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Theme

Proposal of a model for an intelligent behavior of a CHATBOT

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Dedication

First of all, we want to give thanks to ALLAH , the Most Compassionate and the Most Merciful for his everlasting love. This is how we dedicate this thesis to:
Our Families for their tenderness and for their patience and encouragement
Our friends for their advice,and helps
Our Teachers
everyone we love,

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We feel happy, blessed, grateful for this journey, and ready for what comes next

Abstract

Providing consultations and answering the questions that the customer requests when getting into any institution or a company reflects the extent of the companies and the institution's interest in its customers. The use of technology and artificial intelligence in this place bring a lot benefit to the institutions and the companies. This research offers a mechanism and solution by a smart (Intelligent) CHATBOT model to chat with customers so that they can obtain the information and courage them. In a smooth and automatic way, directly when meeting with CHATBOT and talking to it, as a human worker within the company (or institution) but with special capabilities. It can provide all technical solutions and answer questions that concern the customer and can also make contact with all (the services) available of the company, using a set of technologies and Text processing and a knowledge base that contains frequently asked questions (FAQ) that it automatically updates when the system is connected to the internet from various websites, like Wikipedia, social networks websites, or Algeria Telecom website, and that is done when it is in a state of stability, the idea is to create or update the knowledge base in the AIML (Artificial Intelligence Markup Language) files and with the calculation of the meaning distance between sentences, the system can know if the meaning of sentence is already stored or not, and it can also automatically know the customer if he had a prior visit to the company using facial recognition technology, as well as converting voice into text to facilitate the communication process .

Keywords: Chatbot, artificial intelligence, AIML files .

Résumé

Fournir des consultations et répondre aux questions que le client demande lors de son entrée dans une institution reflète l'étendue de l'intérêt de l'institution pour ses clients. L'utilisation de la technologie et de l'intelligence artificielle dans ce lieu apporte beaucoup à l'institution. Cette recherche offre un mécanisme et une solution à travers un modèle de chatbot intelligent pour discuter avec les clients afin que le client puisse obtenir Les informations sont de manière fluide et automatique directement lorsqu'il rencontre un chatbot et lui parle, il est un travailleur humain au sein de l'organisation mais a des capacités spéciales. Il peut fournir tout solutions techniques et répondre aux questions qui concernent le client et il peut également prendre contact avec toutes les installations disponibles de l'établissement, en utilisant une gamme de techniques de traitement de texte C'est une base de connaissances contenant des questions fréquemment posées qu'elle met à jour automatiquement depuis Internet à partir de différents sites, que ce soit Wikipédia ou les sites de la Société Algérienne des Télécommunications ou d'autres sites, et cela se fait quand c'est dans un cas particulier, l'idée est de créer ou de mettre à jour la base de connaissances dans les fichiers de -AIML (Artificial Intelligence Markup Language)- En examinant les phrases, il peut connaître si la phrase est déjà stockée ou non. Il peut également connaître automatiquement le client s'il a déjà visité l'institution en utilisant la technologie. La méthode de reconnaissance du visage et de reconnaissance des sentiments du client afin d'apporter une réponse cohérente avec l'état psychologique du client permet de donner une bonne image de l'institution aux yeux du client, et également de convertir la voix en texte pour faciliter le processus de communication.
Mots Clés: Chatbot, l'intelligence artificielle, AIML ..

الملخص

إن تقديم الإستشارات والإجابه عن الأسئلة التي يطلبها الزبون عند دخول أي مؤسسة يعكس مدى إهتمام المؤسسة بزبائنها. إستعمال التكنلوجيا والذكاء الإصطناعي في هذا المكان يقدم الكثير للمؤسسة ، يعرض هذا البحث آلية وحل عن طريق نموذج شات بوت ذكي للمحادثه مع الزبائن بحيث يتمكن الزبون من الحصول على المعلومة بطريقة سلسلة وتلقائية مباشرة عند مقابلة شات بوت والتحدث معه كأنه عامل بشري داخل المؤسسة لكن ذو قدرات خاصة. يستطيع تقديم كل الحلول التقنية والإجابه عن الأسئلة التي تشغل بال الزبون ويمكنه أيضا إجراء اتصال مع جميع الإيطارات العاملين داخل المؤسسة ، وذلك باستعمال مجموعة من تقنيات معالجة النصوص وقاعدة معرفية تحتوي الأسئلة المتداولة يقوم بتحديثها بطريقة تلقائية من الأنترنات من مختلف المواقع مثل موقع ويكيبديا او موقع مؤسسة اتصالات الجزائر او مواقع اخرى ، ويتم ذلك في حالات خاصة، تكمن الفكرة في إنشاء او تحديث القاعدة المعرفية الموجوده في ملفات -اي ا ام ال - و بفحص الجمل يستطيع معرفة ما اذا كانت الجملة مخزنة مسبقا أو لا كما يمكنه معرفة الزبون بطريقة تلقائية إذا كان قد قام بزيارة مسبقة للمؤسسة باستعمال تقنية التعرف على الوجه والتعرف على مشاعر الزبون لكي يقوم بتقديم إجابه تتوافق مع الحالة النفسية للزبون تساعد على إعطاء صورة حسنة للمؤسسة في نظر الزبون، وأيضا تحويل الصوت إلى نص لتسهيل عملية الإتصال.

كلمات مفتاحية: شات بوت، ملفات -أي أأم أل.

Contents

Liste of Figues

Liste of Tables

Acronymes

AIML:	Artificial Intelligence Markup Language .
UX:	USER Experiences.
CX:	Customer Experiences.
CE:	Customer engagement.
CM:	Conversational Management .
FAQ:	Frequently Asked Questions .
EmguCV:	is a cross platform .Net wrapper to the OpenCV image processing library.
OpenCV :	Open Source Computer Vision Library .
PCA:	Principal component Analysis.
eigenface :	eigenvectors face.

Introduction

Providing assistance to people who need it needs special skills to get good review to the company which he belongs. Reception has a very important role in the surroundings of any institution (or a company). The use of technology in this context facilitates a lot and ensures the satisfaction of the customer and provides everything he needs in a way that makes him prefer this company over the other, as the automated reception aid and through the conversation with the customer maintains the same body and the same high level of good reception that will force the customer voluntarily to become loyal For this company.

problematic Customers who come to Algeria Telecom Agency are numbering in the thousands per day, not to mention those who make phone calls. This causes fatigue for reception workers inside the establishment because of the repetition of the same question by customers every day also the external factors that affect the reception worker mentality.

Purpose of the research

1. Creating an intelligent chatbot that allows answering questions from customers within the Algeria Telecom Agency (as a study sample)
2. Monitoring the effectiveness of using the Internet and other sensors (face and sound recognition) in improving the performance of the chatbot.

The importance of this research lies in the development of an intelligent chatbot (AIML(Artificial Intelligence Markup Language) APPORCH) that can:

- Answer the questions of Algeria Telecom Agency customers (as a study sample)
- Performing some of the services requested by the customer:
  - Join a new customer
  - Make an Interview

- Updating knowledge database via the Internet or via chat.
- Attempting to provide answers that suit the customer (appropriate to his age, culture, language ...)

In this Thesis we'll see the full work project of chatbot behaviors in four chapters, we gonna see in the first chapter theoretical background, some necessary definitions of our work, the next chapter witch defines the main problem and the goals of our work and how to make communication between customer and the company. In the third chapter, we'll see the Architecture of the chatbot and the environment. In the last chapter, we'll see the test and the results obtained from the work we did and also the language we used and discuss about the results and we'll see also the application interface. Finally, in the Conclusion and perspectives we'll discuss about the element presented through the study and the limitations and further research.

Chapitre 1

Theoretical background

Introduction

The process of sharing sources and information does not take place except through conversation. To make a conversation, we define a specific topic so that we and those we are talking to know that we are talking about the same topic. Children point to the thing they want in order to realize the topic they want to talk about, before they start speaking, then they learn the language and words, and then they learn how to identify the thoughts in their minds. Certainly, language is not just words and sentences. Our minds create a map of ideas behind conversations to form feelings and actions.

