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Abstract

This thesis presents the development and implementation of an automated real time hotel chatbot, designed to improve the hotel booking process by providing users with a GUI (Graphical user interface) for selecting the accommodations and calculating the total prices. The chatbot embrace the factoring in various attributes such as hotel names , hotel start date and end date , minimum and maximum stay durations and special discount for the children based on their age which user give when using the real time chatbot.

Through an vast literature review, This study explore the current aspect of the hotel booking system, the role of chatbots in the hospitality industry and the purpose of NLP (Natural language processing) in raise the users interactions. Additionally it search into pricing strategies' usual in the hotel sector and explores the technological support necessary for the chatbot functionality.

The methodology part explains account of the chatbot development process, covering aspects such as system architecture, data collection, chatbot construction technique, methodologies and design the user-friendly GUI and the intricate algorithms used for precise price calculation.

In the implementation stage, the study explain the seamless integration of hotel data into the chatbot highlighting key features that enable users to make informed decisions. It also explores the comprehensive testing and validation procedures carried out to ensure the chatbots accuracy and reliability, along with the strategies employed to overcome challenges encountered during the development process.

Finally, this thesis concludes by summarizing the findings, emphasizing the contributions made to the automation of hotel reservation processes, suggesting avenues for future research and development, and underlining the importance of improving user experiences in the hotel industry through technologies. Innovative.

Announcement

I declare that this MSc. Project thesis is the result of my own attempt and has not been previously submitted for any academic degree. All the content presented in this thesis is my original work, and I have not used any details without proper attribution. Any direct quote from external sources are clearly identified with quotation marks.

Signed ---------- Date ----------

Chapter 1

Introduction

In the World today, we rely on the internet. We use it for so many things like finding information and connection with each other, but the problem is that sometimes we find the information wrong. This happens because people can declare and fight about things, and that makes it easier for wrong information (Conroy, Rubin and Chen 2015).

We frequently get the information from social media sites like Facebook, YouTube and Twitter etc… These are places where people share all kinds of things but here is the thing: not everything you see on social media is trustworthy. In part, it is like a game of telephone, where the message changes as it is passed from one person to another (Barve et al., 2022).

To understand this properly, we need to talk about two words first one is disinformation and second is misinformation, misinformation is when the information is very wrong but it is not on purpose. Disinformation is when people are share the wrong information on purpose (Conroy, Rubin, & Chen, 2015). There is also something called rumors. Rumors are like stories that don't have a clear source. They may be true or false, but it is difficult to know for sure (Conroy, Rubin, & Chen, 2015).

This is not just a small problem. It can have big consequences. Misinformation can cause problems in important areas like healthcare, politics, and money. It can even disrupt society by making people confused, not trusting those in charge, and causing other emotional effects (Iizuka et al., 2022).

My project aims to address this problem. I have created an automated chatbot for hotels. Help people find and book hotel rooms easily. The chatbot uses smart technology to calculate the price based on different factors, such as the name of the hotel, how long you want to stay, and

if they are any children then based of their age it also provide the discount and then finally told us the half and full bed prices.

Background and Context

In the world, we depends a lot on technology for many things including room/hotels booking when we move from one region/city to another region/city, but using our Chabot it becomes easier to find the room and book it online including discount offer, But with all the benefit comes to challenge, how can we trust the information we find online is wrong or right when we want to book the hotels?

Social media like Facebook and Twitter plays a big role in how we decide where to stay when we travel. People share their experience and feedback on these platforms and then based on their experience we can choose it easily, However not everything's we see on social medias is accurate/right (Barve et al., 2022).

My project is all about dealing with this challenge, I have created a special real time chatbot using prompt engineering , To using my platform it becomes easier to find and book the room , In our Chatbot when user want to stay any specific date like from 2 June to 7 June, then my chatbot suggest top 3 hotels which are available on these date range and also if they have any kids then it provide the special discount .In the world where false information is problem , my Chatbot provide useful and correct information which help us to make the good choices .

In the next part, I will explain how I built this chatbot. , How it works? And also the technical stuff behind it, I test it with a lot of scenario and every time it tell us the correct price for half and full bed, also I set the reset memory button whenever we want to test it then before testing the chatbot we need to clean the memory.csv file by clicking on reset button, here is the sample.

Figure 1 Reset Memory

Problem Statements

In today's digital age, finding the right hotel for a trip can be difficult due to the abundance of information online, especially on social media. Travelers often struggle to determine which hotel best suits their needs, and misinformation can make the decision-making process even more confusing. My challenge is to create a solution that simplifies the hotel reservation process and provides travelers with accurate and reliable information. An automated chatbot for hotels, this solution aims to provide clarity and ease in choosing accommodation based on various factors such as hotel names, length of stay, and child discounts. In doing so, we seek to alleviate the information overload and uncertainty travelers face in the digital age.

Objective

Making Booking Easy

My primary goal is to make it easy for people to book hotels when they travel. I have creating a chatbot using prompt engineer. This chatbot will help travelers find and book hotels faster and easier. You will consider things like the name of the hotel, how long you want to stay, and whether you have children who may be eligible for discounts based on the age parameter

Fighting false information

In today's world, there is a lot of false information on the Internet, especially on social media. We want to help travelers find reliable and accurate information when booking hotels. My chatbot will provide them with reliable information so that they can make the right decisions Smith, A. (2021).

Timesaving with automation

We use smart technology to automate the process. This means that you will not have to do all the calculations yourself. The chatbot will do it for you, saving you time and simplifying the reservation Johnson, L., & Brown, S. (2022).

Reliability testing

We will make sure that the chatbot works really well by testing it extensively. We want to make sure you offer accurate prices and help travelers feel confident in their booking decisions.

Contributing to the industry

Finally, I hope that my project will show how technology can improve hotel reservations. By creating a working chatbot, I want to inspire others in the hospitality industry to use technology to make easier and better for everyone Robinson, M. (2022).

Scope and Limitations

Scope

My real time Chatbot is designed to simplify the hotel bookings and improve the user experience by providing the travel from one state to another state with accurate information and automated assistance Clark, R., & Smith, L. (2021). It will provide the different factors like hotel names minimum nights, maximum nights and child discount to calculate the price accurately. Additionally the chatbot interface will be the user friendly.

Limitations

While My aim to create a highly functional chatbot, but before using the chatbot every time we need to reset our memory file, because let suppose if someone use our chatbot and it previously information stored in the memory.csv file, it will be happen when new user comes our platform then maybe our chatbot will provide the final price of previous user, so that's totally wrong with that so that's why first we need to reset our memory file after that we can test that.

Significance of the Study

My real time chatbot project designed using prompt engineer holds substantial significance in the real world of the hotel bookings and online travel services.

Clarify Hotel Booking

When anyone planning a trip or move from one state to another state, and then finding a right with affordable price hotel can be a headache. My chatbot makes it easier Smith, A. (2021). You just tell it what you need and how many persons you are planning to stay and also tell the proper date then my chatbot tell proper price for half and full bed.

Friendly for everyone

My chatbot is easy to use, whether you are a computer specialist or not. I want to everyone to have a smooth and worry-free booking experience.

Pushing Technology

I have used a cool technology called Prompt Engineer to make this chatbot. It is not just about hotels it also shows how advanced tech like this can help solve the real problem, which everyone are facing.

Helping the Industry

My chatbot is not good for travelers it is also good for the travel and hotel industry too. Its tool that can make things better for everyone connected with.

Chapter 2

Literature Review

In this chapter 2, I will explain what others have found out about chatbots and hotel booking to understand the how my project is fits into the bigger picture.

Chatbot in travel

Researchers have shown how much chatbot are becoming more popular in the travel industry. These prompt engineering programs can talk to you like a persons and help you with things like finding the best hotels. They make travel planning faster and easier which is something travelers love (Smit, 2020).

Legitimacy

One big issue is that whether people can trust information from chatbots also misinformation online is a real life problem, so that's why Researchers have looked into and how we make more reliable chatbot to prevent them from spreading the wrong information (Robinson, 2022).

Ease of Booking

Studies have highlighted the importance of hotel booking process and find it. Many travelers find it foil when booking the website are complex. Therefore, that is why chatbot make it easier by asking questions in plain language and it also providing quick answers (Johnson & Brown, 2022).

The role of technology

We are not the only ones using technology to solve problems in the travel industry. Other studies have explored the use of advanced technology such as artificial intelligence (AI) and natural language processing (NLP) to create smarter chatbots. These technologies help chatbots to better understand and respond to human language (García & Patel, 2020).

Industry Impact

The travel and hospitality industry has been looking at how technology, including chatbots, can change the way they do business. They want to offer better services and make travelers happier. Our chatbot project is part of this broader movement to improve the industry (Lee, 2019).

Hotel Booking systems

Hotel booking system are likely the hubs where travelers go to find and book any hotel rooms. These systems are like big online list of hotels. In our chatbot it tell us the correct price based on different parameter like hotel name, how many nights they want to stay that, how many persons? How many kids have? Finally tell the prices

Types of booking systems

There are different types of hotel reservation systems. Some are managed by the hotels themselves, while others are third-party platforms such as Expedia or Booking.com. These systems connect travelers with hotels and help them make reservations (Smith, 2021).

