through interaction as it will learn from previous interactions to create its knowledge base. Its knowledge is saved in AIML (Artificial Intelligent Mark-up Language) files which evolved from the Extensible Mark- up Language (XML) (Shawar, B.A and and Atwell, E, 2007).

2.2.1. RULE BASED CHATBOTS :

The very first attempts at chatbots' implementation were rule-based. Rule-based models are usually easier to design and to implement, but are limited in terms of capabilities, since they have difficulties answering complex queries. Rule-based chatbots answer users' queries by looking for patterns matches; hence, they are likely to produce inaccurate answers when they come across a sentence that does not contain any known pattern. Furthermore, manually encoding pattern matching rules can be difficult and time consuming.Furthermore, pattern matching rules are brittle, highly domain specific, and do not transfer well from one problem to the other.

2.2.2. ARTIFICIAL INTELLIGENCE CHATBOTS :

AI models, contrary to Rule-based models, are based on Machine Learning algorithms that allow them to learn from an existing database of human conversations. In order to do so, they need to be trained through Machine Learning algorithms that can train the model using a training dataset. Through the use of Machine Learning algorithms, there is no longer the need to manually define and code new pattern matching rules, which allows chatbots to be more flexible and no longer dependent on domain specific knowledge. As stated, AI models can be further categorised into Information Retrieval based models and Generative models. Information Retrieval Models. Information Retrieval based models are designed so that given a dataset of textual information, the algorithm will be capable of retrieving the information needed based on the user's input. The algorithm used is usually a Shallow Learning algorithm; nonetheless, there are also cases of Information Retrieval models that use Rule-based algorithms and Deep Learning ones. Information Retrieval based models include a pre-

defined set of possible answers; the chatbot processes the user query and based on this input it picks one of the answers available in its set. The knowledge base for this kind of model is usually formed by a database of question-answer pairs. One of the main downsides of this approach is that creating the necessary knowledge base can be costly, time-consuming, and tedious. Furthermore, if the great volume of data available provides for a greater training set and a wider knowledge base, it also implies it will be all the more challenging to match a user's input to the correct answer; a significant amount of time and resources must be deployed to train the system to select one of the correct answers available [29]. Finally, Information Retrieval systems, due to the fact that they do not generate answers but rather retrieve answers from a pre-defined set in their knowledge base, are arguably less suitable to be used as the underlying algorithm for conversational or chit-chat agents-the so-called social chatbots. Information Retrieval models are in fact less suitable to develop a personality, which is an important trait for this kind of chatbot [16].

2.3. NATURAL LANGUAGE UNDERSTANDING ENGINE :

The chatbot engine is thought of as one of the most critical elements of a chatbot, alias "Natural Language Understanding (NLU) engine" (Kar, R and Haldar, R. 2016). The NLU holds liability for the translation of conversational dialogs to actions which are understood by the machine. NLU engines use a variety of artificial intelligence methods to understand the natural language used in conversational interfaces such as chatbots. These methods consist of: Natural Language Processing (NLP) and Machine Learning (ML) (Kar, R and Haldar, R. 2016). Googles Dialogflow, previously known API.ai, is a natural language understanding engine that identifies the intent and context from the natural language in user supplied utterances. These concepts are used to develop the behaviour of the chatbot and how coherently it interacts with the user. Intents are used to establish a connection between the user input and the appropriate action to be executed by the chatbot in order for the user to achieve their goal.

2.4. ARTIFICIAL INTELLIGENCE :

"Artificial Intelligence is neither a new technology nor a machine". Artificial intelligence is the recognition of outcome-direction which is the rapid analysis of live data to achieve the expected goal. Outcome-directed thinking splits from the confines of the rule-directed approach that is accomplished through artificial intelligence. The generalised practice of AI can be broken down into a straightforward process which does not require an experienced level of proficiency to understand. First of all, a numerical representation is established for the target or outcome.

Specific data is then associated with the target is gathered and conditions and behaviours are investigated to increase the likelihood of achieving the expected target. Multiple aspects can determine the outcome. The weight of each aspects effect is computed. "AI uses the relative weighting of each aspect to create a prediction (evaluation) formula" (Yano, K. 2017).

2.4.1. ARTIFICIAL INTELLIGENCE METHODS :

"Natural Language Processing (NLP) is a theory motivated range of computational techniques, for the automatic analysis and representation of human language" (Jurafsky , D and Martin, J.H. 2017). Natural Language Processing technology has made great advancements in machine learning based systems to be able to extract meaning from natural language utterances also known as sentiment analysis (Cambria and White, 2014). There are many techniques used in NLP for the analysis of natural language include Entity recognition: which Entity Recognition is a technique which rrecognises entities in text. The most common entities include; nouns, organisations, people and places. Named Entity Recognition (NER) is the task of finding every instance of a named entity in text and label its type in order to classify it correctly (Jurafsky , D and Martin, J.H. 2017).

"Entities are domain specific information extracted from the utterance that maps the natural language phrases to their canonical phrases in order to understand the intent. They help in identifying the parameters which are required to take specific action" (Kar, R and Haldar, R. Kar and Haldar, 2016). Establishing the context of the of the users message is a vital feature that allows the chatbot to deal with situations that it may not be able to carry out a specific action for. This is due to the user input being very vague or may have an alternative meaning.

2.5. EXISTING PROBLEM :

The typical user care chatbot can answer simple questions, such as store locations and hours, directions, and maybe even making appointments. When a question falls outside of the scope of the pre- determined question set, the option is typically to tell the user the question isn't valid or offer to speak to a real person.

It is evident from the research carried out in the literature review that modern financial services are constantly seeking to expand their technologies, both to improve customer service and increase delivery of services through the advancements in technology. This is to gain a competitive edge over other banks for financial benefits and to expand its customer base. A domain specific chatbot will be implemented to assist users with their banking. In

order to overcome the user satisfaction issues associated with online banking services. The chatbot will provide personal and efficient communication between the user and their bank in order to manage their finances and get assistance when needed, such as; answering any queries and booking appointments.

2.6. PROPOSED SOLUTION :

In this project, there will be another option. If the user question is about the operation of a device, the application shall pass the question onto Watson Discovery Service, which has been pre-loaded with the device's owners manual. So now, instead of "Would you like to speak to a user representative?" we can return relevant sections of the owners manual to help solve our users' problems. So unless and until user specifically asks for a user representative the bot will try to solve all your queries. To take it a step further, the project shall use the Smart Document Understanding feature of Watson Discovery to train it on what text in the owners manual is important and what is not. This will improve the answers returned from the queries. Then using Watson actions as webhook, Watson Discovery can be integrated with Watson assistant. Finally using Node-Red, Watson assistant can be integrated with a web UI. This UI can then be used to connect with Watson assistant and chat with it .

The proposed solution is to create a chatbot to simulate a human conversation to assist users with their banking needs and to provide a more personal experience. Advancements in artificial Intelligence, machine learning techniques, improved aptitude for decision making, larger availability of domains and corpus, have increased the practicality of integrating a chat bot into applications (Dole et al., 2015).

2.7. SUMMARY :

Artificial Intelligence (AI) increasingly integrates our daily lives with the creation and analysis of intelligent software and hardware, called intelligent agents. Intelligent agents can do a variety of tasks ranging from labor work to sophisticated operations. A chatbot is a typical example of an AI system and one of the most elementary and widespread examples of intelligent Human-Computer Interaction (HCI) [1]. It is a computer program, which responds like a smart entity when conversed with through text or voice and understands one or more human languages by Natural Language Processing (NLP) [2]. In the lexicon, a chatbot is defined as "A computer program designed to simulate conversation with human users, especially over the Internet" [3]. Chatbots are also known as smart bots, interactive agents, digital assistants, or artificial

conversation entities.

Chatbots can mimic human conversation and entertain users but they are not built only for this. They are useful in applications such as education, information retrieval, business, and e-commerce [4]. They became so popular because there are many advantages of chatbots for users and developers too. Most implementations are platform-independent and instantly available to users without needed installations.

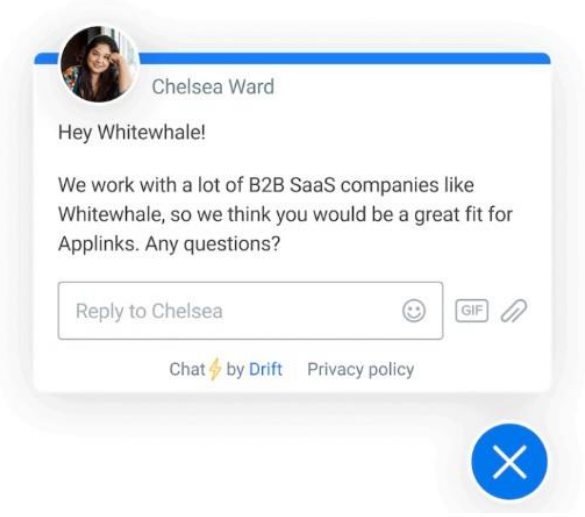
CHAPTER 3 : CONCEPTS OF CHATBOTS

3.1 CHATBOT OVERVIEW :

3.1.1. WHAT IS AN AI CHATBOT?

Artificial intelligence chatbots are chatbots trained to have human- like conversations using a process known as natural language processing (NLP).With NLP, the AI chatbot is able to interpret human language as it is written, which enables them to operate more or less on their own.