In this chapter, we will talk about the structure of chatbot environment, external relations and interferences related to the idea. In addition, to the motives and goals of doing this research, and a historical summary on this topic. . . etc

1.1 Key concepts

Here are some importants conceptions in chatbot we'll define them in short:

1.1.1 Artificial Intelligence

It is a computer technology concerned with understanding information, in addition to the ability to learn and reason in a logical and subjective manner similar to humans.

1.1.2 Artificial Intelligence in the marketing business

It is encouraged to use artificial intelligence to expand and increase the number of customers through a digital database, and various machine learning processes (teaching a reasoning, initiation, predicate ...) and responding to customers' questions in a way

that leaves a behavioral impression like the human being

1.1.3 Marketing diagnosis

It is a term related to the nature of the company and its strategy, the aim of which is to model the two brands in a purposeful and personal way for each customer separately, meaning in an individual way that targets the customer based on his individual characteristics, by analyzing the data obtained from direct dealings with a particular customer, and then presenting it automatically. What he needs personally, the aim is to encourage the customer to build trust with the company or instutition by understanding everything he needs and his special requirements according to his personality, and to give him in a special way everything he needs based on his information [3].

1.1.4 Customer experience

It is all that the customer expects from the company, according to his cultural and geographical background, standard of living, salary ... etc.

1.1.5 User experience (UX)

Based on market leaders in research base ux Nielsen group, it is every perspective, vision, or convergence that the end user provides for a good or service, including user experience and every idea or impression that the end user acquires based on contact with the company or the experience of a good or service, including behavior. And the personality and nature of the customer's work, his job, and also the way he speaks [15].

1.1.6 Marketing conversation

it is not just an ordinary conversation, it goes beyond that to a method that allows requesting information (behavior, location, tendencies ...) and making it in textual form, a search that presents the answers in a smart way that relates to the consumer personally.

1.1.7 Chatbot

It is a program that creates human-like sentences, words and answers, which using machine learning to develop its own skills and abilities, to understand and predicate what the user wants in a manner similar to a conversation with a normal person.

1.2 History of Chatbots

ELIZA is the first official registered CHATBOT. It was created in 1966 by the scientist Joseph Weizenbaum through which he was able to create a connection suggesting that it was a conversation with a natural person using a sentence of SCRIPTS registered in it's knowledge base. ELIZA can have a near-perfect dialogue with the user (human). Programming language is JAVA SCRIPT[22].

In 1972, psychiatrist Kenneth Lolby created CHATBOT under the name Parry, which has the same structure with ELIZA and also the same programming language. Alice, in 1995, will be the first chatbot to save conversations as patterns in an AIML file written in English[17]

BATTA is an Arabic chatbot, can discuss like humanbeen in the Arabic language (Egypt Arabic Language), it is considered the first Arabic chatbot established in 2016, by developers ***Dana Abu Ali and Nizar Habash*** at Abu Dhabi University in the United Arab Emirates, it can learn through dialogue with users depending on AIML files in creating appropriate responses[19].

There are many CHATBOT available on the Internet, we mention, for example, MEENA developed by Google , which contains about 400 gigabytes of ready-made answers, and also, Apple company that developed SIRI, and AMAZON company which created ALEXA, A Chinese company established in 2009 in the social networking platform Wechat, and also the Russian company YANDEX developed its own chatbot ... , In addition to many other companies, especially social media companies such as Facebook and others, Google has also provided to developers special platform that allows you to create a private chatbot in an easy and simple way.

1.3 Motivation

According to the study of DRIFT in collaboration with SurveyMonkey Audience, Salesforce, and MYCLEVER, we conclude the following:

1. People who think there is benefit from using a chatbot:
   - 64 % believe that the chatbot provides a 24-hour service
   - 55 % believe that the chatbot should answer all kinds
2. People who are having trouble with traditional communication channels on websites:

- 34 % say that the websites are somewhat complicated, and they face problems to communicate.
- 31 % also could not find answers to simple questions.

We conclude from the presented results that the traditional methods of contacting and communicating channels with customers is not sufficient and does not meet the purpose, but rather it may cause a customer loss[11].

Many companies are still hesitant to use chatbot, according to the survey conducted by Chatbot.org, 53 % of consumers believe that the chatbot is not effective, and the reason for this may be due to many other factors, including that future generations and users Techies (users who's uses Technogie lot) trust the chatbot more than previous generations, as nearly 60 percent of them believe that the chatbot is very effective.

Despite all of this, we should not close the door, but rather we continue to research this area to develop it more and take advantage of its very effective properties[11].

1.4 Chatbot architecture

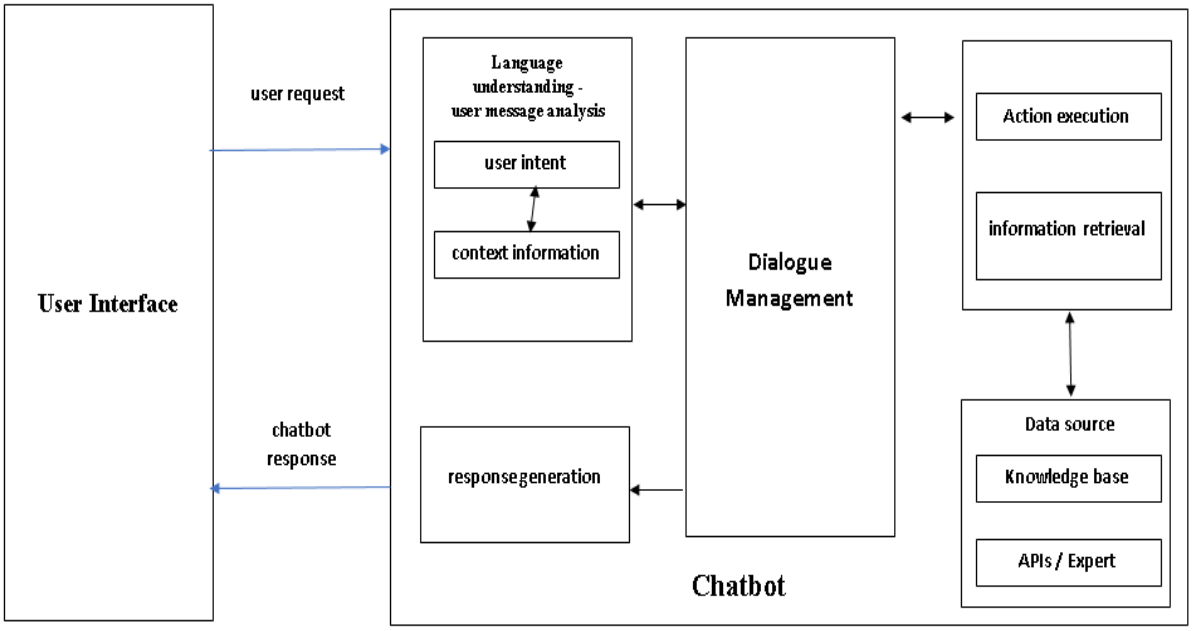

Figure 1.1: Chatbot Architecture.

A chatbot is a normal program like many others, which contains a knowledge base as well as a set of APIs called External Services.

In fact. Chatbot does not understand customer needs, but companies that have

chatbot rely on teaching it and integrating a set of routine answers in it. Developers use logs and a set of machine learning tools for processing customer needs, questions and the ultimate aim of their requests. Developers associate the customer's questions with the best answers. For example, when a customer asks, "Where is the payment card?" or "I haven't received my payment card yet!"sentences have the same meaning, and so developers prepare a model that contains all similar questions and answers, thus a chatbot can link the questions with their answers. If there isn't a ready model, some APIs help the chatbot with learning.

1.4.1 Chatbot Learning

Chatbot learns faster than humans. Humans need a long time to learn regardless of their intelligence level. However, chatbot learning depends primarily on the speed and power of the computer it is loaded on, as well as on the simplicity of the resources from which it learns.