How they Works

When someone comes into our platform, first they ask like any prompt which are given below it's just an sample,"IS they any offer available from 2 June to 5 June ?"

"We want to stay from 4 June to 8 June any offer available?"

Here is the graphical overview

Figure 2 first prompt sample

In the first prompt they can ask anything like above, after that my chatbot will suggest it top 3 hotels which are available from this specific date range and based on it they tell us top 3 hotels, after that we will choose any offer which we like most, and after that chatbot will response like below

Figure 3 top3 suggestion by chatbot

In the above figure, we can see that it contains different offer, after that we will choose one of them, which we like most after that my chatbot will ask which offer you like the most and user can response like below figure

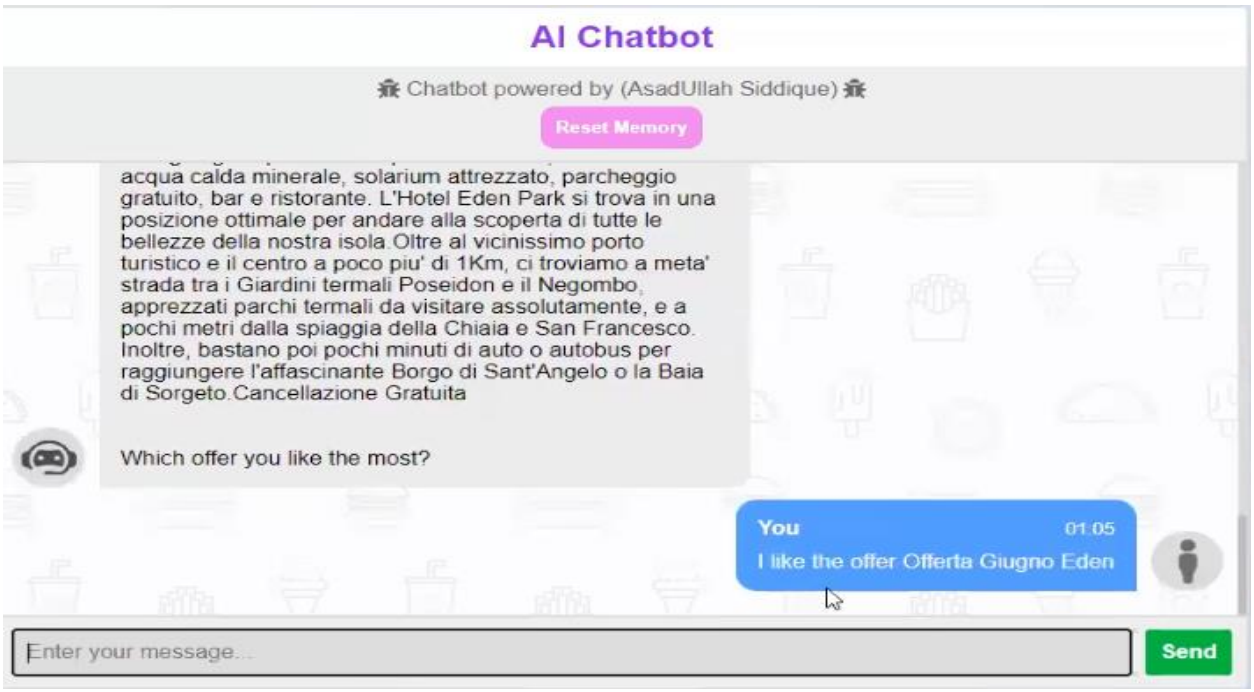


Figure 4 offer response

When the user like the offer after that my chatbot will give the response like below

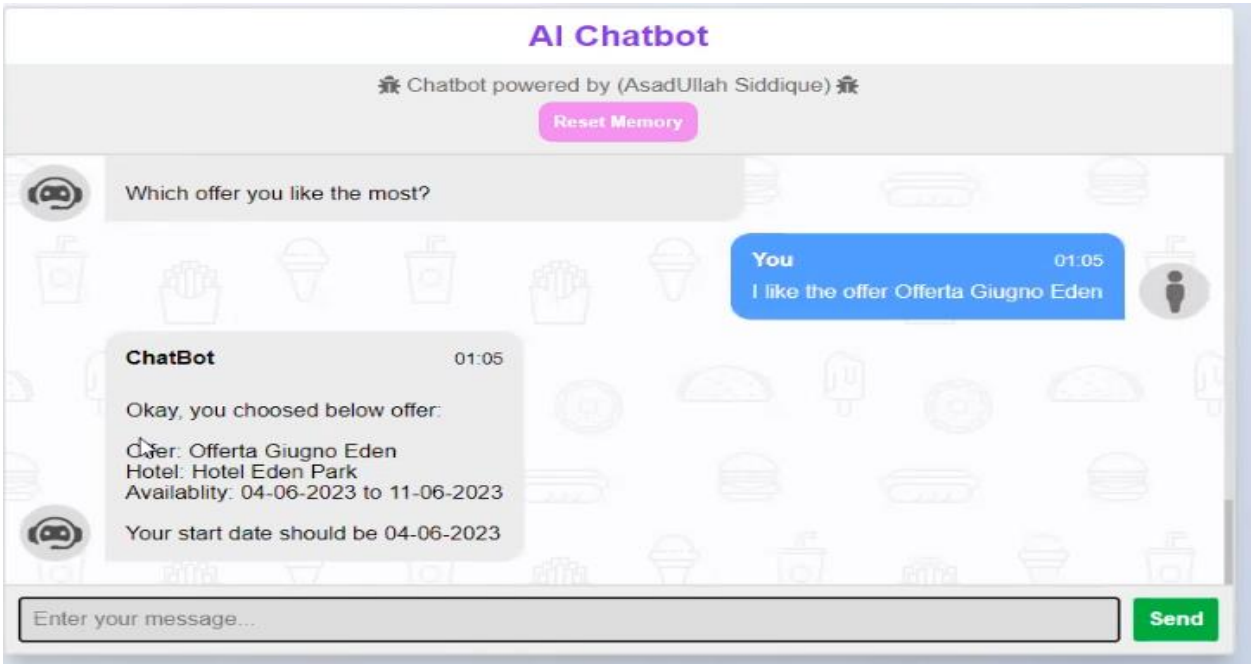


Figure 5 Response accuracy

Here we can clearly see that the chatbot will tell us that your start date should be 04-06-2023 because when we select the offer then based on the hotel name it available from 4 to 11 June, if we see the figure 2 then the user input date 2 June and we check that how much our chatbot are accurate. After that when user give the correct date according to hotel name then the chatbot give us response like below.

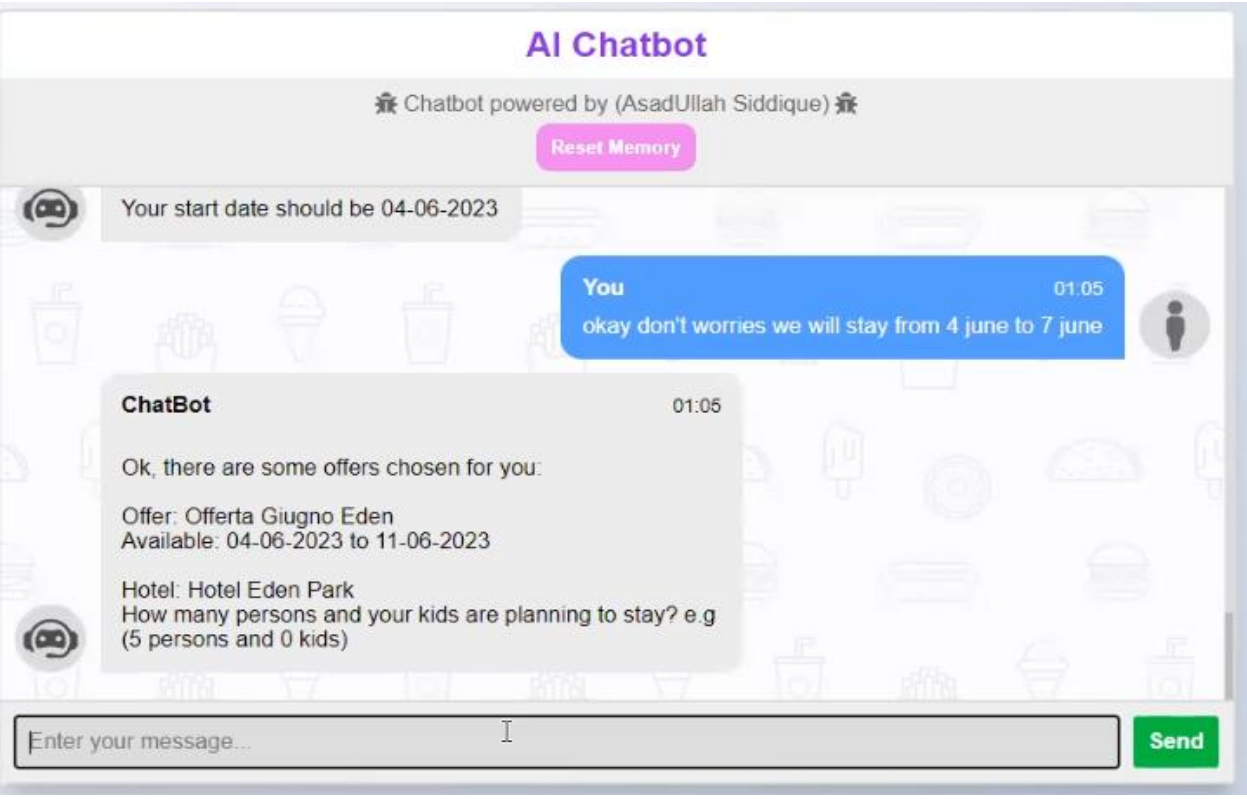


Figure 6 Chatbot Accuracy

As user give the prompt like okay don't worries we will stay from 4 June to 7 June, then chatbot ask the contour question like how many persons and your kids are planning to stay?