In other words,AI chatbot software can understand language outside of pre- programmed commands and provide a response based on existing data. This allows site visitors to lead the conversation, voicing their intent in their own words.



*F*igure 4: AI Chatbot

What's more, AI chatbots are constantly learning from their conversations — so, over time, they can adapt their responses to different patterns and new situations. This means they can be applied to a wide range of uses, such as analyzing a customer's feelings or making predictions about what a sitevisitor is looking for on your website.

3.1.2. HOW AN AI CHATBOT WORKS ?

Today, one of the biggest roadblocks to AI adoption is that nearly half of all marketers consider themselves AI beginners. But the truth is you don't need to have a PhD in NLP (or even be a programmer) to set up an AI chatbot.

All you need is a good AI chatbot software and a basic understanding of how an AI chatbot operates. Here's a quick rundown 👇

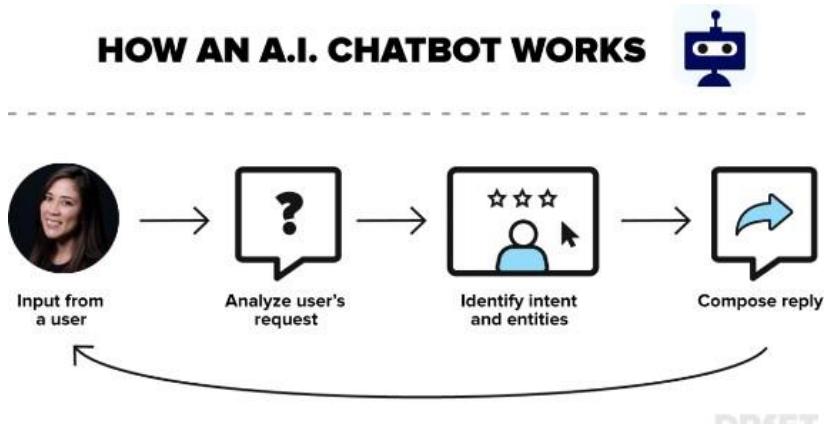


Figure 5: Working of Ai Chatbot

At the base level, an AI chatbot is fed input data which it interprets and translates into a relevant output. So, if a site visitor asks a question, the AI chatbot will analyze their intent, as well as other factors like tone and sentiment, and then attempt to deliver the best possible answer.

3.2 BENEFITS OF CHATBOT:

3.2.1 USE CHATBOTS TO CONVERT MORE WEBSITE TRAFFIC:

The average conversion rate on a website generally sits in the ~1% range. That's a lot of work to do for a lot of wasted traffic! One of the most effective ways we see bots being used is to help nudge leads who might not have con- verted without chat over the hump. Sometimes a quick question or a proactive offer to help can be the difference between average conversion rates, and filling your pipeline full of qualified leads.

These are especially useful on high intent pages, like a pricing page. As you can imagine, here at Drift we create a lot of bots, so we have created two sep- arate pricing page bots to optimize the pricing experience:

1. First Touch Pricing– Appears when you first visit the pricing page
2. Return Visit Pricing– Appears when you return to the pricing page

3.2.2. USE CHATBOTS TO GENERATE MORE QUALIFIED LEADS

Traditional landing pages have been in a state of stagnation for what seems like an eternity. One effective and creative way we've seen our customers use bots is to embed a bot right in the same view as a .pdf once a lead has given their email.

What this allows you to do is to start a conversation at any point while they're reading your latest e-book. It's a great way to take advantage of all the effortyou put into creating content.

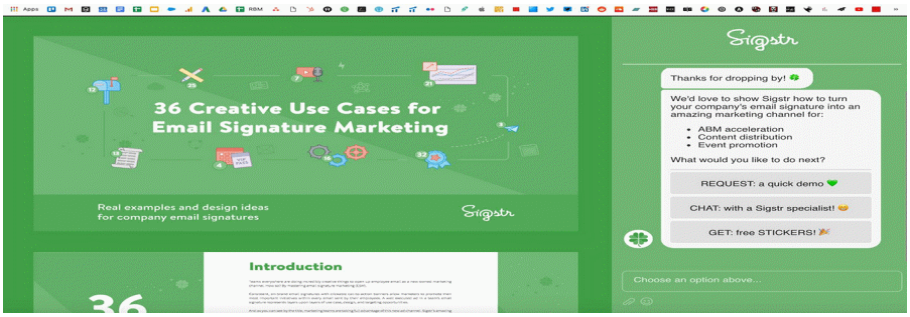


Figure 6: chatbots in Marketing

3.2.3. USE CHATBOTS TO AUTOMATE BUSINESS PROCESSES

Many chatbot software applications out there do just one thing – chat. However, a true conversational marketing platform that fully integrates into & automates your existing business processes is exactly what we're building here.

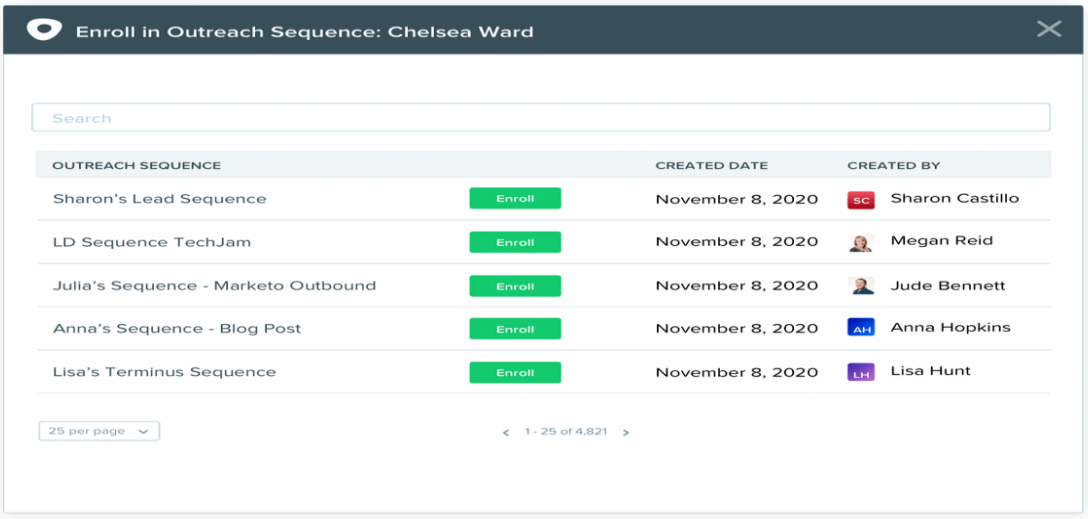


Figure 7: chatbots automating business process

The reality is that it's never enough to just have a conversation. Once the con- versation is completed, there's so many actions you can take to move the con- versation further along. From scoring leads, to entering in conversation notes, to entering leads into a custom drip email sequence with one click.

3.2.4. USE CHATBOTS TO ELEVATE CUSTOMER SERVICE

Today it's not enough to just generate more leads & sales. Today consumer expects an all-around great customer experience, and the impact of those experiences, good or bad, is felt most heavily in customer support. The reality is that consumer expectations are only getting faster, so many customer support teams have struggled to match the "Amazon" style expectations.

One way we see modern Support teams adapting is to use chatbots as the first line of defense. Below you can see the chatbot pull help articles directly from the help article database. If this article answers the person's question, the conversation is over and you've saved yourself a support call. If more help is needed, the bot can automatically route the conversation to a person for a more personal touch.