1.4.2 How does chatbot works ?

It works depending on the integration of three basic elements, which are:

- **Pattern matchers**. Chatbot uses pattern matchers for dividing the text and establishing the right answer for the customer. The main idea of this pattern is AIML (Artificial intelligence markup language).
  For example:
  <category>
  <pattern>POURQUOI M ATTENDS TU</pattern>
  <template>j'ai entendu dire que vous viendriez ici tôt ou tard. </template>
  </category>
  [16]
- **Algorithms**. In this type, each question must be linked with the required answer, and it must be integrated into the database. We use algorithms to get the right appropriate answer, and we can also use NLP or NAIVE BAYEs[18].
- **Artificial neural networks**. Here, we calculate the relationship between the input and the output by using the weight of each link between the word and the other, when we find the smallest link between the input and the output, we realize that it is the correct answer[12].

1.5 Chatbot types

Chatbots are divided into different categories based on different parameters witch are:

- Knowledge domain.
- The service provided
- The goal that chatbot aims to archieve
- The input processing and response generation method
- The build method

1.5.1 The first category

The first category is based on the knowledge domain. It includes the open domain chatbots which deal with topics in general and give good answers. The other is the closed domain chatbots which focus on a specific area of knowledge and may fail to answer other questions.

1.5.2 The second category

The second category is based on the service provided. Here, there are the interpersonal chatbots which deal with communicating and providing services, such as restaurant and flight booking, the intrapersonal chatbots as chat apps like Messenger and WhatsApp and the inter-agent chatbots like Alexa-Cortana integration.

1.5.3 The third category

The third category is based on the goal that chatbot aims to achieve. It includes three types of chatbots, the informative chatbots which give users stored or available information, like FAQ chatbots, chat-based/conversational chatbots which provide correct answers and talk as humans, and finally task-based chatbots which handle specific types like booking a flight.

1.5.4 The fourth category

The fourth category is based on the input processing and response generation method. Here there are three types: First, rule-based model chatbots which respond according to a limited set of rules based on the lexical form of the input. Second, the retrieval-based model chatbots which use APIs to analyze existing resources before giving responses. Third, the generative model chatbots which give better answers than the previous two

models and use more learning techniques.
The fourth category is based on human-aid. Human-aided chatbots use the human factor in its processes, so this can reduce the gaps made by the fully automated chatbots.

1.5.5 The fifth category

The fifth category is based on the build method. These chatbots depend on the permissions provided by their development platform, some platforms are open-source, which allow the chatbot designer to engage in the whole process in contrast with the closed platforms which work as black boxes[2]

1.6 Chatbot benefits to the companies

Nowadays, there is a big rise in the number of people using messaging apps like Whatsapp and Skype. In a similar way, there is a huge demand for chatbots in the market due to their many different benefits. For example, they can be used for making orders or booking a restaurant or a flight and for many other things. Also, they save time, effort and money, as they not only give responses to customers' questions, but also perform business tasks like gathering customer information and arranging meetings. Moreover, customers prefer to interact with chatbots because they are much more fun, give them rapid responses, help them to avoid loneliness and to improve their communication skills[20].

As for companies, chatbots help them to expand their work, because they can handle multiple customers at the same time precisely. Also, when a customer wants to buy a product that many companies are selling, chatbots help him to choose the best option by giving him information about the product during the conversation.

Chatbots are particularly important when a company makes products for millennial customers. These customers like to research products before purchasing them and because they are inpatients, they prefer using chatbots rather than waiting in queues.

When there is greater contact with customers, the company is more likely to increase its sales. Chatbots can have a conversation with customers and get their responses instantly, unlike sending them an email or SMS. Also, chatbots give them specific, not broad information, which is what customers prefer.

Also, when a company makes a marketing campaign, it's better to use chatbots that allow the campaign traffic to travel in two directions, and this helps in calculating the campaign's ROI, unlike traditional marketing campaigns that go in one direction, from

the business to the consumer. Chatbots handle repetitive tasks or customer questions, which employees are unwilling to take on, and provide effective 24/7 support[20].

Also, chatbots help in the shopping process. They ask customers specific questions about the product they want to buy, then they send the information to the sales department and find out if the product is available for purchase. If not available, the chatbots will notify the customer when the product is available. When the customer returns,the chatbots remember the customer's preferences and use that information.

Finally, chatbots increase the response rate to 100 % and turn potential customers into buyers.[20]

1.7 Chatbot limitations

In spite of their astonishing development, chatbots often fail to understand the real intent of the user, which results in user frustration and consequently losing a customer. This may happen for a number of reasons, for example: the chatbot doesn't give the user enough time to explain his request, the existence of various ways of writing messages, the user's mood, the user's spelling mistakes, the user's misuse of phrases, intonation, pronunciation, syntax... etc.

Also, sometimes the user feels frustrated as the chatbot doesn't use a clear strategy, which results in an ineffective orientation of the user towards the communication goal. Moreover, when a chatbot designed for one purpose is modified to serve another one, this creates a double personality that builds negative emotions in the user.

Data security is very important for the user and the provider, but since companies make their chatbot available on third-party sites, data is often handed over to them. Therefore, customers should be aware that companies may gather and use their personal data for commercial and marketing purposes.

A serious problem for chatbot providers and users is the toxic content. For example, toxic content that results from recording of personal information by unreliable services, or the utterances aimed at exploiting chatbot or breaching confidentiality or to copyright theft. So, chatbots should have protection to avoid misuse.

Human-like chatbots have some features that incite human deceivers to engage in undesirable strategic behaviors in order to hide their deception. It was found out that chatbots with improved conversational skills led users to engage in strategic activities that are counterproductive to fraud detection. Chatbots can provide comfort to their

users, but at the same time they have several vulnerabilities. A case study on Amazon Alexa has shown that Alexa depends on a weak single-factor authentication, which can be broken, because it tracks voice commands without the need for physical presence.[3]

1.8 Performance assessment

Chatbots can be evaluated from various perspectives. First, from an information retrieval (IR) perspective, evaluators here measure the effectiveness and accuracy of chatbot's response to questions and requests. Second, from a user experience perspective, where evaluators measure user satisfaction and usability of chatbots, usually by using questionnaires. Third, from a linguistic perspective, here linguistics experts assess chatbot's ability to form complete, grammatical, and meaningful sentences. Finally, from an artificial intelligence perspective, the more chatbots look like humans, the more effective they are.
There are a lot of evaluation methods, such as PARAdigm for DIalogue System Evaluation (PARADISE). It is one of the most widely used frameworks that integrate these perspectives. First, it aims to estimate some subjective factors, such as ease of usage, clarity, naturalness, friendliness and willingness to use the system again, by using questionnaires to collect user reviews. Second, it seeks to measure the effectiveness of a chatbot by maximizing task success and minimizing dialogue costs.
Another method discribed by Kuligowska et. al. It evaluates eight chatbot attributes, which are visual appearance, implementation form on the website, speech abilities, the knowledge base, knowledge presentation ability, conversational abilities, having consistent and rich personalities, and personalization options.
Chakrabarti & Luger (2012) assess chatbots based on Grice's conversational maxims, which are the quality, the quantity, the relation and the manner maxims.

Shawar and Atwel (2007) see that chatbots evaluation should be based on their purpose and the user's needs.

According to Cahn (2017), chatbots should be evaluated from four perspectives, information retrieval perspective, user perspective, linguistic perspective, artificial intelligence perspective.
Peras (2018) adds another perspective to the previous four, which is business perspective. According to Peras (2018), chatbots don't have to be evaluated from the five perspectives, the evaluator should choose an approach depending on the area of the chatbot application and the needs of the user. [15]

Conclusion

We talked about chatbot importance and the objectives of the study. In short, we explained the importance of a chatbot to the economic companies in general. Moreover, we introduced chatbot types and categories, as well as some of the key concepts that we will use in the second chapter and the rest of the research. In the next chapter, we will highlight chatbot as a means of driving customer engagement.

Chapitre 2

Chatbots as a mean of driving customer engagement

Introduction

It is not easy to encourage a customer to give fidelity to a company or to stay with it especially nowadays. This has resulted from the great development and the tremendous increase of quality and quantity in the constituents of companies. Customers' fidelity depends on some very subtle factors. Surely, each company wants to win more customers for the sake of its durability, staying at the top, and even entering new markets, this is the goal of Algeria Telecom Agency. In this chapter, we will highlight the effectiveness of the AI, represented by a chatbot, and a data analysis in encouraging customers to be loyal to the company and in winning new customers. Also, we will discuss the problems within this field, the importance of conversational marketing, personalization marketing and its relationship to customer experience and finally how to encourage customers to stay with a company.