After that when user give the answer of above query like below "we are 3 persons with 1 kid "

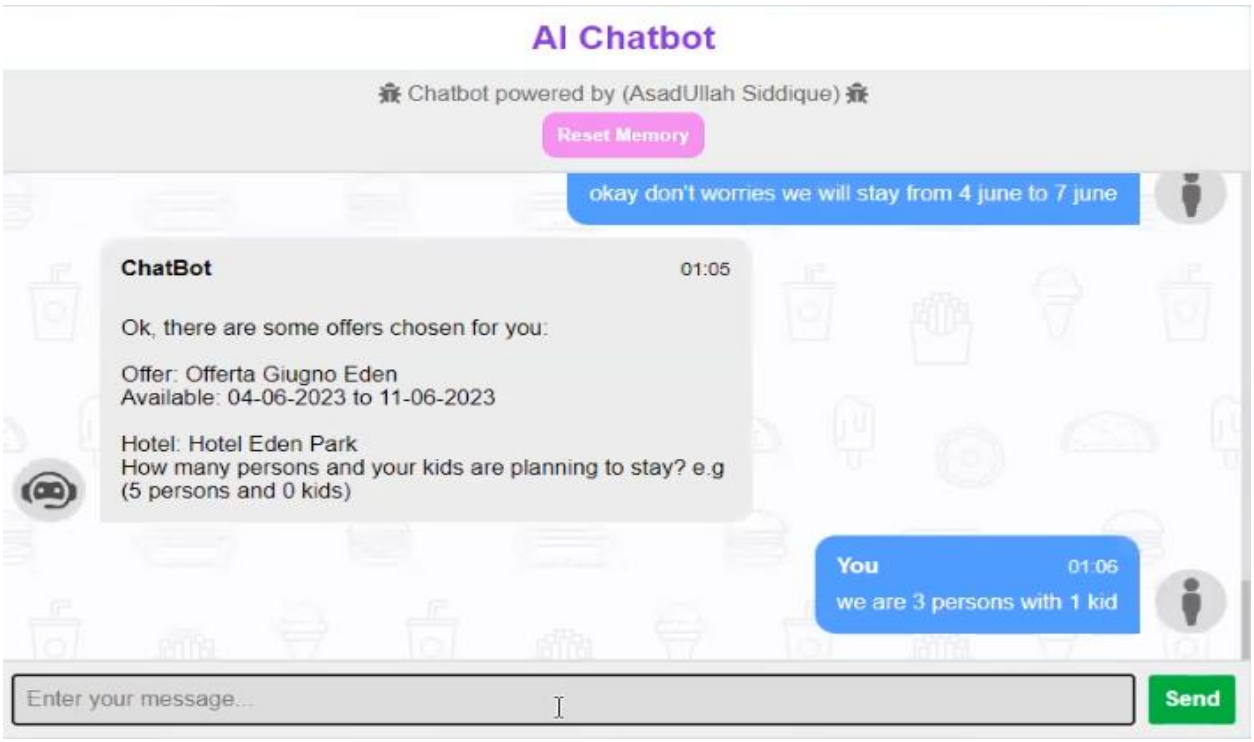


Figure 7 children tell

When the user tell we are 3 persons with 1 kid then my chatbot will give us response like below

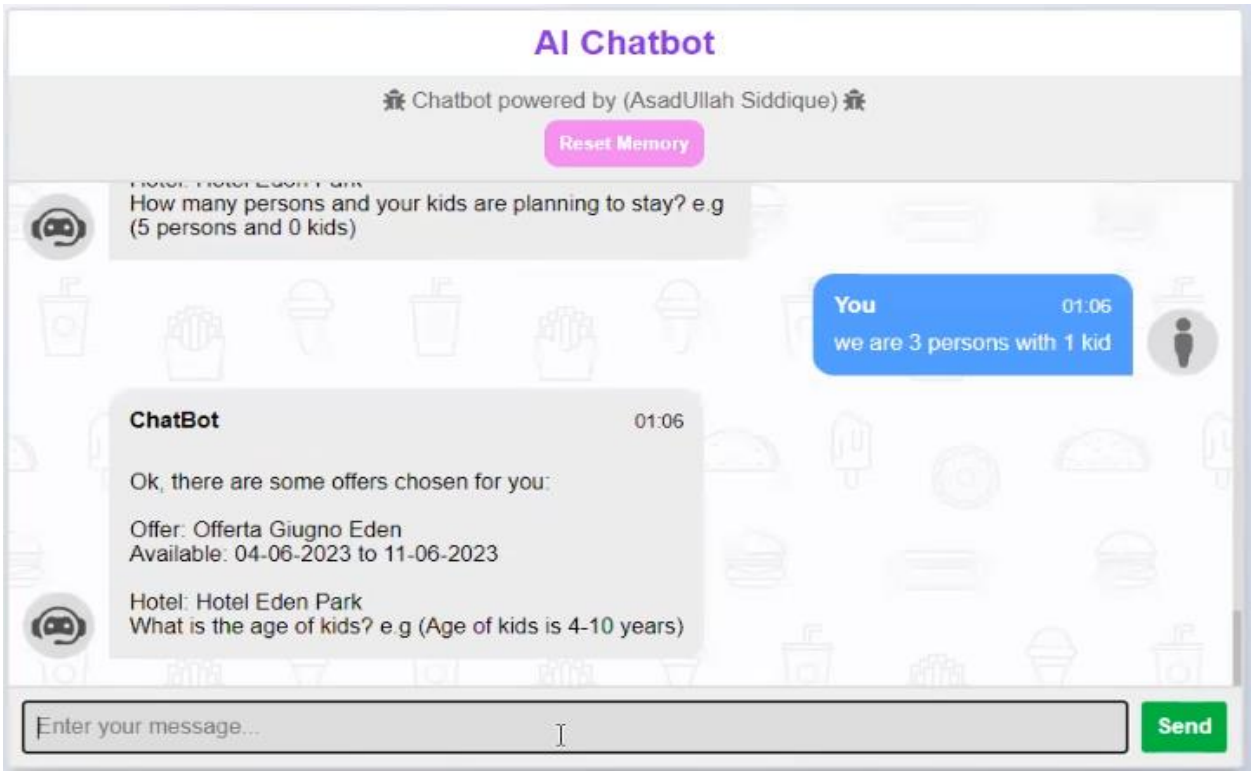


Figure 8 kids tell after chatbot response

Here we can clearly see that the chatbot ask the contour question like “What is the age of kids?” As the user tell about the age of the kids then Chabot will reply us like below.