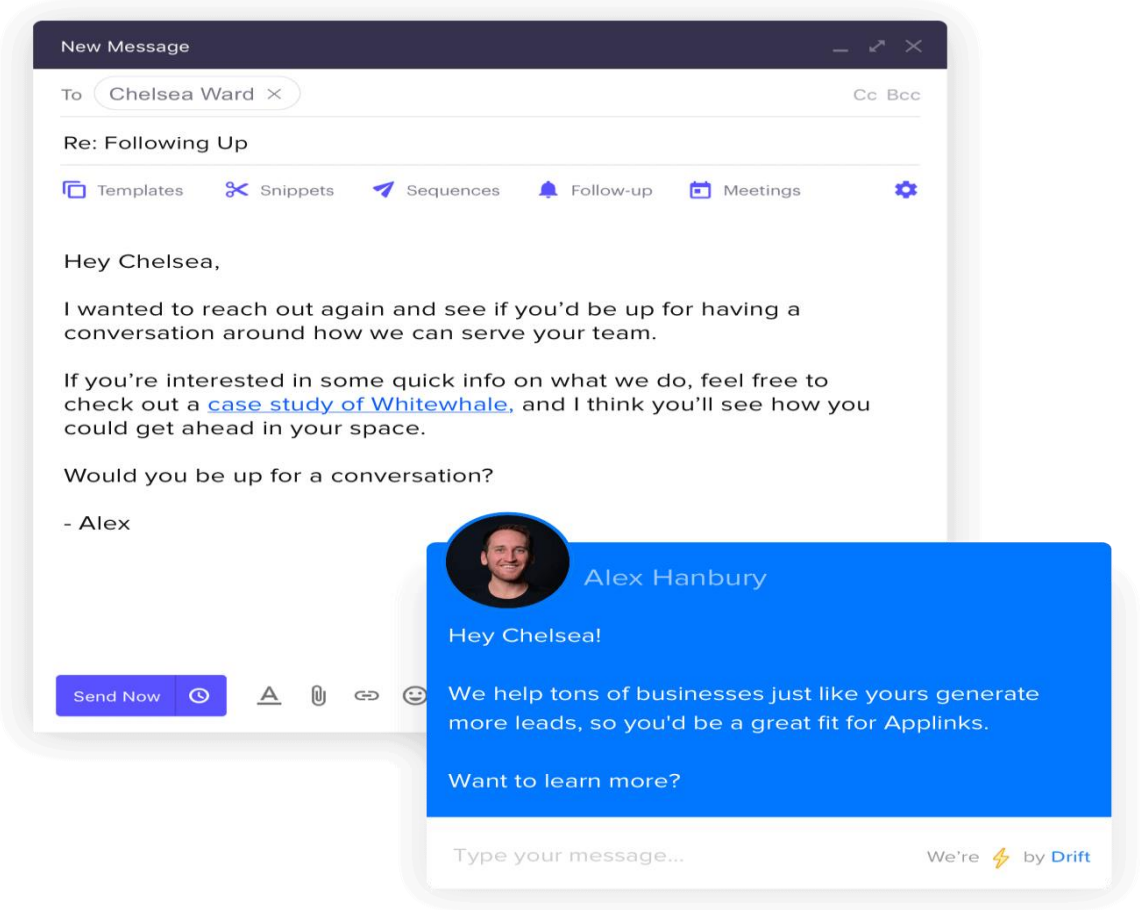


Figure 8: Chatbots elevating customer service

3.3 IMPORTANCE OF CHATBOTS

3.3.1. THE PROBLEMS WITH TRADITIONAL ONLINE CUSTOMER EXPERIENCES

Just like any emerging technology, chatbots will only become widely adopted if it's shown that they can solve real problems. Otherwise, the novelty will eventually wear off.

So in order to better understand where the opportunity lies for chatbots, we asked our 1,000+ survey participants to think about the online services they use today, such as search engines, messaging apps, product/service websites,and mobile apps.

Then we asked them: *What frustrations have you experienced with these onlineservices in the past month?*

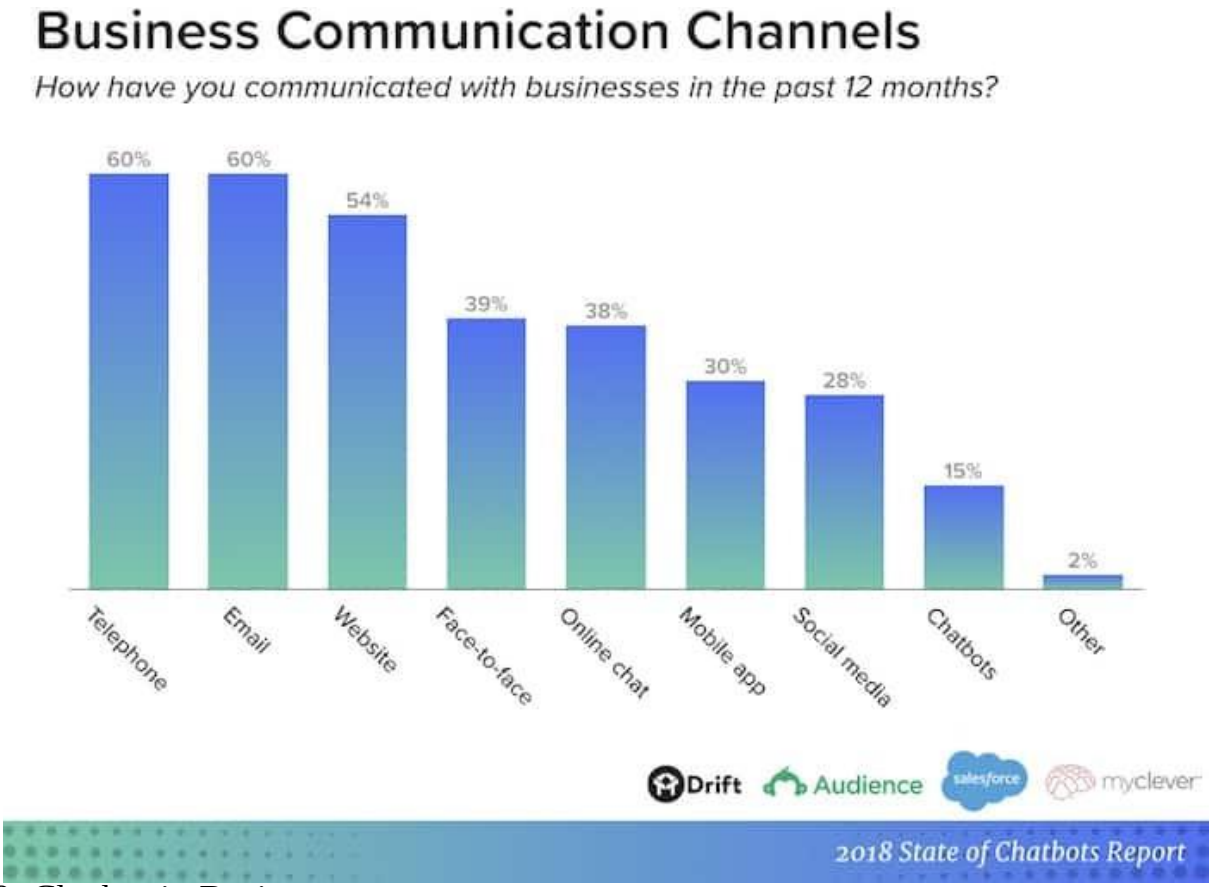


Figure 9: Chatbot in Business

The most common frustrations reported by consumers included:

1. Websites being hard to navigate (34%)
2. Not being able to get answers to simple questions (31%)
3. Basic details about a business — like address, hours of operations, and phone number — being hard to find (28%).

3.3.2. USES AND POTENTIAL BENEFITS

Now that we understand the main problems consumers have with traditional online experiences, let's look at if (and how) chatbots can actually solve theseproblems.

It's also worth noting that 34% of consumers predicted that they'd use chatbots as a means to having a human conversation & human interaction.

The takeaway: There's alignment between consumers' frustrations and their predicted use cases for chatbots. Consumers want to be able to use chatbots to surface information and get

answers quickly and easily. And if a chatbot doesn't have all the answers, consumers would like that chatbot to be able toconnect them with a human.

3.3.3. BLOCKERS TO WIDER CHATBOT ADOPTION

Despite the many uses and benefits that consumers predict chatbots will be able to provide, the mass adoption of chatbots isn't a foregone conclusion. Especially when you consider how new the technology is, it's understandablethat consumers would have some concerns.

So, we felt it was important for us to ask our survey participants the following question: What would stop you from using a chatbot?