2.1 Problem description

Algeria Telecom Agency is a pioneer company in Algeria and well known on the local and national levels. This popularity resulted from the great effort of its staff and its long experience through time. Moreover, it aims to satisfy the Algerian customers and looks forward to international markets whether in Africa or other continents. These aims require more effort and struggle, particularly when it comes to the different types of customers. Marketing is not a simple task, it requires a lot of data, especially as it is the basis for convincing customers to stay loyal to the company. As a result, companies rely on specialists in marketing and conversational marketing to convince customers to stay with the company. Also, these specialists can use the huge amount of data

of customers' experience existing with the company for modeling a structure for each customer, which is not available yet. Another problem happens with the surroundings of the receptionist, the human factor that is affected by external elements outside the institution's capacity, which affects the customers immediately after receiving them. For example, if the receptionist is in a bad mood, this may lead to a loss of the customer, and this is what companies try to avoid. Also, the receptionist may get tired and feel tremendous pressure from working throughout the day and from the frequent questions asked by customers.

2.1.1 Goals

The high-level view of the final objective is to design a scalable and easily maintainable chatbot solution that can interface with the company's existing customer support software. It should serve as the first communication layer in the company's receptionist and customer service which provide a way for users to send free-form text messages to help them with the most common issues they encounter regarding the company's products. In short, it should replicate the menial tasks performed by customer service and receptionist agents on a daily basis We resume the goals on those points:

1. Building a chatbot that can initiate a dialogue with the customer and get the largest amount of information about the customer, his personality, features, place of residence, his work nature, his academic level ... etc.
2. Respond in a timely manner to all customer inquiries in an appropriate manner, according to the customer's experiences.
3. Help the customer solve some technical problems without referring to a specialist.
4. Work 24/7 without stopping for breaks.

2.1.2 Constraints

Quite naturally, the designed solution must also follow certain guidelines enforced by the company :

1. The method of update should be easy , and every one who can can use computer easy to make it.
2. the uses of chatbot should be easy and smooth.
3. Training the system's models must take a reasonable amount of time..
4. The bot should make as little errors and invisible mistakse
5. The bot should skips mistakes.and don't stop there.

2.2 Conversational marketing (CM)

Nowadays, conversational marketing (CM) has become a hot topic, as it has been an obvious impact and made a huge difference in the market. The impact of artificial intelligence and data control, in addition to market diagnostics, enables companies' owners to rapidly increase the number of their customers, and build good relations with them individually, unlike previous years when they were interacting with customers in a holistic way[17] .

A chatbot can provide answers to customers' many enquiries immediately and at the same time. In the coming years, a chatbot is expected to be able to answer all potential customers' questions. CM will be the first influencing factor to control customers using a chatbot, and it will be able to deal with multiple customers at the same time(in some situations), as well as understand their tendencies.

To understand CM in a better way, DEVANEY 2018 summarized the constituent features of conversational marketing in the following table:

Table 2.1: Distinguishing features of conversational marketing[19].

#1 Real-Time	**#2 Scalable**	**#3 Focused on Engagement**	**#4 Personalized**	**#5 Built-in Feedback Loop**
The rise of messaging means you no longer have to force people to fill out forms and wait for follow-ups	Thanks to chatbots,even small teams can have 1 to1 conversations at scale and qualify leads 24/7	Inbound and outbound tactics are used to start quality conversations for Sales	Even before a conversation starts, you can personalize the experience and tailor your messages to specific people	conversations give you insights you can't get anywhere else

2.3 User experience

The first question that may be asked is, what are the problems that a chatbot can solve? This is not an easy task for a chatbot unless:

1. It has gained previous education about the presented problem.
2. The problem is a simple one, where chatbot can provide an adequate answer for the customer.

Here are some problems that may occur:

Table 2.2: Discribe Some problem that may occur.

Problem	Description
A game	The user may ask chatbot to enter a game and forget what he came for.
Identity theft	The user provides someone else's information.
Change of address	Changing the address may cause a problem for the customer base.
Change of some habits	Some people change some habits that had before which makes problem to the chatbot

2.4 Personalization of marketing communication

According to Moth(2013), in his report in Econsultancy marketing 21 blog personalization of sales and marketing is a very successful method, while the Financial Brand (2017) mentioned that personalization has become among the three features of the global trend on year (2017). Personalization in marketing is mainly related to the customer's experience, it encourages the customer more and forces him to continue choosing a specific product voluntarily , which increases the duration (lifetime) of the interaction with the customer[19].
Personalization of marketing requires a lots of work, effort and cost, due to the complex nature of human beings , the evaluation process, and the need to understand the customer accurately and deeply, including his needs, patterns, and anticipate his behavior in order to build trust with him. In 2016, Exitbee wrote a report in Bhargava, said that 50 % of marketers see that the deep understanding of customers is the main key to win them. Though it has a great benefit, it takes a lot of time and effort from the company.

Understanding a customers needs depends on past and real-life experiences between people and on the methods used in persuasion as a salesperson does. A chatbot which relies on knowledge bases and prior education in addition to the sales journey, can replace the salesperson, and we can rely on it to persuade larger numbers of customers and encourage them to change some of their habits and thoughts resulting from the wrong image created in their minds for the company.

Table 2.3: the main benefits of incorporating personalization into marketing communications (Bhargava 2017) .

Recognize	Remember	Reach	Relevance
Know Customer's and prospects profiles including demagraphics, geography, and expressedor shared interests.	Recall customers history,especially how they act as expressed by what they browse and buy	deliver the right promotion,content, risk management service or suggested advice for a customer based on actions, preferences and interests.	deliver personalization within the context of the digital experience based on who customers are, where they are located and/or what time of the year it is.

2.5 Customer experience

Customer experience is what organizations and companies gain after a period of engaging with a set of customers. These dealings include attracting new customers, studying existing ones or defending the company's stake and ensuring that customers remain loyal to its services. Customer experience is measured and evaluated based on a comparison between individuals 'experiences throughout the contract period and their expectations of the product. Economic analysts and observers have become increasingly interested in studying and managing customer experience, the most famous of which is Dr. Bernd Herbert Schmidt, professor of economics at Columbia University.

Customer experience requires the customer to be involved on all levels: mental or emotional, subjective or spiritual. Customers respond differently to the multitude of communicative processes undertaken by the company. Direct contact often occurs when the customer is the one who automatically initiated the purchase or service request. While indirect contact takes place with the intervention of promotional advertising media - news articles - unprepared meetings with the salesperson - viral transmission of company propaganda. Every personal response to a customer, whether direct or indirect, can be considered part of that customer's experience, including direct relationships that arise in places that have a wide turnout from customers for the purchase process or to benefit from a service of a project (such as selling in stores or direct selling by interview or interaction with the team of distributors).
While the source of indirect relationships, at times not expected, may come from advertising representatives to sell the product, some companies and trademarks, or sometimes from a positive recommendation, for example, coming from friends. Moreover, it may take the form of criticism, publicity, news, polls and other similar forms. In short, customer experience is the result of gathering both the contribution of the customer and the contribution of the company, the company here is the source of testing that experience.

Customer experience includes all events that customers experience before and even after a purchase. When the customer experiences these events, his psychological behaviour, where he appeals to all the senses, emotions, rational and physical aspects with which he can recall an experience that is difficult to forget, is studied individually. Customer experience is checked by various types of organizations and industries all over the world.
Most of the studies being developed now on customer experience focus on the retail sector, where both the customer and the company play a major role in creating that experience.
Gartner defines customer experience as a general perspective related to the emotions and feelings that are influenced by various attractions. Forrester Research defines customer

experience as the way a customer feels about a company[11].

Figure 2.1: Customer's Perception and interactions with brand[2].

User experience (UX) is all about a user's behavior, attitude and perception regarding his use of a specific product, system or service. User experience highlights the valuable, emotional, experiential and meaningful aspects of human-computer interaction and product ownership, but it also includes anyone's perceptions of practicalities such as utility, usability, and system efficiency.

The nature of user experience is considered personal, because it is related to the person's feelings and thoughts about the system. Also, user experience is considered dynamic, as it changes over time as conditions change[2].