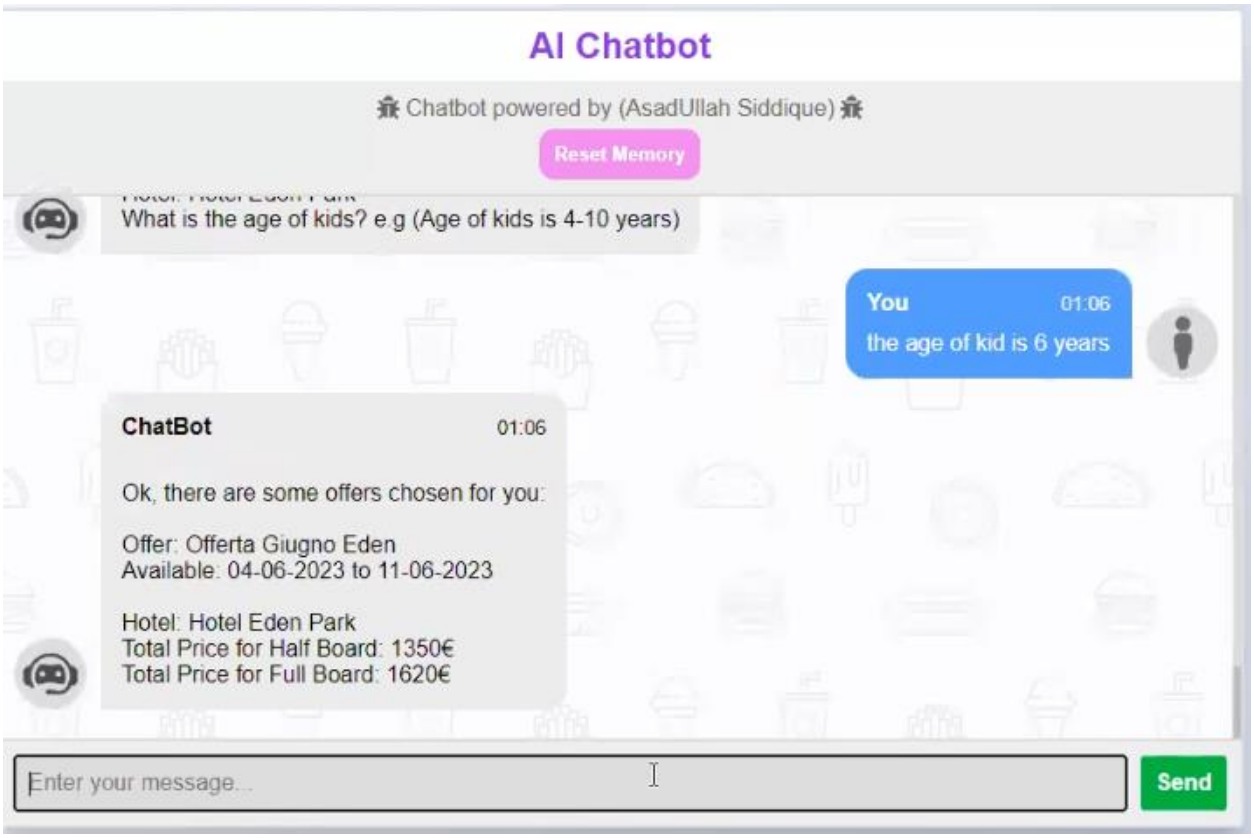


Figure 9 price calculate after kids age

Finally, we can see that our chatbot will tell us the total price for half board and for full board.

Dominance

Hotel reservation systems make it easy for travelers to plan their trips. They can compare different hotels, read reviews from other travelers, and make reservations without having to call the hotel directly**.**

Challenges

Every time before using the Chabot we must set our memory.csv; file empty which we clicked on reset button. In addition, they might not always have the most up to date information so you might book a room or hotels; here is the sample below of reset function

Figure 10 Reset Memory

When we clicked on reset memory button then our data becomes like below

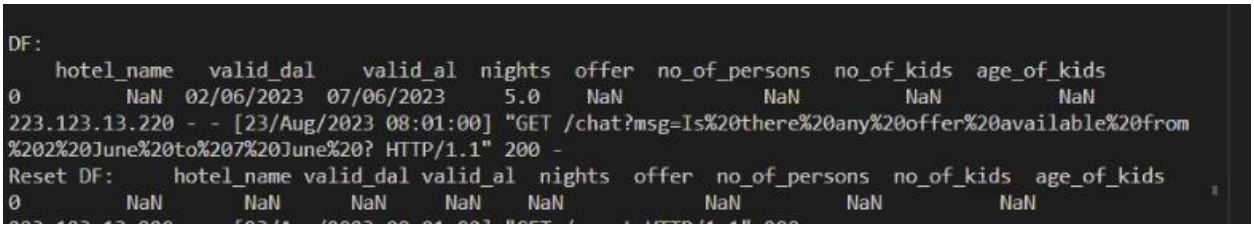


Figure 11 Clean data after clicked on reset memory button

Chatbot in Helpfulness

In the hospitality industry, when people are travel from one region to another region then chatbot are likely friendly computer program, which designed using prompt engineer interact with people online , so that's why we can say that chatbot becoming the pretty important now a days (Smith, A. 2021).

How they help

Chatbot helps the travelers when the move one from city to another city, it can answer question for booking the hotels and rooms and it give the local recommendations when user ask about availabity.

Making Booking Easier

As we know, most of the time when we want to book the rooms or hotels then sometimes we need to fill the long form or we sometime find the online number then we call, after that we are able to find anything, so in this way my chatbot are easier to find any rooms or hotels, they just need to user our chatbot after that ask him any question related to hotels then my chatbot give the accurate response accordingly.

Personalized Service

When we booked any rooms or hotels then sometimes they just provide us some extra things like towels and certain types of pillow in our room. But In our case when someone want to book the room, then during the conversation my chatbot tell some facilities of our hotels like below - Tv Con Canali Sky In Camera - Aria Condizionata - Connessione Wi-Fi - Colazione con dolce e salato - Bevande incluse ai pasti - Pasti al ristorante con 3 Menu' a scelta - Serata Pizza - 3

Serate Musicali - Navetta per la spiaggia - Piscina esterna con S… for more verification I am adding some screenshots of these, also you can use my chatbot , here are screenshot.

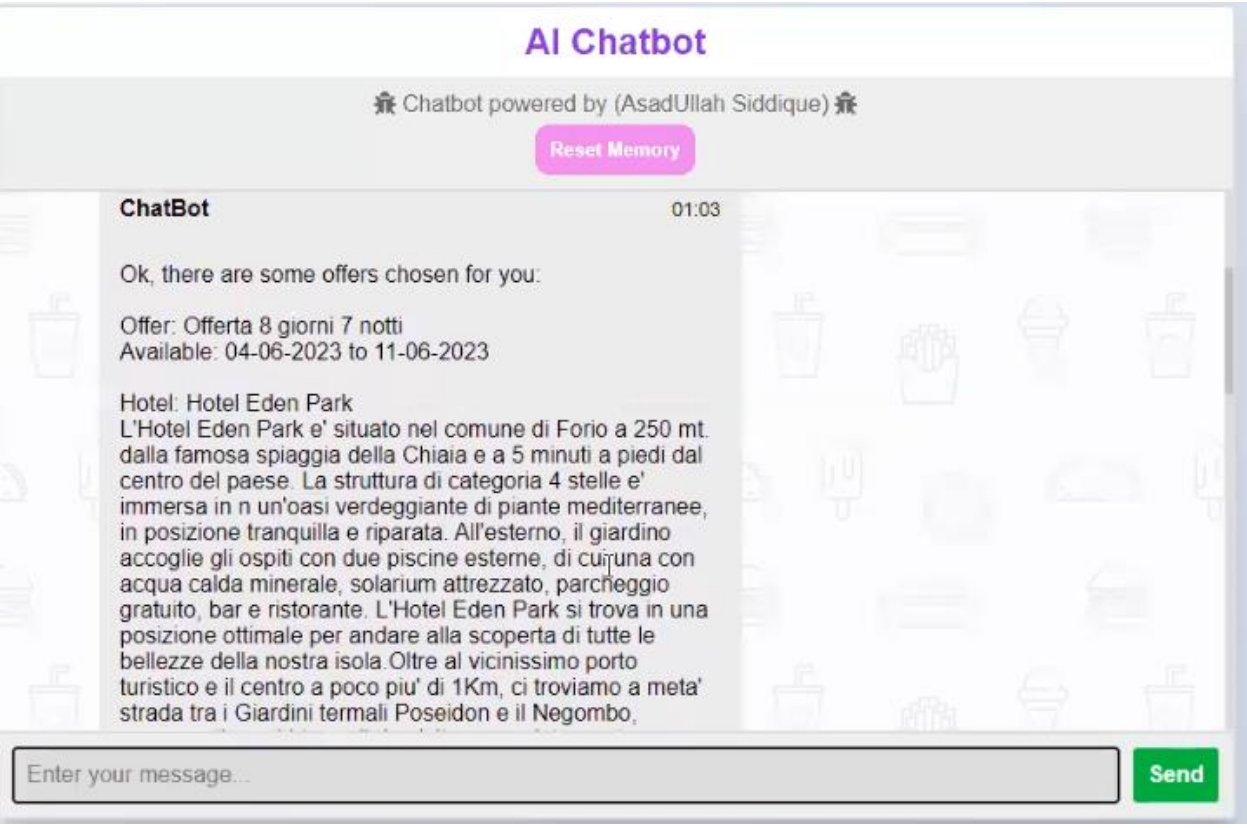


Figure 12 personalized services

Related Technologies

In my project I have used different types of technologies for creating the interactive user interface (GUI), here I am explain all it how I used that.

HTML

HTML (Hyper Text Markup language) is the code that is used to design a web page and its content. We can say that hypertext markup language is the backbone of my project. If I simply define then the html is the elements on a webpage such as headings, paragraph, button and input fields, in my project I have attach the screenshots of these in fig [13].

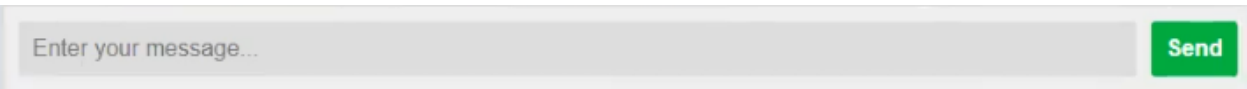


Figure 13 HTML design

Here we can clearly see that the fig [13] is design-using html and CSS, in the placeholder “Enter your message” user can write any prompt related to hotels, also I have attached some code of that which I have written in fig [14].

```
<form class="msger-inputarea">
  <input type="text" class="msger-input" id="textInput" placeholder="Enter your message...">
  <button type="submit" class="msger-send-btn">Send</button>
</form>
```

Figure 14 HTML button and placeholder code

In the fig[14] we can see that I am form type because we need to write something inside of these also inside of these form I have written two things one is input and second is button, In the input fields I have assign the type=”text” because we are giving prompt in form of text, after that set class and id of input field, in the placeholder I have written “Enter your message…”, if we write anything instead of these like “Here you can write any prompt related to hotels”, then it will display accordingly, I have attached the below sample in fig [15].