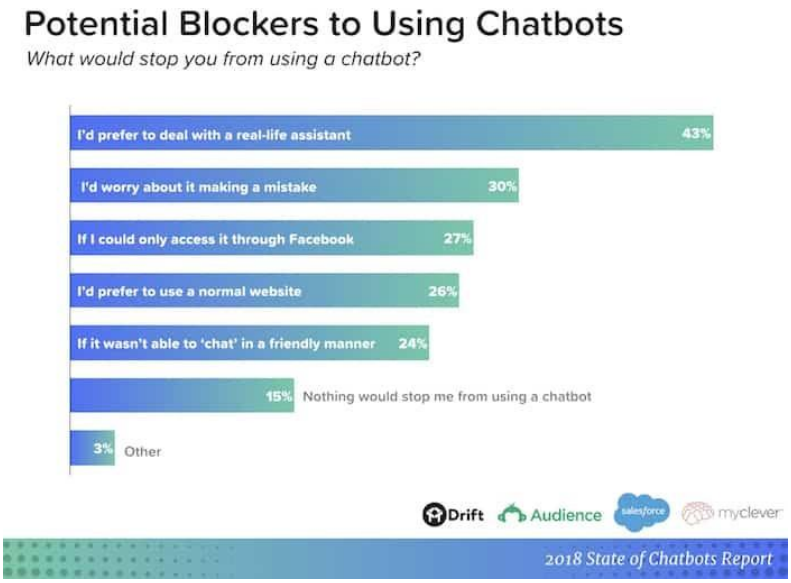


Figure 10: Potential Blockers for chatbots

3.3.4. CONCLUSION

These days, consumers expect to be able to find the information they're looking for online quickly and easily. And when a business can't provide that type of experience, they become frustrated. Chatbots are poised to ease these frustrations by providing the real-time, on-demand approach that consumersare seeking out.

The top three potential benefits of chatbots that consumers reported in our survey:

1. 24-hour service (64%)
2. Instant responses (55%)
3. Answers to simple questions (55%)

And that's true across all age groups. It's not just Millennials who see the potential benefits of chatbots. In fact, Baby Boomers were 24% more likely to to expect benefits from chatbots in five of the nine categories we looked at compared to their Millennial counterparts.

However, chatbots — like all technologies — aren't without their limitations: 43% of consumers said they prefer dealing with an actual person (that was the number one potential barrier to using chatbots). That being said, 34% of consumers also predicted that they would use chatbots for getting connected with a human. So it doesn't have to be either/or. As a business, you can use chatbots to supplement your human workforce (not replace them).

And while chatbots can't replace phone or email when it comes to providing in-depth answers to technical questions (some things will always require a human touch), they are poised to become the new apps. As you saw in the previous section, chatbots outperformed apps in the following five benefits categories:

1. Quick answers to simple questions (Chatbots, 69% | Apps, 51%)
2. Getting 24-hour service (Chatbots, 62% | Apps, 54%)

3. Quick answers to complex questions (Chatbots, 38% | Apps, 28%)
4. Ability to easily register a complaint (Chatbots, 38% | Apps, 28%)
5. Getting detailed / expert answers (Chatbots, 28% | Apps, 27%)

3.4. CREATING A CHOTBOT

➞Step 1. Copy and paste the Drift Javascript snippet into the header of your website.

The best way to get Drift up and running on your site is to drop a quick JavaScript code block (or "snippet") into the head tag of your website. Simply copy the code block from the install webpage and paste.

➞Step 2. Connect your calendar, set up routing rules, and add your team.

Allow your chatbot to schedule meetings for you while you're out of office by connecting your calendar.

➞Step 3. Copy and paste questions from your standard form into the leadbot visual builder. Turn it on!

You're almost there! Now it's time to give your bot the finishing touches and make your bot conversational with some of the questions you might have on a form. Then, in Drift, you can plug these questions into the leadbot visual builder as questions for your bot.

Remember, you want to keep things conversational — even if you're using a bot. Make sure your chatbot copy is friendly and engaging for a website visitor. We put together some chatbot examples for you to make chats more inviting.

3.4.1. HOW TO DEVELOP A CHATBOT FROM SCRATCH ?

If you feel convinced that custom chatbot development is the right thing to do, let's now find out how to invest management time and engineering effort best in order to build a chatbot solution perfect for you and your business.

The question that frequently arises when an organization arrives at the idea of chatbot development is what exactly they should do and in what sequence to turn this idea into an actual feature. For your convenience, we've prepared a step-by-step guide on how to create a chatbot. Let's look at each of the seven stages – from choosing the chatbot type to chatbot deployment and maintenance.

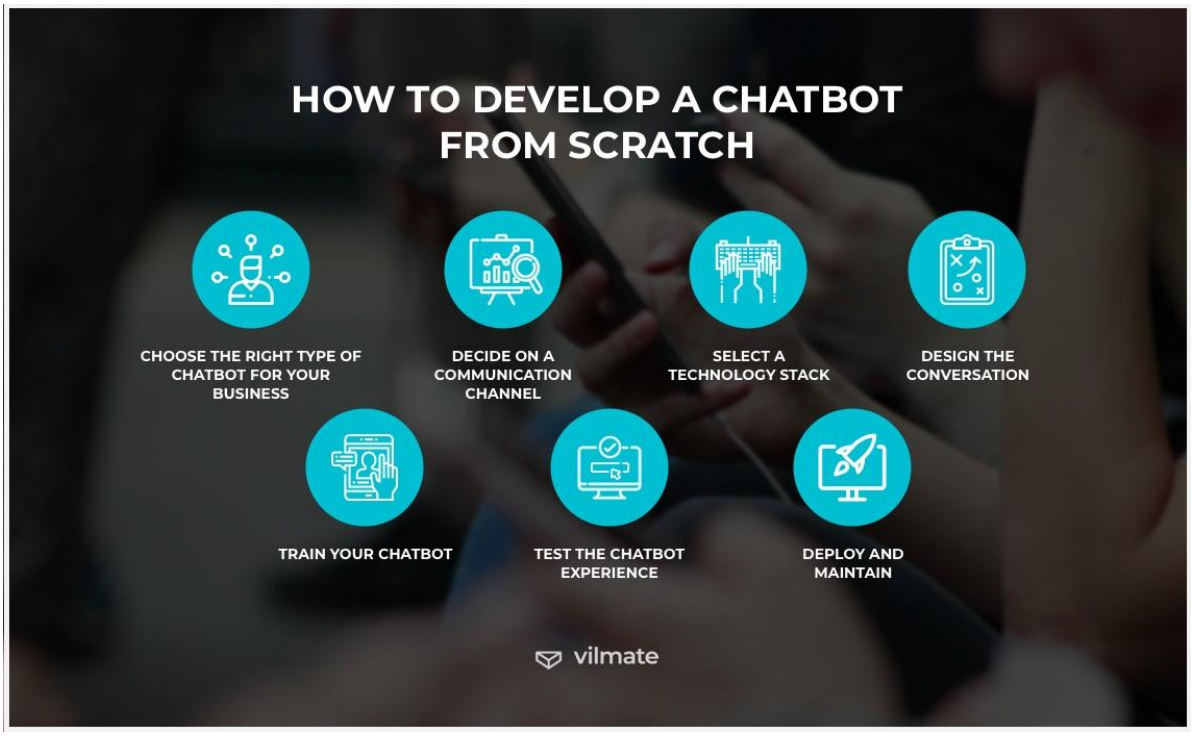


Figure 11: chatbot development

3.5 CHATBOT TYPES

For simplification purposes, most classifications single out two main chatbot types: **pattern-based** chatbots and **learning-based** AI chatbots. The former is more primitive, while the latter is more advanced and sophisticated.

Early chatbots were the chatbots using **pattern matching** for text classification and response reproduction. ELIZA was the first chatbot of this kind released as early as 1966.

AI-based chatbots are much more successful as they use the power of ML not only to match the output with the user input but also to understand, contextualize, and predict. This is the type of chatbots that is nowadays used to effectively optimize the work of sales representatives, customer support, that is used in personal assistance, and more. The algorithms in AI-based chatbots are trained using historical data from actual user responses. Due to their ability to understand the context of a message, they can more naturally engage in a conversation without being explicitly trained and, thus, can be further improved through ongoing user feedback.

3.6. SUMMARY :

Chatbots have quickly become key cogs in the enterprise business. They make it far easier (in

most cases) to resolve outstanding customer issues and eliminate a significant amount of manual work for live support agents. With that said, they are not to be perceived as human replacements, but rather as human augmentation.

Customers still value the ability to interact with live agents, particularly for more complex queries. Thus, keeping a human in the loop remains essential to the overall chatbot equation.

As businesses look to make information more easily accessible (both internally and externally), expect to see even further innovation in chatbot technology. Key to that innovation equation is deeper contextual understanding of language. We know a thing or two about that.

CHAPTER 4 TECHNOLOGIES USED

4.1. NATURAL LANGUAGE PROCESSING (NLP) :

NLTK is a leading platform for building Python programs to work with human language data. It provides easy-to-use interfaces to over 50 corpora and lexical resources such as WordNet, along with a suite of text processing libraries for classification, tokenization, stemming, tagging, parsing, and semantic reasoning, wrappers for industrial-strength NLP libraries, and an active discussion forum.