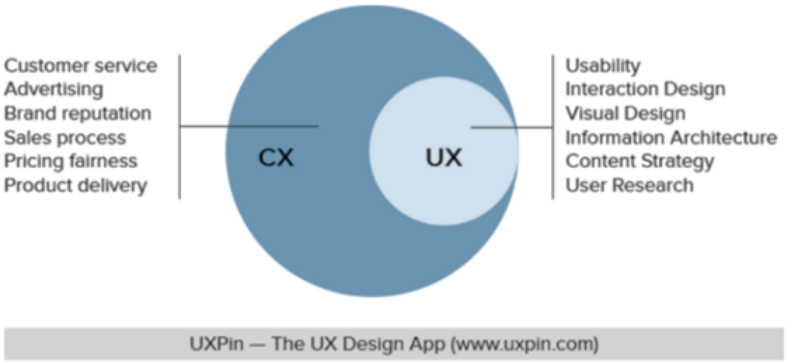

Figure 2.2: a description of the relationship between CX and UX .

Customer exprience (CX) is a more comprehensive concept than UX, while UX is a factor contributing more precisely to the importance of interaction with digital interfaces.

2.6 Customer engagement (CE)

Customer engagement (CE) is related to the passion level and the strength of communication between the company and its customers. This relationship makes customers more loyal to the company, and they demand more of its products, which appears from the increased demand for the services it provides. According to (Calarabridge 2018), the major economic companies seek to increase the number of their customers using modern ways, such as digital media and social media platforms, to strengthen the relationship between the company and its customers more and more.
In 2015, Solomon wrote to Forbes (global media company) a detailed explanation about the engagement as a direct way towards the ultimate goal of the company. This engagement with the customer can increase the number of sales, fidelity to the company and the lifetime and value of the customer.

Harmeling, Moffett, Arnold and Carlson contributed research papers to Marketing Science Academy highlighting new phenomena related to customer engagement marketing, the definition of voluntary compulsion concept and empowering the motivation for interaction through monitoring regular customer behaviours and interacting accordingly, which leads to a stronger connection between the customer and the company.

In 2017, a research group presented a thesis in which they explained chatbot's ability to customer engagement. The study was implemented on the potential uses of chatbot and the extent of its impact on customers and on linking customers to the company. They found out the positive impact of chatbot on customer engagement, through its ability to serve customers 24/7, without stopping, in addition to its ability to provide personalized services[20].

Companies that invest in chatbot are able to take advantage of the range of features that a chatbot offers and meet the needs of the most demanding customers in the current digital age[4].

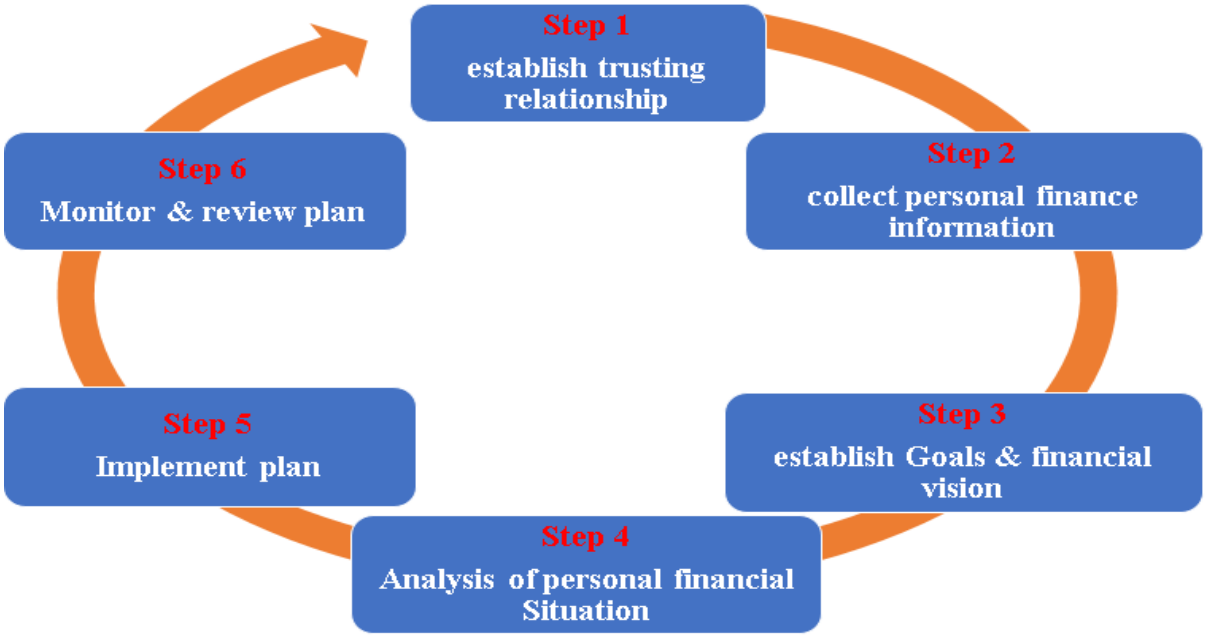

Figure 2.3: the Process of Engagement[6] .

Conclusion

n this study, we have found that chatbot has a big impact on companies, as it reduces much of their effort and time, as well as it can deal with a huge number of customers at one time, if it is in a position that allows that. Moreover, it offers a lot to the company, as it can collect many neglected subtleties that enable the company to keep a good relationship with the customer, and it also indirectly enables the company to win new customers.

In the next chapter, we will discuss in details proposed system architecture of this chatbot.

Chapitre 3

Software architecture

Introduction

The aim of each scientific study is to provide an addition to the practical field or to improve a service. Through this work we will try to facilitate the work of the reception aid within the Algeria Telecom Agency, in this part we will try to present our work in a technical way and highlight the most important points that we walked through to obtain this chatbot that will provide a lot for the company, and we will also shed light on the most important elements in the system architecture through an in-depth analysis of the basic components of the program in addition to the environment of the program that will be integrated into it and the way it interacts with all the elements in the work environment.

3.1 Chatbot environment

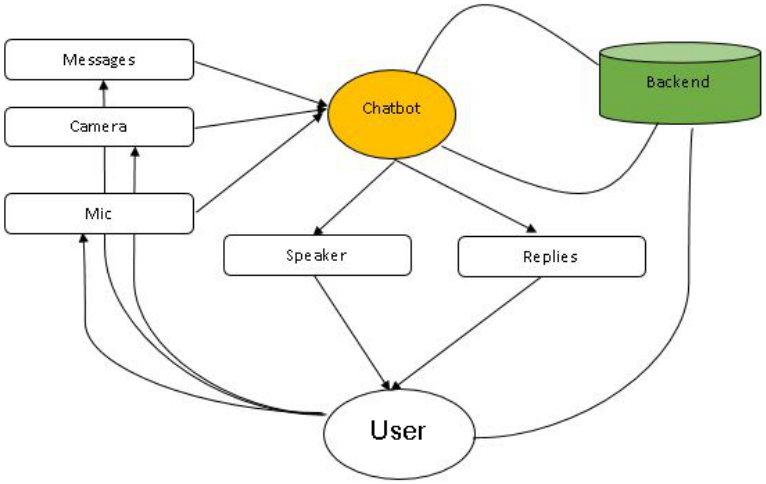

Figure 3.1: Chatbot environment

The chatbot environment contains many different elements. The previous diagram shows all the elements arround the chatbot, and we will explain each element separately.

- The first element is the customer or the user who has a direct contact with the chatbot. He provides the chatbot with a set of information and messages to which the chatbot can respond and operate in an organized and structured manner internally.
- The second element is the message. It is among the most important elements or maybe the main element in the chatbot environment. The message may be a customer's orders or a piece of information that the chatbot uses to provide a service or to help the customer contact a frame within the company.
- The third element is the camera. It is a tool to help chatbot to obtain information about the customer's feelings or to take a photo of the customer and use it to find out his name and whether he is registered.
- The fourth element is the microphone. The microphone records the voice, then the chatbot converts it into written text.
- The fifth element is the speaker. It reads the written text and the replies that the chatbot provides to the customer.
- The sixth element is the replies. They are in the form of written text, so the customer can read and listen to them from the chatbot.
- The seventh element is the backend. It is an important part of the chatbot environment that contains a set of information that the company has collected about the customer in a group of databases. Therefore, the chatbot can benefit from it, add to it, or modify it at the request of the customer.