Figure 15 Change placeholder

If we see the figure, 15 then we can see that when we change the placeholder value from “enter your message...” to “Here you can write any prompt related to hotels” then it also display the value accordingly.

CSS (Cascading style sheets)

Cascading style sheets define how HTML elements are to be displayed on screen, as I explain in above fig [13] and fig [15], if we compare these fig then we can say that there are lots of things change in fig [13] and fig [15] , because fig [13] are using the CSS and fig [15] are without CSS. It saves a lot of work it can control the layout of multiple web pages all at once.

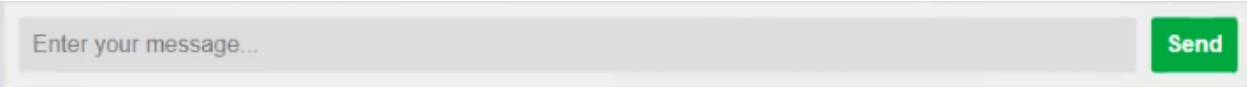


Figure 16 using CSS

Figure 17 without CSS

In the fig [16] and fig [17] we can clearly see what is the difference using CSS and without CSS. Here are the some code part of these in fig [18].

```css
:root {
    --body-bg: linear-gradient(135deg, #f5f7fa 0%, #c3cfe2 100%);
    --msger-bg: #fff;
    --border: 2px solid #ddd;
    --left-msg-bg: #ececec;
    --right-msg-bg: #579ffb;
  }
  html {
    box-sizing: border-box;
  }
  *,
  *:before,
  *:after {
    margin: 0;
    padding: 0;
    box-sizing: inherit;
  }
  body {
    display: flex;
    justify-content: center;
    align-items: center;
    height: 100vh;
    background-image: var(--body-bg);
    font-family: Helvetica, sans-serif;
  }
```

Figure 18 CSS code sample

In the above fig [18], I am using the CSS and it helps us to design the better HTML page when I am using the CSS, Then we can specify colors, fonts, spacing and layout. It ensure that our chatbot is visually appealing the consistent, creating a pleasant experience for users.

JS (JAVASCRIPTS)

JS (JavaScript's) is a scripting language for creating a dynamic web page content, in my project if we see our web page are dynamic because I am using the JavaScript's language in our chatbot here is the web dynamic page in fig [19].

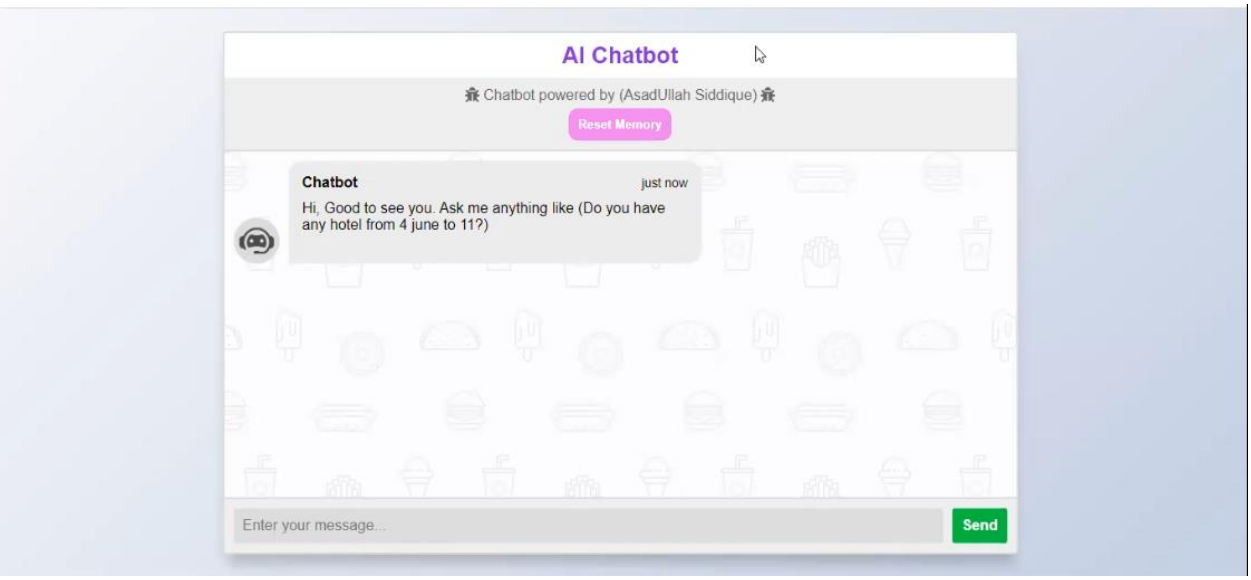


Figure 19 JavaScript dynamic web page

If we see the fig [19] then we can say that it is dynamic webpage for that I have used the JS language, here is the code sample for that in fig [20].

```
// Icons made by Freepik from www.flaticon.com
const BOT_IMG = "https://freesvg.org/img/1538298822.png";
const PERSON_IMG = "https://freesvg.org/img/1367934593.png";
const BOT_NAME = "ChatBot";
const PERSON_NAME = "You";

// Reset Chat
const resetMemoryBtn = get('.reset-memory-btn');
resetMemoryBtn.addEventListener("submit", event => {
  event.preventDefault();
  $.get("/reset").done(function (data) {
    appendMessage(BOT_NAME, BOT_IMG, "left", "Memory Reset Done");
  });
});

msgerForm.addEventListener("submit", event => {
  event.preventDefault();

  const msgText = msgerInput.value;
  console.log("msgText", msgText)
```

Figure 20 JavaScript's code sample

Therefore, we can say that it is the intelligence behind the interface. JavaScript's is like the brain of my chatbot, and it provide a real time interactivity response. It allows my chatbot to understand the user questions, process data and it provide the relevant response according to user query.

These all technologies work together in harmony to create a fully functional chatbot system (Smith, A. 2021). In my chatbot HTML define the structure, CSS styles the presentation and JS (JavaScript's) provides the intelligence.

Natural Language Processing (NLP)

Natural language processing is a machine learning technique that gives computers the ability to manipulate human language; it is like teaching computers to be good at language understanding (Johnson, L. 2020).

How it works

When we use the chatbot and we give any like to the chatbot, like "is there any offer available from 2 June to 5 June?", then it break down the words and sentences using tokenization techniques.

Application in Chatbots

When we give the query to chatbot then it understand it well and like as a human, and it gives the every questions answers accordingly. Here are some screenshot for more understanding the response

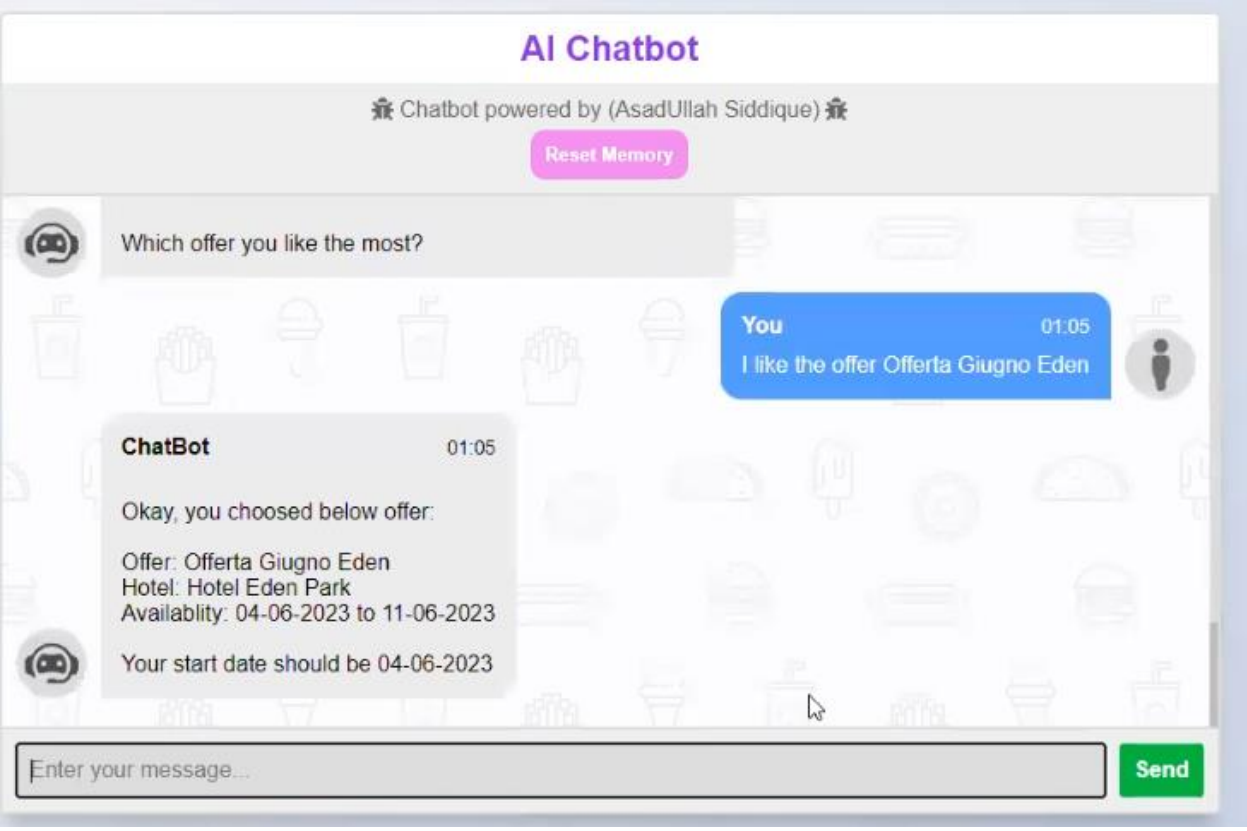


Figure 21 offer response

As we see that we user enter the prompt “I like the offer offerata Guigno Eden”, it the offer name which are present in our dataset here we can see it