> Thanks to a hands-on guide introducing programming fundamentals alongside topics in computational linguistics, plus comprehensive API documentation, NLTK is suitable for linguists, engineers, students, educators, researchers, and industry users alike. NLTK is available for Windows, Mac OS X, and Linux. Best of all, NLTK is a free, open source, community-driven project.
>
> NLTK has been called “a wonderful tool for teaching, and working in, computational linguistics using Python,” and “an amazing library to play with natural language.”

Natural Language Processing with Python provides a practical introduction to programming for language processing. Written by the creators of NLTK, it guides the reader through the fundamentals of writing Python programs, working with corpora, categorizing text, analyzing

linguistic structure, and more. The online version of the book has been been updated for Python 3 and NLTK 3. (The original Python 2 version is still available at https://www.nltk.org/book_1ed.)

4.1.1. PUNKT :

In NLTK, PUNKT is an unsupervised trainable model, which means it can be trained on unlabeled data (Data that has not been tagged with information identifying its characteristics, properties, or categories isreferred to as unlabeled data.)

It generates a list of sentences from a text by developing a model for words that start sentences, prepositional phrases, and abbreviations using an unsupervised technique. Without first being put to use, it has to be trained on a sizable amount of plaintext in the intended language.

While working on any project under the natural language processing domain, nltk is the most vital module used. Now, nltk does have an extensive range of functions, but sometimes to increase the efficiency and to verify the outputs are accurate and the developed model is considering all case scenarios, we need to import a few extra modules.

4.1.2. WORDNET :

Nltk wordnet is an English lexical database (dictionary) built primarily for NLP. Synset is a specific type of simple interface used in NLTK that allows users to search WordNet for words. Synset examples are collections of words that are synonymous and express the same idea. Some words have a single Synset, whereas others have multiple Synsets. WordNet is a focused English dictionary with a more complex structure than a typical thesaurus.

- Wordnet is an English database for lexical which was based on the NLTK corpus reader. It can be used to look for word definitions, synonyms, and antonyms.
- It's best described as an English dictionary with a semantic focus. The import command is used to bring it into the system. Because Wordnet is a corpus, it is pulled from the ntlk.corpus directory.
- Both the synonym and antonym lists are left blank, and they will be appended later. The module synsets search for active words of synonyms and add them to the synonyms list. It is very useful in python programming language.

4.1.3. OMW-1.4 :

- NLTK 3.6.6 release: December 2021:
- add precision, recall, F-measure, confusion matrix to Taggers
- support alternative Wordnet versions (#2860)
- support OMW 1.4, use Multilingual Wordnet Data from OMWwith newer Wordnet versions
- add multi Bleu functionality
- allow empty string in CFG's + more
- fix several TreebankWordTokenizer and NLTKWordTokenizerbugs
- fix levenstein distance for duplicated letters
- modernize nltk.org/howto pages
- update third party tools to newer versions

4.2. MACHINE LEARNING :

Machine learning is concerned with the creation of computer programs that can learn to adapt and learn in response to new input. It's also known as Predictive Analytics or Statistical Learning, and it's a research area in the field of statistics, big data, and software engineering. Machine learning teaches computers to do what comes naturally to humans and animals through the experience of learning. Machine learning algorithms use methods to "read" data directly from the data without relying on a predetermined number as an example. Algorithms improve their performance as the number of samples available for learning increases.

Machine learning helps us to find a natural pattern in data that allows us to produce insights and helps us make better decisions and predictions. These are used in our daily lives to make decisions in critical situations such as weather forecasting, medical diagnosis and much more. Coming to real- time applications in machine learning, as the concept of machine learning increases with great data it has become increasingly important to solve many problems such as image processing and computer vision. It assists in natural language processing.

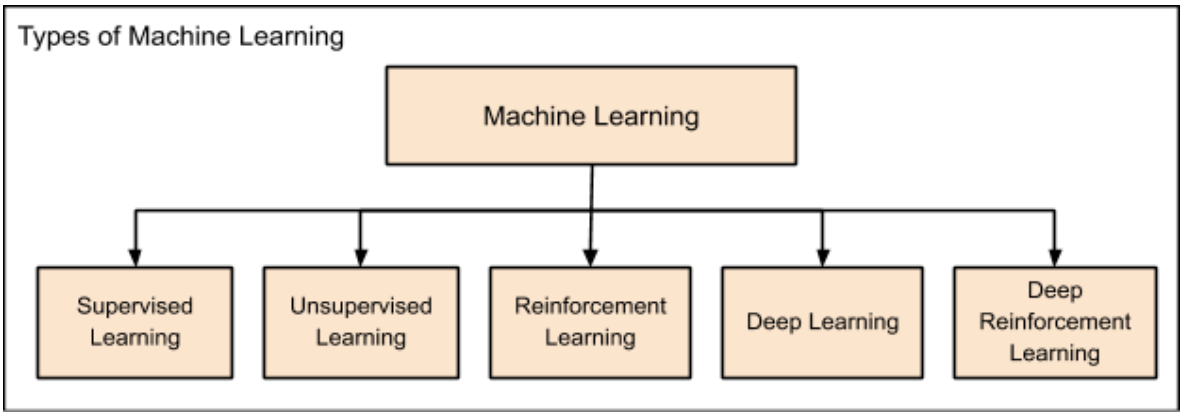


Figure : Types of machine learning

4.2.1. SKLEARN :

Scikit-learn is probably the most useful library for machine learning in Python. The sklearn library contains a lot of efficient tools for machine learning and statistical modeling including classification, regression, clustering and dimensionality reduction.

Please note that sklearn is used to build machine learning models. It should not be used for reading the data, manipulating and summarizing it. There are better libraries for that (e.g. NumPy, Pandas etc.)

4.2.2. TFIDFVECTORIZER :

TF-IDF:

Term frequency-inverse document frequency is a text vectorizer that transforms the text into a usable vector. It combines 2 concepts, Term Frequency (TF) and Document Frequency (DF).

The term frequency is the number of occurrences of a specific term in a document. Term frequency indicates how important a specific term in a document. Term frequency represents every text from the data as a matrix whose rows are the number of documents and columns are the number of distinct terms throughout all documents.

Document frequency is the number of documents containing a specific term. Document frequency indicates how common the term is.

Inverse document frequency (IDF) is the weight of a term, it aims to reduce the weight of a term if the term's occurrences are scattered throughout all the documents. IDF can be calculated as follow:

$$idf_i = \log(\frac{n}{df_i})$$

Where idf_i is the IDF score for term i, df_i is the number of documents containing term i, and n is the total number of documents. The higher the DF of a term, the lower the IDF for the term. When the number of DF is equal to n which means that the term appears in all documents, the IDF will be zero, since log(1) is zero, when in doubt just put this term in the stopword list because it doesn't provide much information.

The TF-IDF score as the name suggests is just a multiplication of the term frequency matrix with its IDF, it can be calculated as follow:

$$w_{i,j} = tf_{i,j} \times idf_i$$

Where w_{ij} is TF-IDF score for term i in document j, tf_{ij} is term frequency forterm i in document j, and idf_i is IDF score for term i.

4.2.3. COSINE SIMILARITY :

Cosine similarity measures the similarity between two vectors of an inner product space. It is measured by the cosine of the angle between two vectors and determines whether two vectors are pointing in roughly the same direction. It is often used to measure document similarity in text analysis.

A document can be represented by thousands of attributes, each recording the frequency of a particular word (such as a keyword) or phrase in the document. Thus, each document is an object represented by what is called a term-frequency vector. For example, in Table 2.5, we see that Document1 contains five instances of the word team, while hockey occurs three times. The word coach is absent from the entire document, as indicated by a count value of 0. Such data can be highly asymmetric.

4.3. SUMMARY :

Chatbots aren't new in the tech world, though they have hit the mainstream only in 2016. It was the first wave of AI technology introduced to the masses.

In contrast to chatbots of the past, the most sophisticated of today's chatbots have the ability to carry on a real organic conversation. Enterprise chatbot solutions offer rich sources of data for further analysis. With the help of this data, brands become more perceptive to customers needs. By delivering personalized products and services, businesses optimize engagement, gain better relevance, and higher revenue. Messaging apps simply outstrip other types of applications. The primary driver that stood behind 2016's chatbot outbreak decreased user interest in social media and messaging apps.

Users don't need hundreds of apps on their mobile devices to support each separate brand. Messaging applications solve this problem – they are simple, easy, and fast. Thereafter, businesses follow their audience.