3.2 System modules

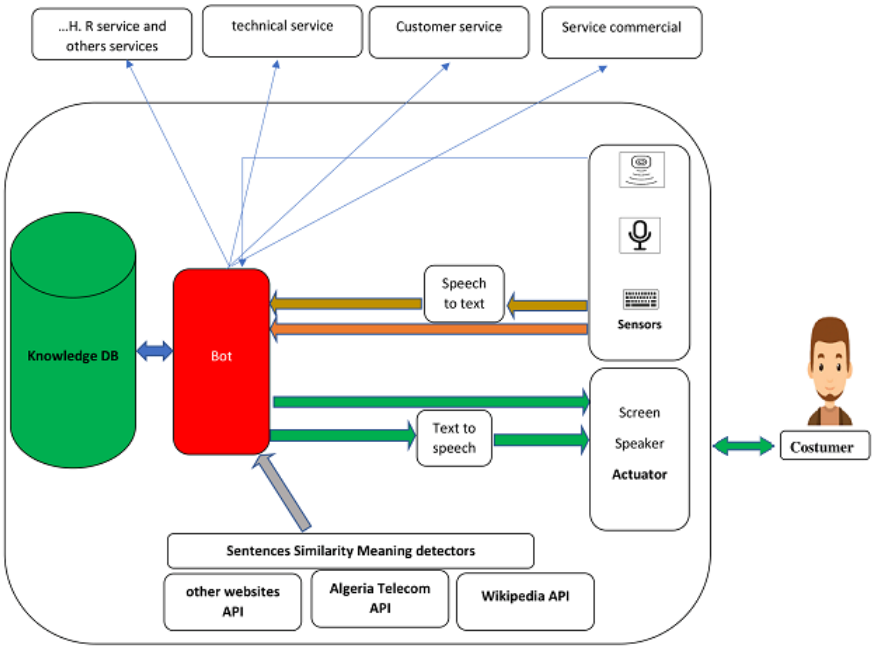

Figure 3.2: Chatbot system modules .

3.2.1 Inputs

In this chatbot, we use three main input tools, which are:

3.2.1.1 Camera

The purpose of the camera is to take a photo of the customer's face, then analyze and study it using face recognition algorithms. If the customer is registered in the database of the company, the chatbot, starts a conversation with him, depending on all the data available to the company, such as his name, address, age, job, personality...etc. Also, the chatbot adds any new information or things the customer prefers to his knowledge base. Moreover, the chatbot can provide advertisements related to the customer based on his address, for example, it provides offers available at the company and requested by other customers who live in his area, and more other offers. Also, if it does not recognize the customer, the chatbot asks a question requiring the customer private information in a serial way. Moreover, the customer can make a call with some of the departments available in the company, whether the technical department, project management or management department. Further, the camera can also identify the feelings of the customer and based on these feelings the chatbot provides him with the answer in a

distinctive way.

3.2.1.2 Mic

The purpose of the microphone in this chatbot is to identify the user's voice and convert the voice into writing to facilitate communication with the customer who does not prefer writing. This feature helps the chatbot create a quick dialogue with customers to provide the best services available in the company. Also, it can be used to have direct conversations with someone within the company.

3.2.1.3 Keyboard

The purpose of using the keyboard is to let the customer write and chat with the chatbot.

3.2.2 outputs

The main outputs are:

3.2.2.1 Screen

Using a screen as an output in the chatbot is very important and helpful for the customer and the chatbot. With it, you can find out and see the dialogue that takes place between the customer and the chatbot. Also, by using the screen, the chatbot can provide appropriate advertisements to the customer. Moreover, it gives an excellent customer impression towards the company and the technology used to ensure customer comfort. Further, it shows the meeting that takes place between the customer and the company frame if the customer wants to have a conversation via the camera.

3.2.2.2 Speaker

Through it, the voice of the chatbot and those who read the answers that the chatbot give to the customer can be heard.
Speech to Text API: This is a feature in windows, which Microsoft provides free for Windows users. Through it, you can convert speech into text, it can work without the internet because it is an implicit program in Windows. It analyzes and processes voice and then converts it into written text based on the language used in Windows, and it also provides many languages, including French, English and other languages.
Text to Speech API:This is another feature provided by Windows, and it is similar to the first feature but works in reverse. It has the same previous features as it works without the internet and is integrated with Windows. In addition to that, it deals with many different languages such as Arabic, French and English.

3.2.3 Sentence meaning similarity detectors

In NLP (Neuro-Linguistic Programming) , we want to find the similarity among sentence or document. Text is not like number and coordination that we cannot compare the different between “Apple” and “Orange” but similarity score can be calculated. There are many methods and techniques used in defining sentences similarity meaning, but we decided to use one method which is Cosine Similarity.

3.2.3.1 What is Cosine Similarity method ?

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[13].

3.2.3.2 How does it work?

Cosine similarity is a measure of similarity that can be used to compare documents or, say, give a ranking of documents with respect to a given vector of query words. Let x and y be two vectors for comparison. Using the cosine measure as a similarity function, we have
sim(x,y) = $\frac{x.y}{||x||.||y||}$
where ||x|| is the Euclidean norm of vector

$$(x_1, x_2, \ldots, x_p) \ , definedas. \sqrt{x_1^2 + x_2^2 + \cdots + x_p^2} \tag{3.1}$$

Conceptually, it is the length of the vector. Similarly, ||y|| is the Euclidean norm of vector y. The measure computes the cosine of the angle between vectors x and y. A cosine value of 0 means that the two vectors are at 90 degrees to each other (orthogonal) and have no match. The closer the cosine value to 1, the smaller the angle and the greater the match between vectors.

3.2.3.3 Steps of Work

Determine the angle between two objects is the calculation method to the find similarity. The range of score is 0 to 1. If score is 1, it means that they are same in orientation (not magnitude). The following steps shows how the Algorithm work :

1. Read the two sentences.
2. Perform the tokenization process.
3. Removing the stopwords from the text (Stop words are those words in natural language that have a very little meaning, such as "is", "an", "the", etc.)

4. Create a group of key words to make the two sentences in the same array.

5. Calculate cosine. The closer to the 1, which means the two sentences are the same, and vice versa.

3.2.4 Wikipedia Api

It is a service provided by Wikipedia for free for developers to access Wikipedia content in a simple and direct way from the program interface. It is available in many languages and is easy to work on. All Wikipedia content is available using a simple code, which you can get by going to this page: https://www.mediawiki.org/wiki/API:Main_page Also, it enables you to perform an exclusive search on Wikipedia articles and get results in console as a string[5].

3.2.5 Algeria Telecom website

Also, it makes scraping on some of the pages of Algerie Telecom website to obtain frequently asked questions and other information through which it can enrich the knowledge of its own chatbot, which will become answers to potential user's questions. Moreover, it makes use of some of the sites which we made scraping on them, and we got a lot of important information from the conversation with customers, and this information will be stored as answers for customers who will ask similar questions.

3.2.6 Bot

The primary role of the bot core is to conduct the regulatory process and it has the inference engine that chooses the appropriate answer according to the question the customer is asking, as well as implementing the process of updating its knowledge base and increasing the information collected from websites and from available sources. Moreover, it is possible through it to fetch the user's data and know what he would like to do and convert them into direct orders that other workers can view. Further, it can carry out self-operations based on the customer's will, after verification and approval request from the relevant authority. Finally, it can create a file and either register it for a new client or delete it.

3.2.6.1 The algorithm used

The main library utilized on this algorithm is bot.dll[7] , this library contains all codes for make the chatbot works, the steps of using this library is very clear it's use some xml files like (settings.xml , substitution.xml) which contains some predefined things that the chatbot utilize, for example , the gender of the chatbot or the path of AIML files , we'll show the instructions of this algorithm step by step :

1. Define the name of bot to hold the bot's information.
2. Load the settings from the config folder.
3. load AIML files from the AIML folder (in this step we'll chose the right folder according the the result of Emotion detect algorithm).
4. on this step we've to stop using of using the input to let the files load correctly.
5. Create user name for the chatbot using the object "AI "'s information.
6. Switch the user input back on.
7. Start loop forever so the bot will keep replying and accepting input.
8. Generate a request using the user's input written.