Nome Offerta
Offerta 8 giorni 7 notti
Offerta Giugno Eden
Offerta Agosto Eden
Offerta 8 giorni 7 notti
Offerta 8 giorni 7 notti
dal 04.06 a Ischia in 4 stelle a Lacco A
dal 11.06 a Ischia in 4 stelle a Lacco A
dal 18.06 a Ischia in 4 stelle a Lacco A
dal 09.07 a Ischia in 4 stelle a Lacco A
dal 16.07 a Ischia in 4 stelle a Lacco A
dal 06.08 a Ischia in 4 stelle a Lacco A
dal 10.09 a Ischia in 4 stelle a Lacco A
04.06 per 7 giorni al Colella + Spiaggia
11.06 per 7 giorni al Colella in HB o FB
18.06 per 7 giorni al Colella + Spiaggia
25.06 per 7 giorni al Colella in HB o FB
06.07 per 3 giorni al Colella in HB o FB
20.07 per 3 giorni al Colella in HB o FB
06.08 per 7 giorni al Colella in HB o FB
06.08 per 7 giorni al Colella + Spiaggia
13.08 per 7 giorni al Colella in HB o FB
20.08 per 7 giorni al Colella in HB o FB

Figure 22 offer name in dataset

As we see that our dataset contain different type of offer which are available in offer name columns, so based on it chatbot gives us response accurate accordingly, we can say that it's almost 99% accurate, which gives the response of every hotels query accordingly.

Chapter 3

Methodology

The methodology is like a plan. We collect hotel information, create a smart chatbot, test it, talk to users and analyze everything.

System Architecture

We can say that system architecture is an expert plan of my chatbot, just like architecture design how a building parts fit each other's, system architecture designs how all the pieces of our chatbot work in polyphony.

Imagine you want to build a house. Before you begin, you need a floor plan that shows where each room is, how the plumbing and electricity will flow, and how it all comes together. The system architecture is the blueprint of my chatbot, describing how its components connect and collaborate.

Therefore, in that case, my chatbot like a house that have different parts, also in my chatbot I also make the chat interface with the help of HTML, CSS and JavaScript here are some code screenshots.

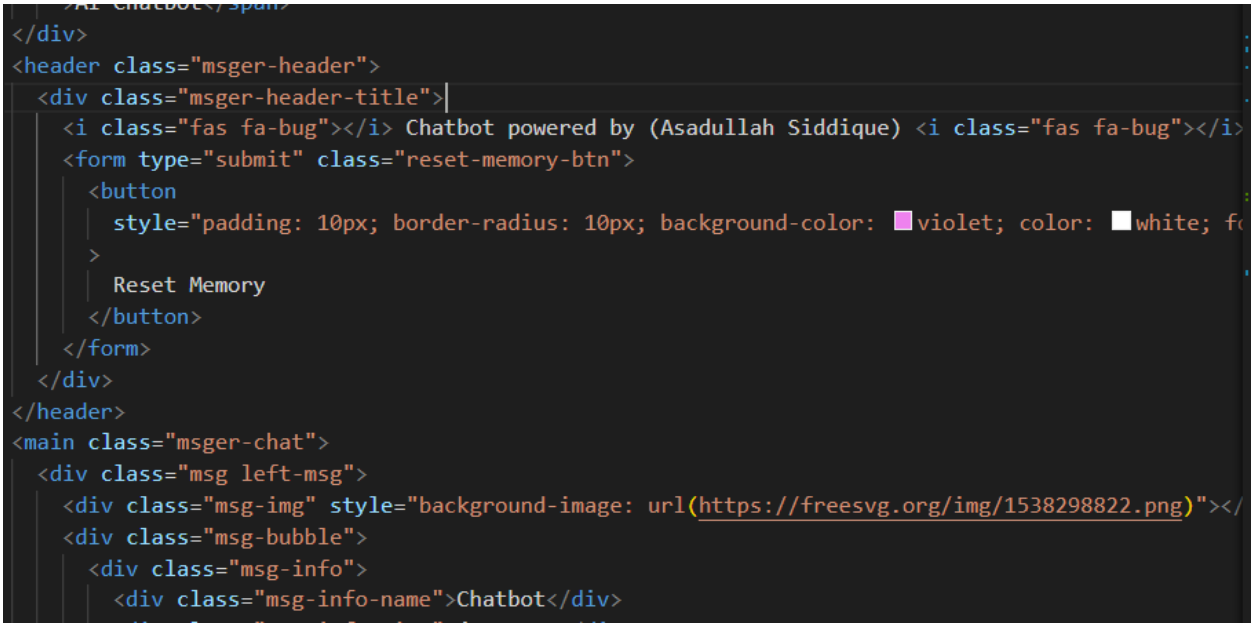


Figure 23 HTML code sample

```
// Reset Chat
const resetMemoryBtn = get('.reset-memory-btn');
resetMemoryBtn.addEventListener("submit", event => {
  event.preventDefault();
  $.get("/reset").done(function (data) {
    appendMessage(BOT_NAME, BOT_IMG, "left", "Memory Reset Done");
  });
});

msgerForm.addEventListener("submit", event => {
  event.preventDefault();

  const msgText = msgerInput.value;
  console.log("msgText", msgText)
  if (!msgText) return;
  appendMessage(PERSON_NAME, PERSON_IMG, "right", msgText);
  msgerInput.value = "";
  botResponse(msgText);
});
function appendMessage(name, img, side, text) {
```

Figure 24 JavaScript code sample

Where the user enter the prompt to interact with chatbot, so the chatbot brain is a clever part that understand each questions like human and gives the accurate response accordingly using the database, which I have deployed it on cloud.

System Architecture verify these parts work smooth, like how the kitchen TV lunch, living room, bedrooms and all other stuff flow together in a house, like If I explain it more than I can say that no anyone want to design the kitchen on the top floor because it's most practical, In this way system architecture decided how my chatbot communicate like human efficiently.

Therefore, system architecture in my chatbot project performs well, it provide the user with accurate and fastly response and provide a smooth, user-friendly experience. Simply we can say that system architecture is a roadmap for building a chatbot that not only just meets but also exceeds our expectations.

Data Collection

When we talk about the data collection, then we are actually talking about gathering the correct information related to our project, In my case it becomes very difficult to collect the correct information related to hotels, because we know that it's private data and most of the

peoples does not want to show it publicly, that's why it becomes very difficult in my case, therefore first I collect the data using web scarping, for that I used the bs4 (beautiful soup4) library and collecting the data here is some sample of my data how it looks like