CHAPTER 5 DESIGN AND IMPLEMENTATION

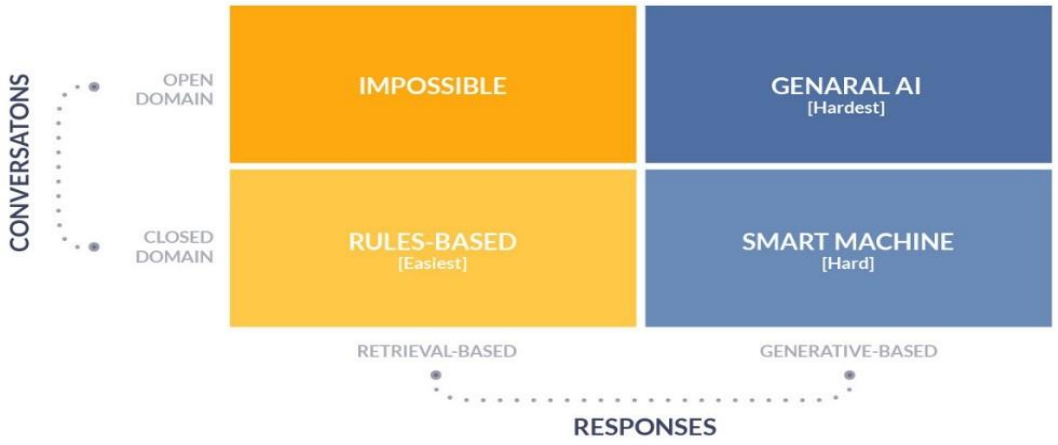
5.1. CHOOSING RIGHT TYPE OF CHATBOT FOR OUR PURPOSE :

As i want to develop a chatbot that is not application specific it is a domain specific chatbot that i want to develop . We can train the chatbot that i build for different purposes according to over domain. To alter the bot to specific domain we use a corpus file .Whatever the data we store in the corpus file the chatbot will train itself on that data using different Artificial Intelligent (AI) Methodologies like Natural Language Processing (NLP) and Machine Learning (ML) and the techniques involved in those methodologies . For example if we want to use the chat bot to answer

FAQS about a specific firm then we store those FAQs ans answer into the corpus file then we train the chatbot on top of that corpus file or if we want the chatbot to provide information about a specific technology then we store all the knowledge about that technology in that same corpus file

then the chatbot itself trains on that data.

Figure 12: Choosing best suitable chatbot



As we have many types of chatbots we need to choose the best suitable chatbot for our purpose. Since we change the behaviour of our bot according to domain and it should learn itself from the training data we choose general AI chatbot from the available types of chatbots.

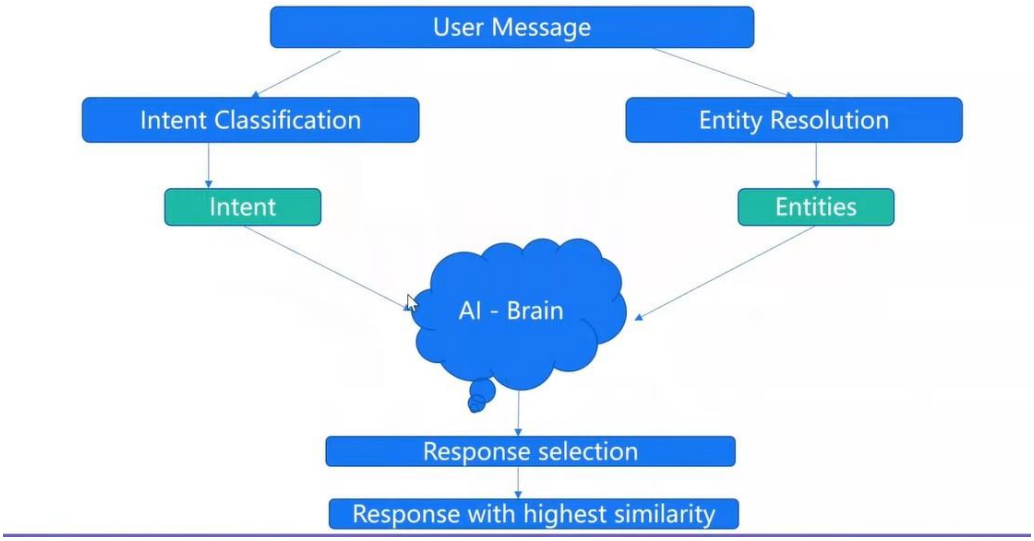
5.2. CHOOSING TECHNOLOGY FOR CHATBOT :

Continuously many technologies are evolving the market like Big Data
, Data Science and

Artificial Intelligence etc . Personally we choose the Artificial Intelligence to build our chatbot because AI includes Natural Language Processing and Machine Learning that helps us to Build efficient Chatbot. The responses from the chatbot will we Accurate if we use this AI technology to build our chatbot. Hence we fix NLP and Machine Learning as the bases to Build our Chatbot.

5.3. UNDERSTANDING THE CHATBOT ARCHITECTURE :

First the User will send a message to the chatbot. Then from that message using the above mentioned technologies we classify different intents present in the User message and also different Entities are resolved from the User message.



5.4. DESIGNING CODE FOR THE CHATBOT :

5.4.1 IMPORTING THE REQUIRED MODULES FOR THE PROJECT :

5.4.1.1. NUMPY MODULE :

NumPy is an open-source Python programming library that simplifies the process of numerical computing with a focus on mathematical functions and arrays. NumPy is also the foundation of an extensive ecosystem of Python products and libraries, with the NumPy library itself being based on C and Fortran. Many Python users draw upon NumPy and other programming libraries which are dependent on NumPy, such as Pandas, SciPy, and Seaborn. NumPy is highly interoperable and works with multiple programming languages, hardware, and platforms. Whether you are a data scientist in the social sciences and academic research or working within engineering and computer science, there are multiple uses for the NumPy programming library.

for performing exploratory analysis on a dataset. Especially when used within a Python environment like JupyterLab and/or Notebook, you can use NumPy to work through a series of functions that are useful for making inferences and initial hypotheses. In particular, these functions can be used for returning descriptive statistics within the NumPy library. Whether you require the average of a set of values or the standard deviation, there are functions that can be used to perform calculations that return a statistical overview of the dataset under analysis.

5.4.1.2. NATURAL LANGUAGE TOOL KIT (NLTK) :

NLTK is a leading platform for building Python programs to work with human language data. It provides easy-to-use interfaces to over 50 corpora and lexical resources such as WordNet, along with a suite of text processing libraries for classification, tokenization, stemming, tagging, parsing, and semantic reasoning, wrappers for industrial-strength NLP libraries, and an active discussion forum.

5.4.1.3. STRING :

It's a built-in module and we have to import it before using any of itsconstants and classes.

String Module Constants

Let's look at the constants defined in the string module.

```
import string


# string module constants
print(string.ascii_letters)
print(string.ascii_lowercase)
print(string.ascii_uppercase)
print(string.digits)
print(string.hexdigits)
print(string.whitespace)  # ' \t\n\r\x0b\x0c'
print(string.punctuation)
```

from the above constants we use string.punctuation and string.lower() forour project.

5.4.1.4. RANDOM :

The Python Random module is a built-in module for generating random integers in Python. These are sort of fake random numbers whichdo not possess true randomness.

```
#@title Importing required files for project
import numpy as np
import nltk #this is natural language took kit
import string # this is used for string manipulations
import random # this is used to generate random responses
```

Figure 15: Importing modules in chatbot code

5.4.2. READING THE CORPUS FILE :

This file is used to train the chatbot in specific domain. Whatever the data we place in the corpus file , that data on top which our chatbot is trained and we can develop the file according to our specifications . We can grow our training data into large extend. This file can be stored in the google drive and can be accessed whenever required by the chatbot. We can change the content in that file according to our Domain. To read the data from the corpus file into the code of chatbot we use the File Handling concept of the python programming .

Figure 16: reading the corpus file

5.4.3. DOWNLOADING TOOLS FROM NLTK :

Before downloading the tools from the nltk convert the whole data intolowercase.

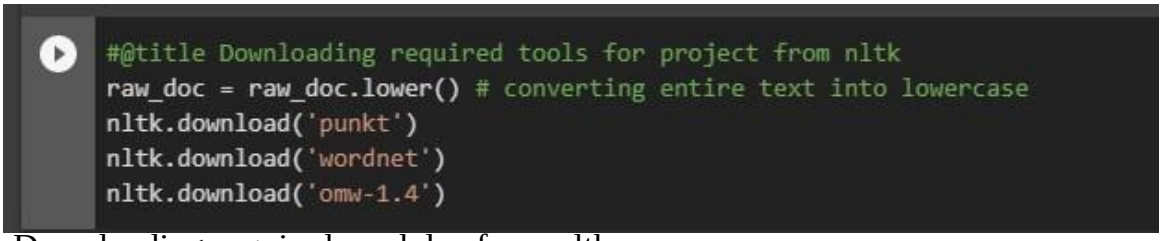


Figure 17: Downloading required modules from nltk

5.4.3.1. USAGE OF PUNKT :

In chatbot this punkt took module is used as a tokenizer which is used to divide the text into list of sentences by using an unsupervised algorithm from machine learning then it builds a model for abbreviation words, collocations , and words that start sentences. Before using the punkt

5.4.3.2. USAGE OF WORDNET :

In chatbot this Wordnet took is used to find the meanings of words,Synonyms, Antonyms, and more.