9. send the request off to the object AI to get a reply back based of the AIML file and folder choose.

10. Display the output in the bubble by retrieving a string from result got for bot object. content...

3.2.7 The intern services

We have linked the chatbot to some services that may in some cases require a direct connection between the customer and the frame. Through it, it is also possible to have a direct conversation with any service available in the company according to the customer's request, and at times when the frame is available (i.e. at times of customer reception).

3.2.7.1 Real Time Face Recognition

Face recognition is a challenging research in the field of image processing and computer vision, especially for security systems, weight determiner, and emotional determination based on the face image recognition,with Genetic Algorithm and Artificial Neural Networks, which showed good accuracy in the number of 92% to 93%. The data used are still images, both test data and training data, making it easier when compared with moving image data, because the still image is not affected by the movement, motion or distance [16].

In our work we interested on using EmguCV cross platform .NET wrapper to the Intel OpenCV (Open Source Computer Vision Library) image processing library and C# .NET, these libraries allow us to capture and process image of a capture device in real time. The main goal of work is to use the easiest way in which to implement a face detector and recognizer in real time for customer using Principal Component Analysis (PCA) with eigenface.

Facial recognition is a algorithm composed for complex methods that use mathematical and matricial techniques, these get the image in raster mode (digital format) and then process and compare pixel by pixel using different methods for obtaining faster and reliable results. Obviously, these results depend on the machine used to process this due to the huge computational power that these methods, functions and routines require, these are the most popular techniques used for solving this modern problem.
Techniques Some facial recognition algorithms identify faces by extracting landmarks, or features, from an image of the subject's face. For example,an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw. These features are then used to search for other images with matching features. Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face detection. A probe image is

then compared with the face data. One of the earliest successful systems is based on template matching techniques applied to a set of salient facial features, providing a sort of compressed face representation. Recognition algorithms can be divided into two main approaches, geometric, which looks at distinguishing features, or photometric, which is a statistical approach that distill an image into values and comparing the values with templates to eliminate variances. Popular recognition algorithms include Principal Component Analysis with eigenface(is the name given to a set of eigenvectors when used in the computer vision problem of human face recognition), Linear Discriminate Analysis, Elastic Bunch Graph Matching fisherface, the Hidden Markov model, and the neuronal motivated dynamic link matching.

EmguCV Emgu CV is a cross platform .NET wrapper to the Intel OpenCV image processing library. Allowing OpenCV functions to be called from .NET compatible languages such as C#, VB, VC++, IronPython, etc. The wrapper can be compiled in Mono and run on Linux / Mac OS X[14].

In other words, EmguCV is an awesome Wrapper, this allows to make very interesting things and tasks of computer vision. This library set lets do an unlimited amount of wonderful projects in this field, EmguCV have many functions that let us work with CPU and GPU increases the performance dramatically with the latest mentioned.
The algorithm used

1. Initialize the capture device, and FrameGrabber event that performs the detection and process of images for each frame captured.
2. load previous trained faces and labels for each image.
3. if we get compatible image that we get back the name from database if not we've to next step.
4. Train the prototype : We tried to do this part in the easiest way possible, the prototype detects faces constantly (Each frame) and we add this detected face in the image database with one label respectably, the face trained image will show in the imageBox and the process will be finished!!

   Remind: The face recognition algorithms based in PCA (Principal Component Analysis) do multiple comparisons and matches between a face detected and the trained images stored in binary database for this reason, and for improving the accuracy of recognition, we should add several images of the same person in different angles, positions and luminance conditions, this training makes this prototype solid and very accurate.

3.2.7.2 Real Time Emotion detection

DeepAI (It is a private company specializing in smart programming and Deep learning, which provides an (free& no-free) APIs for all users in various fields, especially sound and image processing.) was founded with the belief that a future built with artificial intelligence allows for the sustainable accommodation of all humanity at a high standard of living. DeepAI develops the technologies to help make this future a reality, while moving towards the ultimate goal of making it directly accessible to the individual, the accuracy of this APi is very good (more than 95%)because it use High speed pc for training[8].

The algorithm used In short, the algorithm is not just a call to some of the tools on the company's website that provide this service, we tried to short the instruction on those lines:

1. firstly we've to declare new API after added package from https://www.nuget.org/packages/DeepAI.Client.
2. the service gives a trial apikey we've to add it on our algorithm.
3. we're to declare response where the result will came , StandardAPiResponse is a function provided from this service , the input is image (face image)and the output is string which gives you the expression.

Conclusion

Through this study in this field, we have found that it is important to use some APIs and some plugins to help the chatbot to understand and perceive the customer and the user in general. These plugins save a lot of time and effort and support the chatbot program with a massive amount of information that it needs to find appropriate and compatible replies to customer questions. However, the influence of the environment in which the chatbot operates creates a big difference between modeling and real test in which there are many possibilities that may affect the chatbot's replies and may cause confusion and other things. In the next chapter, we will try to test this chatbot and compare and discuss obtained results.

Chapitre 4

Test & Results

Introduction

After the presenting of the chatbot architecture, there is nothing left but to implement and test of this chatbot. So, in this chapter, we will talk about the programming language used and it's characteristics. Also, we will evaluate the chatbot's performance based on the skills it acquires during direct chats or through other learning methods that we have added to it as special behaviors that it can develop even on its own without interference from an expert.

Like all economic companies that want to increase the number of their customers, Algeria Telecom agency looks at this program as a future and an important vision and wants to develop it much more, which is what we are going to talk about more broadly in this chapter. We will also show samples of the conversation that took place with a specific customer and see the evolution of the chatbot performance, in addition to the interface in the program. All the features of this program are basic cores of it and the chatbot will become more powerful after the learning it will acquire.

4.1 Used tools

We tried to model this chatbot to rely on the language that is better in terms of presentation while not neglecting the power of language in terms of artificial intelligence, so we used three tools, which are:

4.1.1 Visual C# (Visual Studio 2019)

Microsoft Visual Studio is a development software suite for Windows and Mac OS designed by Microsoft. The latest version is called Visual Studio 2020.
Visual Studio is a comprehensive set of development tools for building ASP.NET web

applications, XML web services, desktop applications, and mobile applications. Visual Basic, Visual C ++, Visual C # all use the same Integrated Development Environment (IDE), which allows them to share tools and makes it easy to build solutions that use multiple languages. In addition, these languages make it possible to take better advantage of the functionalities of the .NET framework, which provides access to key technologies that simplify the development of ASP web applications and XML web services using Visual Web Developer.

During its Connect () 2016 conference, Microsoft announced the port of Visual Studio to macOS, Apple's operating system[18].

Visual C # is a development tool published by Microsoft, allowing you to design applications based around the C # language.
Visual C# provides the tools to develop C # applications that target Microsoft's next-generation platform for Internet-enabled and distributed programming. This programming language is simple, secure and object oriented. It was designed to build enterprise applications. Code written in C# is compiled into managed code executed under the .NET framework[12].

4.1.2 Python 3.9

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed[21].

4.1.3 Sql Server

SQL server commonly refers to a database server. The definition of SQL server is closely linked to that of SQL (Structured Query Language), a computer language used to exploit databases.

Concretely, SQL server is a tool which has all the characteristics to be able to support the user in the manipulation, the control, the sorting, the update, and many other actions still, of databases[9].

4.1.4 Artificial Intelligence Modelling Language (AIML) V 2.0

AIML stands for Artificial Intelligence Modelling Language. AIML is an XML based markup language meant to create artificial intelligent applications. AIML makes it possible to create human interfaces while keeping the implementation simple to program, easy to understand and highly maintainable[10].

4.2 Application Interface

When the chatbot is opened (or new session), a picture of the customer's face is taken and determined his psychological state Through DeepAI API (Emotion detection) , and then a face is verified if the customer is registered in database before or not.

Figure 4.1: Ask Costumer For his name, First meeting

This picture shows the first interaction with the customer when he first met the chatbot, where the picture shows how the customer was asked to provide personal information about him, this information is useful for him in registering it to the company's database.