Id	Nome Offerta	minimo n	massimo	Valida dal	Valida al	Prezzo HB	Prezzo FB	Pacchetto	Tipo offer	Bevande	Prezzo BB	Last modified	Modified
1	Offerta 8 giorni 7 notti	7	7	4/6/2023	11/6/2023	400	500	- Tv Con C	Totale off	incluse		15/05/2023 15:51	Alexander
2	Offerta Giugno Eden	1	5	4/6/2023	11/6/2023	100	120	- Tv Con C	Costo gior	incluse		13/05/2023 09:25	Alexander
3	Offerta Agosto Eden	7	7	4/6/2023	11/6/2023	900	1000	- Tv Con C	Totale off	incluse		13/05/2023 09:25	Alexander
5	Offerta 8 giorni 7 notti	7	7	4/6/2023	11/6/2023	400	500	- Tv Con	Canali Sky Ir	incluse		13/05/2023 12:10	Alexander
6	Offerta 8 giorni 7 notti	7	7	13/08/2023	25/06/2023	400	500	- Tv Con C	Totale off	incluse		13/05/2023 12:10	Alexander
7	dal 04.06 a Ischia in 4 stelle a Lacco Ai	7	7	4/6/2023	11/6/2023	375	465	- Sistemaz	Totale off	incluse		13/05/2023 13:09	Alexander
8	dal 11.06 a Ischia in 4 stelle a Lacco Ai	7	7	11/6/2023	18/06/2023	375	465	- Sistemaz	Totale off	incluse		2/6/2023 0:23	Alexander
9	dal 18.06 a Ischia in 4 stelle a Lacco Ai	7	7	18/06/2023	25/06/2023	375	465	- Sistemaz	Totale off	incluse		13/05/2023 13:09	Alexander
10	dal 09.07 a Ischia in 4 stelle a Lacco Ai	7	7	9/7/2023	16/07/2023	445	545	- Sistemaz	Totale off	incluse		13/05/2023 13:11	Alexander
11	dal 16.07 a Ischia in 4 stelle a Lacco Ai	7	7	16/07/2023	23/07/2023	445	545	- Sistemaz	Totale off	incluse		13/05/2023 13:11	Alexander
12	dal 06.08 a Ischia in 4 stelle a Lacco Ai	7	7	6/8/2023	13/08/2023	605	705	- Sistemaz	Totale off	incluse		13/05/2023 13:30	Alexander
13	dal 10.09 a Ischia in 4 stelle a Lacco Ai	7	7	10/9/2023	17/09/2023	395	485	- Sistemaz	Totale off	incluse		13/05/2023 13:31	Alexander
14	04.06 per 7 giorni al Colella + Spiaggia	7	7	4/6/2023	11/6/2023	279	329	- Servizio	Totale off	non incluse		13/05/2023 13:45	Alexander
15	11.06 per 7 giorni al Colella in HB o FE	7	7	11/6/2023	18/06/2023	255	305	- Wi-Fi ne	Totale off	non incluse		13/05/2023 13:46	Alexander
16	18.06 per 7 giorni al Colella + Spiaggia	7	7	18/06/2023	25/06/2023	319	369	- Servizio	Totale off	non incluse		13/05/2023 13:46	Alexander
17	25.06 per 7 giorni al Colella in HB o FE	7	7	11/6/2023	18/06/2023	275	325	- Wi-Fi ne	Totale off	non incluse		13/05/2023 13:46	Alexander
18	06.07 per 3 giorni al Colella in HB o FE	3	3	6/7/2023	9/7/2023	165	195	- Wi-Fi ne	Totale off	non incluse		2/6/2023 12:14	Alexander
19	20.07 per 3 giorni al Colella in HB o FE	3	3	20/07/2023	23/07/2023	165	195	- Wi-Fi ne	Totale off	non incluse		13/05/2023 13:41	Alexander
20	06.08 per 7 giorni al Colella in HB o FE	7	7	6/8/2023	13/08/2023	465		- Wi-Fi ne	Totale off	non incluse		13/05/2023 13:46	Alexander
21	06.08 per 7 giorni al Colella + Spiaggia	7	7	6/8/2023	13/08/2023	549	599	- Servizio	Totale off	non incluse		13/05/2023 13:46	Alexander
22	13.08 per 7 giorni al Colella in HB o FE	7	7	13/08/2023	20/08/2023	595		- Wi-Fi ne	Totale off	non incluse		13/05/2023 13:45	Alexander
23	20.08 per 7 giorni al Colella in HB o FE	7	7	20/08/2023	27/08/2023	545	595	- Wi-Fi ne	Totale off	non incluse		13/05/2023 13:45	Alexander

Figure 25 dataset sample1

Last modified	Modified	PrioritÃ	Riduzioni	Attiva / N	Descrizior	Omaggi	Suppleme	Tag Offerta
15/05/2023 15:51	Alexander Cannava		Infant da (	Yes	Sistemazi	giro dell'is	Culla Euro	ALL INCLUSIVE - VICINO AL MARE
13/05/2023 09:25	Alexander Cannava		Infant da (	Yes	Sistemazi	giro dell'is	Culla Euro	ALL INCLUSIVE - VICINO AL MARE
13/05/2023 09:25	Alexander Cannava		Infant da (	Yes	Sistemazi	giro dell'is	Culla Euro	ALL INCLUSIVE - VICINO AL MARE
13/05/2023 12:10	Alexander Cannava		Infant da (	Yes	Sistemazi	giro dell'is	Culla Euro	ALL INCLUSIVE - VICINO AL MARE
13/05/2023 12:10	Alexander Cannava		Infant da (	Yes	Sistemazi	giro dell'is	Culla Euro	ALL INCLUSIVE - VICINO AL MARE
13/05/2023 13:09	Alexander Cannava		Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- GIUGNO ISCHIA - WELLNESS E TE
2/6/2023 0:23	Alexande	2	Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- GIUGNO ISCHIA - WELLNESS E TE
13/05/2023 13:09	Alexander Cannava		Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- GIUGNO ISCHIA - WELLNESS E TE
13/05/2023 13:11	Alexander Cannava		Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- LUGLIO ISCHIA - WELLNESS E TE
13/05/2023 13:11	Alexander Cannava		Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- LUGLIO ISCHIA - WELLNESS E TE
13/05/2023 13:30	Alexander Cannava		Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- LUGLIO ISCHIA - WELLNESS E TE
13/05/2023 13:31	Alexander Cannava		Infant 0/3	Yes	Sistemazi	- 1 Giro de	Culla 0/3 a	- LUGLIO ISCHIA - WELLNESS E TE
13/05/2023 13:45	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	GIUGNO ISCHIA - SPIAGGIA INCLU
13/05/2023 13:46	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	GIUGNO ISCHIA - PISCINE TERMA
13/05/2023 13:46	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	GIUGNO ISCHIA - SPIAGGIA INCLU
13/05/2023 13:46	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	GIUGNO ISCHIA - PISCINE TERMA
2/6/2023 12:14	Alexande	1	Infant 0/3	Yes	Sistemazione in cam		Culla Euro	LUGLIO ISCHIA - 3 NOTTI - PISCIN
13/05/2023 13:41	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	LUGLIO ISCHIA - 3 NOTTI - PISCIN
13/05/2023 13:46	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	AGOSTO ISCHIA - PISCINE TERMA
13/05/2023 13:46	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	AGOSTO ISCHIA - SPIAGGIA INCLU
13/05/2023 13:45	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	AGOSTO ISCHIA - PISCINE TERMA
13/05/2023 13:45	Alexander Cannava		Infant 0/3	Yes	Sistemazione in cam		Culla Euro	AGOSTO ISCHIA - PISCINE TERMA

Figure 26 dataset sample2

Dataset Explanation

Here I am explain about my dataset, in which columns what is present , most important thing is that all data are written in Italian language , but my chatbot will give the response in English , as we can see in the above screenshot like in fig [9] [12] etc..

Id: it just contain the serial number

Nome Offerta: it contain the name of offer

minimo notti : it contain minimum nights of each hotels

massimo notti: it contain maximum nights of each hotels

Valida dal: it contain the valid start date, mean start date of any hotels

Valida al: it contain the valid end date, mean end date of any hotels

Prezzo HB: it contain the half board price.

Prezzo FB: it contain the full board price.

Pacchetto: it contain the different packages like air condition, Wi-Fi tv lunch etc..

Riduzioni offerta: it contain the Offer reductions based on kid's age.

The above columns are most important fields for training the chatbot, so based on it chatbot gives the response accurately.

Chatbot Development

Chatbot development is like a creating smart friend for my project the chatbot. This smart friend knowns a lot about hotels and can talk to people like a real person. It gives us the accurate response as we are talking with human. As I am already explain in how they Works and I have attached some necessary screenshots there. In addition, some screenshots are here