5.4.3.3. USAGE OF OMW-1.4 :

In chatbot it is used to add multi Bleu Functionality. This is theextension of the Wordnet but this contains the newer version words.

5.4.4. TOKENIZING THE CORPUS DATA :

For Tokenizing the data we use the module called tokenize() which is present in the NLTK in that tokenize() we use sent_tokenize() to split the huge data in paragraphs into individual sentences and we use word_tokenize() to split the sentences into word tokens.

```
#@title Tokenizing the data
#now we need to convert the raw_doc into sentence token and word token
# for that we make use of sentence tokenizer and word tokenizer form nltk

sentence_tokens = nltk.sent_tokenize(raw_doc)
word_tokens = nltk.word_tokenize(raw_doc)
```

Figure 18: Tokenizing the corpus data

5.4.5. PERFORMING TEXT PREPROCESSING STEPS :

In this text preprocessing step we perform stemming and lemmatization on the data on the corpus file. Where Stemming is used to extract the base form of the words by removing the affixes from the words. For example the stem of words like eaten, eating, eats, eaten is eat. Lemmatization is slightly different from stemming. Lemmatization considers the context and converts the words into its meaningful base form, which is called Lemma. For example, stemming converts Caring into Car but Lemmatization converts Caring into Care.

```
#@title Performing Text Pre-Processing steps
# we completed tokenization and here we do stemming i.e. we remove stop words
# then we do lemmatization (Lemmatization is a text normalization technique used
# in Natural Language Processing (NLP), that switches any kind of a word to its
# base root mode. Lemmatization is responsible for grouping different inflected
# forms of words into the root form, having the same meaning.)

lemmer = nltk.stem.WordNetLemmatizer()

# the above statement does stemming .i.e it removes all stop words like 'a',
# 'an','the' and punctutions because they are not informative and to give pure
# words for lemmatization

def LemTokens(tokens):
  return [lemmer.lemmatize(token) for token in tokens]
remove_punc_dict = dict((ord(punct),None) for punct in string.punctuation)
def LemNormalize(text): #this function removes all punctuations
  return LemTokens(nltk.word_tokenize(text.lower().translate(remove_punc_dict)))
```

Figure 19: Stemming and Lemmatization

5.4.6. DEFINING GREETING FUNCTIONS :

Even though we are building the chatbot that learns Using AI Methodologies, we need to supply the rule based starting and ending Conversations to the chatbot. So we create to lists called User responses and the Chatbot responses for the user response.

```
[ ]  #@title Define Greeting Functions
     greet_inputs = ('hello','hi','whassup','how are you?')
     greet_responses = ('hi','hey','hey there!','there there!!')
     def greet(sentence):
       for word in sentence.split():
         if word.lower() in greet_inputs:
           return random.choice(greet_responses) # returns a random element
```

Figure 20: defining greeting functions

5.4.7. RESPONSE GENERATION BY BOT USING MACHINE LEARNING :

Scikit-learn (Sklearn) is the most useful and robust library formachine learning in Python. It provides a selection of efficient tools for

machine learning and statistical modeling including classification, regression, clustering and dimensionality reduction via a consistenceinterface in Python.

```
#@title Response Generation By the Bot
# for intelligence of bot we use cosine similarity and tfidf Vectorizer

from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics.pairwise import cosine_similarity

#vectorizer will converts the words into numerical vectors that is related to
# machine learning models
#cosine similarity is used to measure the similarity between two tokens
```

Figure 21: applying machine learning tools

5.4.8. WRITING RESPONSE FUNCTION FOR THE CHATBOT :

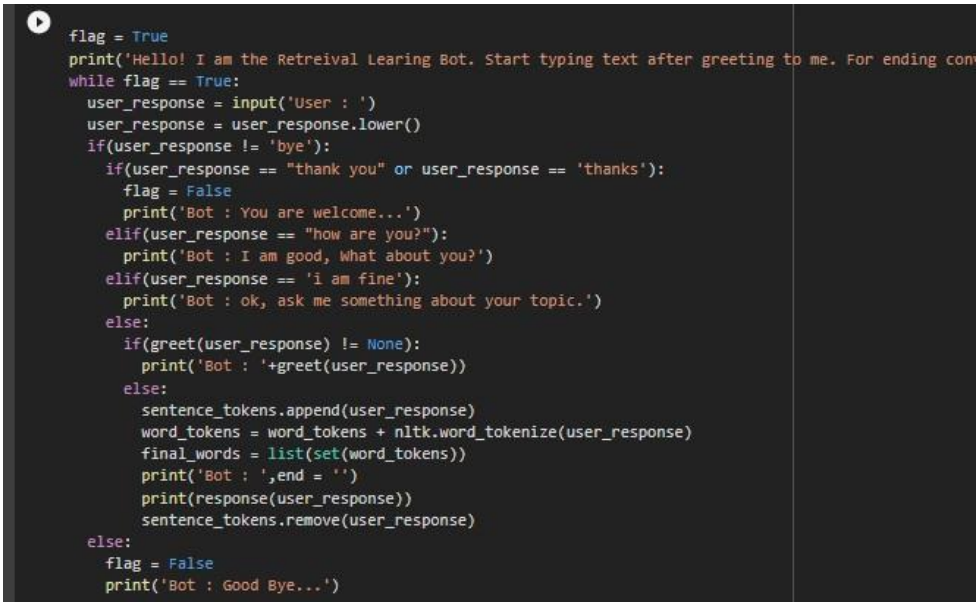
First we create an empty string named robo1_response then we perform tfidfvectorizer function on the data and we store that numerical vector information in variable named TfidfVec.

```
def response(user_response):
  # this funciton basically response to every user input
  robo1_response = ''
  TfidfVec = TfidfVectorizer(tokenizer = LemNormalize, stop_words = 'english')
  # stop words of english language are removed and coverted to vectors
  tfidf = TfidfVec.fit_transform(sentence_tokens)
  # converting tokens into vector form then we perform cosine similarity on top
  # of them
  vals = cosine_similarity(tfidf[-1],tfidf)
  # now sorting the most similar arguments in the vals
  idx = vals.argsort()[0][-2]
  flat = vals.flatten()
  flat.sort()
  req_tfidf = flat[-2] #requested_tfidf
  if(req_tfidf == 0):
    robo1_response = robo1_response + 'I am Sorry, Unable to Understand you.'
    return robo1_response
  else:
    robo1_response = robo1_response + sentence_tokens[idx]
    return robo1_response
```

Figure 22: response function for chatbot

5.4.9. DEFINING CHAT FLOW FOR CHATBOT :

In that while loop we repeatedly take the input from the user and if the user response is ‘bye’ then we again check the condition that the user response is equals to ‘thank you’ or ‘thanks’.



```
flag = True
print('Hello! I am the Retreival Learing Bot. Start typing text after greeting to me. For ending con
while flag == True:
  user_response = input('User : ')
  user_response = user_response.lower()
  if(user_response != 'bye'):
    if(user_response == "thank you" or user_response == 'thanks'):
      flag = False
      print('Bot : You are welcome...')
    elif(user_response == "how are you?"):
      print('Bot : I am good, What about you?')
    elif(user_response == 'i am fine'):
      print('Bot : ok, ask me something about your topic.')
    else:
      if(greet(user_response) != None):
        print('Bot : '+greet(user_response))
      else:
        sentence_tokens.append(user_response)
        word_tokens = word_tokens + nltk.word_tokenize(user_response)
        final_words = list(set(word_tokens))
        print('Bot : ',end = '')
        print(response(user_response))
        sentence_tokens.remove(user_response)
  else:
    flag = False
    print('Bot : Good Bye...')
```