Figure 4.2: Ask Costumer to provide his informations, First meeting

Follow up the request for informations in a sequential manner, as he asked the customer for his name, date of birth, address and reason for arrival.

Figure 4.3: Finish the Session to Receive a new customer

When the customer writes a farewell sentence, the chatbot responds to it in a tactful manner, at the same time the chatbot ends the session and prepares for a new session

with a new user.

Figure 4.4: Customer Ask for news

When the customer wants to know what is new in the company.

Figure 4.5: A previously registered customer, made a second visit to the institution

When the customer is already registered, the chatbot asks about the last problem it

raised, and asks if it was solved or not.

4.3 Obtained Results & discuss

The value of the thing lies in its effectiveness and the extent to which it provides an integrated service in the community. In this section we will appreciate and study the chatbot and its importance in these standards that have been identified by scholars.

4.3.1 Chatbot's Performance Evaluation

More and more companies are investing in developing chatbots to provide their users with exceptional assistance experience, and thus take benefit from the chatbot's endless abilities. Despite the huge benefits that companies gain from using chatbot, there is a question that many ask about investing in it, which is: Is using Chatbot sufficient to take advantage or are there factors that must be tested to determine the competence of the chatbot?

Surely, there are many points in a chatbot that should be evaluated to see how effective it performance. It is no longer just a matter of building a Chatbot which is what many companies have done but have not succeeded in taking advantage of this technology.
So, how can we evaluate the chatbots performance?[1]

4.3.1.1 Activation Rate

It refers to the user's response rate to the bot's first message with a question or an answer that is related to the bot's goal. In other words, it indicates the number of users who go beyond the initial step and start interacting with the chatbot, either by chatting or by making a purchase decision from the bot.
To determine the activation rate, you need to evaluate:

- The total number of users interacted with the chatbot.
- The total number of users who sent a message to the bot, i.e. the engaged users.

This is determined by the bot's Dashboard.

4.3.1.2 Average Session Duration

It indicates the time period of the chat that takes place between the chatbot and the user. It can be evaluated based on the type of the bot's activity. For example, if the

bot's job is to send notifications about the weather to the user, the time period of the chat should be short. Whereas the chatbot acting as a channel for selling or promoting products or booking flights should keep users engaged for a long time to convince them to buy more products and to inform them more about the brand's services.

4.3.1.3 Retention Rate

If the purpose of the chatbot is to answer common questions and to serve customers, and if the customers need more than one chat with the bot to obtain the information they request, then this means that the chatbot doesn't provide replies directly and in an effective way from the first time, and this can annoy users over time.
While frequent chats between the user and the chatbot promoting services or products are a good sign of the bot's ability to attract and interact with the user well.

4.3.1.4 Does Chatbot contribute to revenue growth?

The best way to calculate the chatbot performance is to analyze the financial profit gained. This process includes not only the conversion rate but also the amount of money saved due to the bot's effectiveness in responding and not having to hire a customer service team. There are three points to evaluate to calculate the revenue and growth due to the bot:

- The customer satisfaction with the service provided by the bot.
- The use of a human agent from customer service for a few times due to the bot's inability to respond.
- Achieving the target conversion rate from the start.

4.3.1.5 The possibility of developing Chatbot via Artificial Intelligence (AI)

One of the most important criteria for evaluating chatbots is their ability to work on their own without the need for pre-prepared texts or interference from a customer service agent. There are many companies like Microsoft that have allowed the bot to work on its own and learn from dealing with customers, but the experiments did not achieve much success. The most notable example of this is TAY(artificial intelligence chatter bot that was originally released by Microsoft Corporation via Twitter on March 23, 2016), which has been damaged by the automatic learning process and has started sending hate and anti-Semitic messages to users.

One of the disadvantages of using chatbots that rely on automatic learning is that the capabilities of chatbots are determined by the information entered into them, which

may harm the brand if the bot is fed offensive or inaccurate information.

Therefore, many companies intend to invest in understanding and analyzing users' natural language to provide responses to each user based on their mood and behavior, rather than leaving it to users to teach the bot the responses in ways that could cause problems.

4.3.2 Results

In this part, we will show some estimated statistics obtained through chatbot experience with 20 potential customers within Algeria Telecom agency. After presenting our work to a group of customers, we summarized the results in the following table:

Table 4.1: Obtained Results .

Evaluation Criteria	**Good impression** (20 Customers)	**Neutral impression** (20 Customers)	**Bad impression** (20 Customers)	**Percentage**
Activation Rate	90%	95%	70%	85%
Average Session Duration	Long	Quickly	Very quickly	—-
Retention Rate	10%	50%	92%	50.60%
Does chatbot contribute to revenue growth?	50%	80%	90%	73.30%
Conversion sentiment	satisfact	satisfact	Somehow	—
Errors	—	—	—	6%

From these results, we find out that:

1. The retention rate in the case of the good impression is not good, because in this case the customer wants to talk more widely and gives sentences outside the subject he came for which disables the chatbot from closing the session.
2. The activation rate is somehow satisfactory across all groups because the replies may be taken from helping sites and recorded in the chatbot knowledge base.
3. We notice that some errors may occur, such as giving inappropriate replies or replies that don't match the customer impression, as the chatbot's emotion detection and face recognition capabilities are not 100 % accurate.
4. We see the retention rate in terms of bad impression is good, because the customer here is in the mood that doesn't need much talk, but to get straight into the subject.

From these results, it is evident that the chatbot has played a distinguished role in dealing with customers and has done a valuable job, but sometimes it has faced some problems.

Conclusion

The field is still open to further develop this chatbot. Also, various other features can be added to this chatbot which can help the company to improve the reception within its headquarters. All the efforts we made in trying to cover all the needs required within the framework of the field study we carried out are only part of the work that the receptionist does. The chatbot can replace the receptionist but in a way that depends on the seriousness of the customer while starting the conversation with him, which is something the company cannot control because the developments that may arise in the chatbot environment may be so great that they render the chatbot useless. However, we have made as much as possible some features adjustable without resorting to the software developer.

Conclusion & perspectives

The goal of this study is to find the impact and the relationship between chatbot technology and customer experience and how it can rise to the level of a relationship similar to that of the customer and the receptionist, so that the chatbot can replace the receptionist and provide solutions to the customer problems and spare the company from the problems of the human factor related to the receptionist , based on the analysis of the problems offered by the customer, as well as how it helps build a new marketing tool at the company level.

Chatbot is the best opportunity for Algeria Telecom agency:
By highlighting the chatbot technology in this study on Algeria Telecom agency, as a sample, we had to discuss two important topics, the first is understanding this technology and the possibility of benefiting from it. The second is understanding how the reception sector in Algerie Telecom agency works in general and how to benefit from the challenges and possibilities to obtain better reception using this chatbot.
Limitations and further research:

- This study is subject to sample bias as respondents are mostly highly educated Millennials contacted by means of non-probability and snowball sampling.
  Additionally, the relatively small sample size implies limitations with regards to external validity resulting in the impossibility to generalize the findings to the entire population.
- The absence of a control group in the survey questionnaire could not permit a meaningful evaluation of the real chatbot technology attributes' effect on the customer experience, as planned at first. Future research should take this in considerations in order to minimize the effect of all variables except for the independent variable.
- The lack of sources, records, or archives about the conversations that take place between the receptionist and the customer. Also, what are the challenges that the

receptionist faces in facing customer questions, especially periodic ones?

- Some customers consider getting information about them a privacy matter and feel reluctant to share it with the company.

Future work:
This work could get much better with the addition of many other features. For example:

- we can add another feature to the chatbot which is answering phone calls.
- we can integrate it with a social media platform or change it into a web program on Algerie Telecom website.
- install in a real robot which can move inside the reception area and provide answers to the waiting customers.
- we can make it a central program that is able to do parallel work, so that it can provide answers to more than one customer at the same time.

In conclusion:
Chatbot technology is a new element to study and to overcome the previously mentioned difficulties, which scientists must continue to study and improve more and more. In fact, this research provided a drop in the ocean of what already exists. Nevertheless, the impact of chatbot technology on customers prompts many scientists to research it due to its economic importance.

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