Figure 23: defining chatbot flow

CHAPTER 6 CODE AND OUTPUT

6.1. FULL LENGTH CODE FOR DOMAIN SPECIFIC CHATBOT :

```
#@title Importing required files for project
import numpy as np
import nltk #this is natural language took kit
import string # this is used for string manipulations
import random # this is used to generate random responses#@title Reading the corpusfile
import warnings warnings.filterwarnings('ignore')

f = open('snist','r',errors = 'ignore')
raw_doc = f.read() # then we perform pre-processing on this entire document#@title Downloading required tools for project from nltk
raw_doc = raw_doc.lower() # converting entire text into lowercasenltk.download('punkt',quiet = True)

#The argument to nltk. download() is not a file or module, but a resource id #that maps to a corpus, machine-learning model or other resource (or collection#of resources) to be installed in your NLTK_DATA area.
# here punkt is a tokenizer tool in nltk and This tokenizer divides a text into #a list of sentences by using an unsupervised algorithm to build a model for#abbreviation words, collocations, and words that start sentences. It must be#trained on a  large collection of plaintext in the target language before
#it can be used. nltk.download('wordnet',quiet = True)

#WordNet is a lexical database for the English language, which was created by
```

```
# Princeton, and is part of the NLTK corpus. You can use WordNet alongside #the NLTK module to find the meanings of words, synonyms, antonyms, andmore.

nltk.download('omw-1.4',quiet = True)

# omw helps in running code more efficiently
#support OMW 1.4, use Multilingual Wordnet Data from OMW with newerWordnet
#versions. add multi Bleu functionality. allow empty string in CFG's + more

# running above statements will download the required tools from nltk into# our code
# at this point the raw_doc contains everything in lowercase#@title Tokenizing the data
#now we need to convert the raw_doc into sentence token and word token# for that we make use of sentence tokenizer and word tokenizer form nltk

sentence_tokens = nltk.sent_tokenize(raw_doc)word_tokens = nltk.word_tokenize(raw_doc)

#@title Performing Text Pre-Processing steps
# we completed tokenization and here we do stemming i.e. we remove stop words # then we do lemmatization (Lemmatization is a text normalization technique used# in Natural Language Processing (NLP), that switches any kind of a word to its
# base root mode. Lemmatization is responsible for grouping different inflected# forms of words into the root form, having the same meaning.)

lemmer = nltk.stem.WordNetLemmatizer()# to lemmatize the words into rootwords that are present in the wordnet
```

```
#dictionary

# the above statement does stemming .i.e it removes all stop words like 'a', # 'an','the' and punctutions
because they are not informative and to give pure# words for lemmatization

def LemTokens(tokens):
return [lemmer.lemmatize(token) for token in tokens]
remove_punc_dict = dict((ord(punct),None) for punct in string.punctuation)
def LemNormalize(text): #this function removes all punctuations
return LemTokens(nltk.word_tokenize(text.lower().translate(remove_punc_dict))) #@title Define Greeting
Functions
greet_inputs = ('hello','hi','whassup','how are you?') greet_responses = ('hi','hey','hey there!','there there!!')def
greet(sentence):
for word in sentence.split():
if word.lower() in greet_inputs:
return random.choice(greet_responses) # returns a random element# @title Response Generation By the Bot
# for intelligence of bot we use cosine similarity and tfidf Vectorizer

from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics.pairwise import cosine_similarity

# vectorizer will convert the words into numerical vectors that is related to# machine learning models
# cosine similarity is used to measure the similarity between two tokens

def index_sort(list_var):
```

```
length = len(list_var)
list_index = list(range(0, length))

x = list_var
for i in range(length):
for j in range(length):
if x[list_index[i]] > x[list_index[j]]:
temp = list_index[i] list_index[i] = list_index[j]list_index[j] = temp
return list_index

def response(user_input):
# this funciton basically response to every user inputuser_input = user_input.lower()
sentence_tokens.append(user_input) robo1_response = ''
TfidfVec = TfidfVectorizer(tokenizer=LemNormalize, stop_words='english')# stop words of english
language are removed and coverted to vectors
tfidf = TfidfVec.fit_transform(sentence_tokens)
# converting tokens into vector form then we perform cosine similarity on top# of them
vals = cosine_similarity(tfidf[-1], tfidf)
# now sorting the most similar arguments in the valsflat = vals.flatten()
index = index_sort(flat)index = index[1:]

response_flag = 0
j = 0
```

```
for i in range(len(index)):
if flat[index[i]] > 0.0:
robo1_response = robo1_response+' '+sentence_tokens[index[i]]response_flag = 1
j = j+1
if j>1:
break
if response_flag == 0:
robo1_response = robo1_response+' '+'I apologize, i dont understand.'sentence_tokens.remove(user_inpu
return robo1_response #@title Defining the ChatFlow

flag = True
print('Hello! I am the Retreival Learing Bot. Start typing text after greeting to me.For ending conversation
type bye!')
while flag == True:
user_response = input('User : ') user_response = user_response.lower()if(user_response != 'bye'):
if(user_response == "thank you" or user_response == 'thanks'):flag = False
print('Bot : You are welcome...')
else:
if(greet(user_response) != None):
print('Bot : '+greet(user_response))
else:

word_tokens = word_tokens + nltk.word_tokenize(user_response)
```

```
    final_words = list(set(word_tokens))
    print('Bot : ',end = '')
    snist = ['snist','SNIST','sreenidhi','Sreenidhi']
    trigger = True
    for i in snist:
      if i in user_response:
        trigger = False
        break
    if not trigger:
        user_response = user_response.split()
        user_response.remove(i)
        user_response = ' '.join(user_response)
        print(response(user_response))
    else:
        print(response(user_response))

else:
  flag = False
  print('Bot : Good Bye...')
```

6.2. OUTPUT :

Hello! I am the Retreival Learing Bot. Start typing text after greeting to me.For ending conversation type bye!

User : hi

Bot : there there!! **User** : how are you?

Bot : I am good, What about you?**User** : i am fine

Bot : ok, ask me something about your topic.

User : tell me about my college history **Bot** : history

campus aerial view snist was established in 1997 with the approval of all india council for technical education, government of andhra pradesh, and is affiliated to jawaharlal nehru technological university, hyderabad.

User : where is college location and transport?

Bot : campus location and transport the snist campus covers 33 acres (130,000 m2).it is located in yanampet of ghatkesar mandal in rangareddy district of telangana, india.

User : what are atudent activities in out college?

Bot : student activities there are various student clubs in sreenidhi instituteof science and technology.

User : clubs in sreenidhi **Bot** : other clubs include:

the robotics club (trc)

ieee snist sb codechef campus chapter the techvision clubiste snist civil services aspirants club (csac)

emerging computers arena streetcause sreenidhi photography club(spc)bachpan prayas the faraday's club of electrical igniters

sreevision organized by iste students chapter.**User** : fests in sreenidhi

Bot : "college fests: more than just memories".**User** : bye

Bot : Good Bye...

CHAPTER 7 CONCLUSIONS AND FUTURE SCOPE

7.1 CONCLUSIONS :

In the fast-growing world of AI, consumers are getting technological help in all facets of their lives. The internet provides various ways to get information and has radically changed the way we communicate.

Innovation has enhanced our lives with more opportunities, and everything is quite simple for us. Everybody likes to collaborate and expect quick answers without much delay. You can use online networking platforms or websites regularly for various reasons to connect with others.

A chatbot is a program or service that easily connects with you to help solve your queries. The services that a chatbot can deliver are quite diverse, from providing important life-saving health messages to checking the weather forecast to purchasing a new pair of shoes. While interacting with a chatbot, you should feel as if you are talking with a real person.

From my perspective, chatbots or smart assistants with artificial intelligence are dramatically changing businesses. There is a wide range of chatbot building platforms that are available for various enterprises, such as e- commerce, retail, banking, leisure, travel, healthcare, and so on.

Chatbots can reach out to a large audience on messaging apps and be more effective than humans. They may develop into a capable information- gathering tool in the near future.

We hope this Project has been a great experience that has allowed you to get hands-on with some of the tools that are used in AI and ML.

As a student, we have encountered many problems in which the solution strategy is entirely up to us. So, we learnt to take the problem head-on and never back down from learning something new.

7.2 FUTURE SCOPE :

Innovation is revolutionizing AI chatbot technology more every year. Gone are the days when chatbots could only answer preprogrammed questions. Many of today's cutting-edge versions can carry on lifelike conversations thanks to natural language processing.

Still, AI chatbots have some key challenges to overcome. Doing this will be highly influential in the development of these bots moving forward.

AI chatbot technology is on an exciting growth trajectory. It will become much more secure, capable and versatile in the years to come due to increased investment and new technical innovations. Organizations and users in virtually every industry and niche can benefit from these bots, whether in customer service or behind the scenes. The AI chatbots of the future will be accessible, trustworthy communication tools.

AI chatbots are most well-known for their use in customer service. Innovations and better technology will open up many more applications over the next decade. Businesses, in particular, will benefit from these advancements. For example, new AI chatbots with advanced translation capabilities could help companies expand globally and improve international customer service. Advanced translation AI has already been in development for years, so this specific innovation could go mainstream shortly.

Similarly, AI chatbots will likely become more popular in human resources departments worldwide. This is a straightforward shift from customer service to employee service bots. HR versions are also likely to become popular soon. They may gain ground in employee training, IT help and administrative assistance functions.

AI chatbots often collect personal information, such as payment data in customer service functions. Protection will be a top priority for these bots in the future.

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