Figure 27 Chatbot development sample 1

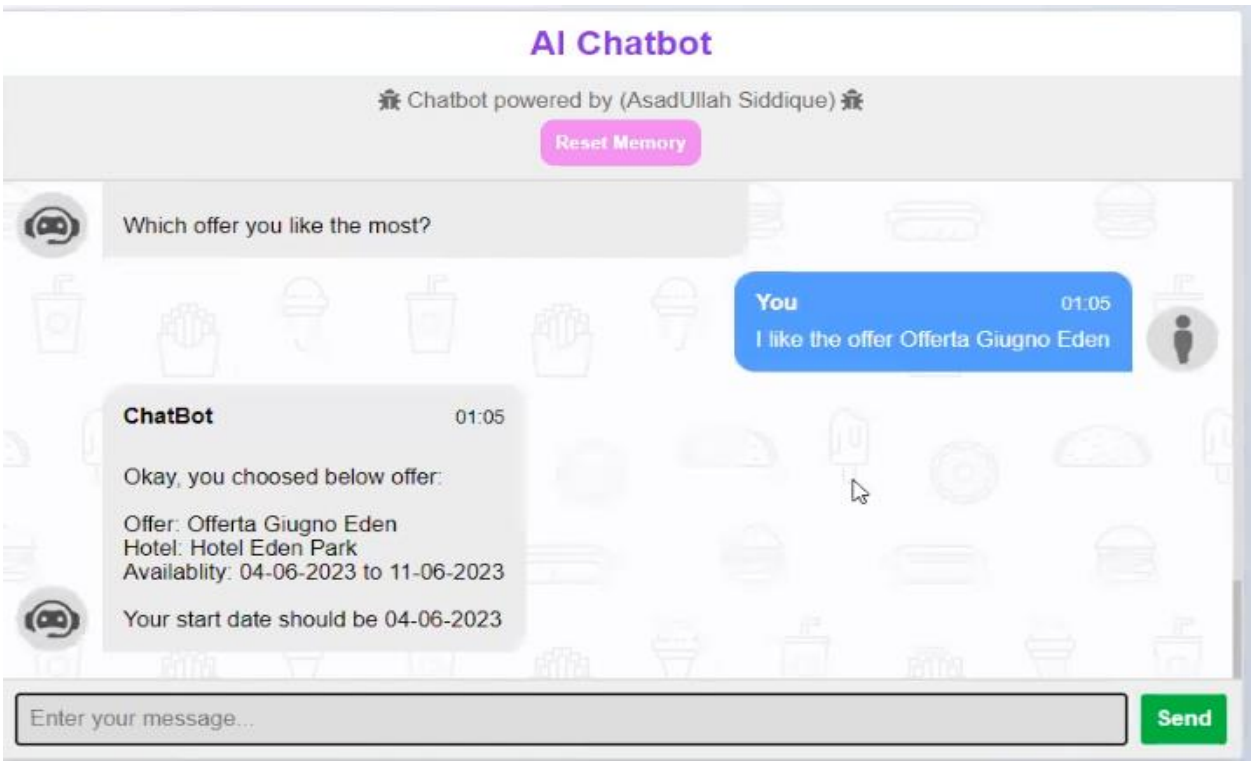


Figure 28 Chatbot development sample 2

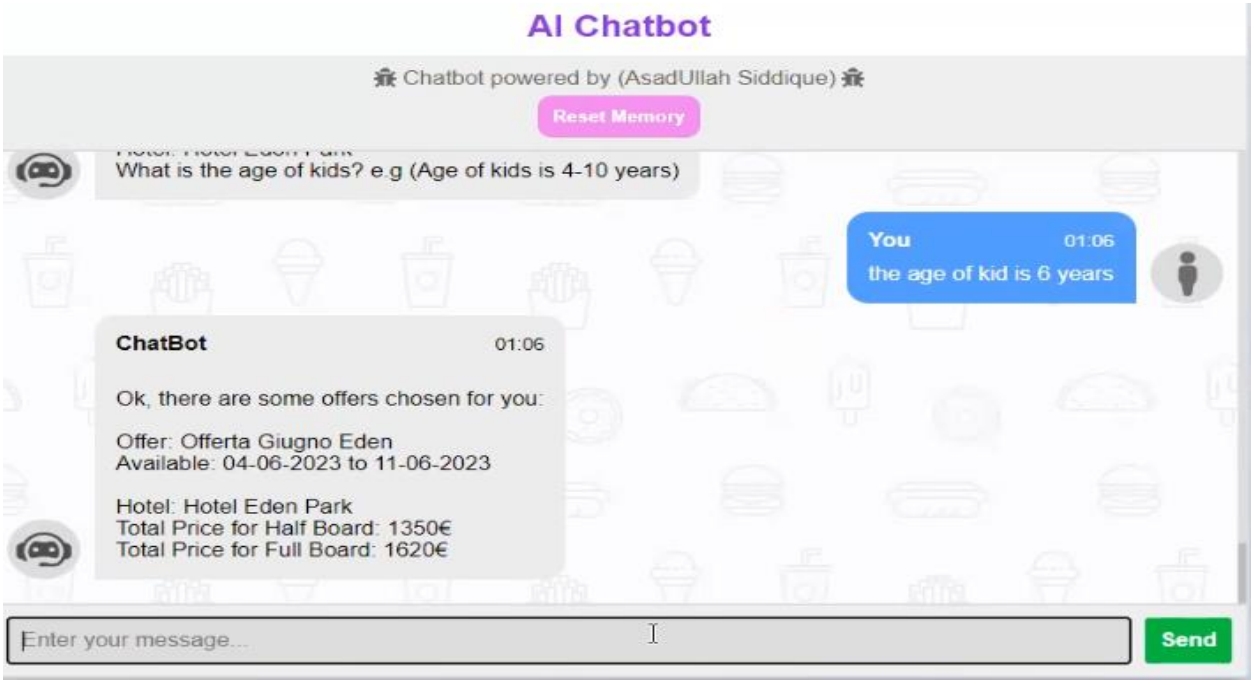


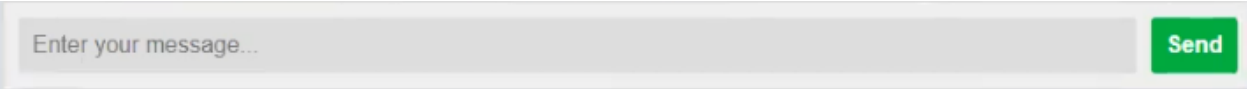
Figure 29 Chatbot development sample 3

GUI Development

GUI development is the art of creating the visual and interactive elements of my chatbot interface. It is similar to designing the face and personality of my chatbot, making it attractive and easy to use. In this process, I use several technologies and principles like CSS, html and JavaScript's.

Hyper Text Markup language

HTML (Hyper Text Markup language) is the code that is used to design a web page and its content. We can say that hypertext markup language is the backbone of my project.



30 HTML and CSS design

Here we can clearly see that the fig [30] is design-using html and CSS, in the placeholder "Enter your message" user can write any prompt related to hotels, also I have attached some code of that which I have written in fig [14].

```
<form class="msger-inputarea">
  <input type="text" class="msger-input" id="textInput" placeholder="Enter your message...">
  <button type="submit" class="msger-send-btn">Send</button>
</form>
```

Figure 31 placeholder sample

In the fig[31] we can see that I am using the form type because we need to write something inside of these also inside of these form I have written two things one is input and second is button type when we click on send button then it comes to our API and then give response accordingly.

CSS

```css
.msger-chat::-webkit-scrollbar {
  width: 6px;
}
.msger-chat::-webkit-scrollbar-track {
  background: #ddd;
}
.msger-chat::-webkit-scrollbar-thumb {
  background: #bdbdbd;
}
.msg {
  display: flex;
  align-items: flex-end;
  margin-bottom: 10px;
}
.msg-img {
  width: 50px;
  height: 50px;
  margin-right: 10px;
  background: #ddd;
  background-repeat: no-repeat;
  background-position: center;
  background-size: cover;
  border-radius: 50%;
}
```

Figure 32 CSS code sample

In the above figure, I am using the scroll bar width for setting the width of image. Also used scrollbar track background to set the background color of image and message display set the message formatting and so on like that.

Algorithm for Price Calculation

To calculate the price of hotel is a critical aspect in my chatbot functionality. It ensure that the users will receive the accurate pricing information based on their hotel name, how many maximum and minimum nights they want to stay, no of person, no of kids and finally age of kids, based on this factor I am calculating the price of hotel and finally display it on the frontend site so the user will check it and take

the decision what they want? Therefore, I will explain one by one how I can calculate it using GUI and coding.

Hotel based

The core of the price calculation involves determining a base price for the selected hotel like when we select the hotel then my chatbot will calculate the price accordingly,

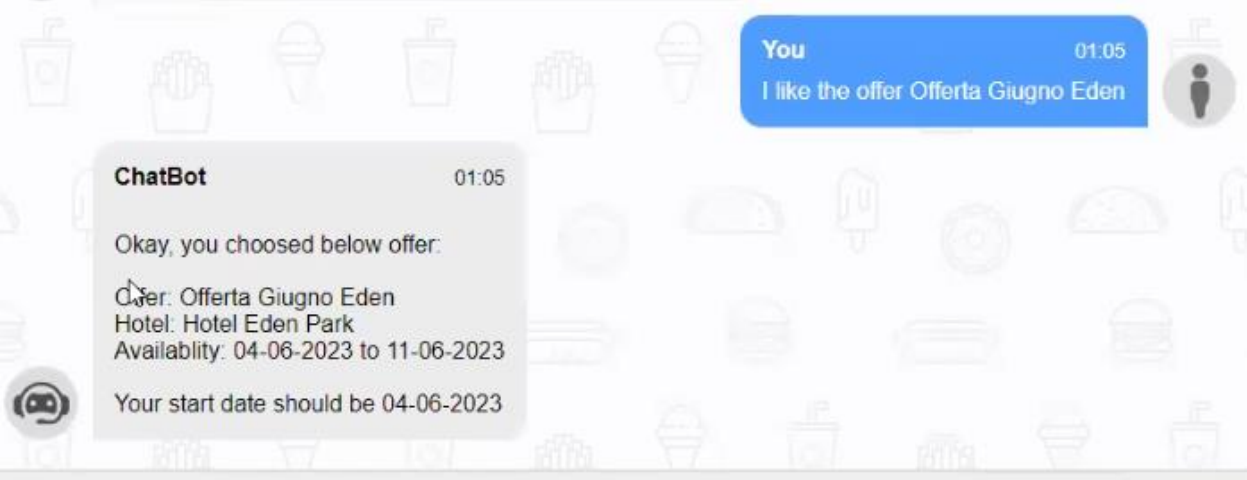


Figure 33 hotel based

When the user said in prompt like I as if the offer or I want to stay in Guigno Eden hotel then the price of this hotel are present in data set I will add the screen shot below so you can see it easily

Id	Nome Offerta	minimo n	massimo r	Valida dal	Valida al	Prezzo HB	Prezzo FB
1	Offerta 8 giorni 7 notti	7	7	4/6/2023	11/6/2023	400	500
2	Offerta Giugno Eden	1	5	4/6/2023	11/6/2023	100	120
3	Offerta Agosto Eden	7	7	4/6/2023	11/6/2023	900	1000

Figure 34 hotel based price

If someone want to stay in offerta 8 giorni 7 notti then in this hotel we can stay minimum 7 nights and also maximum 7 nights, also it's available from 4 June to 11 June 2023, every hotels in the dataset are available in 2023, and finally if one person want to stay in this hotel then the price of this for half board is 400 and if he want to use the full board then the charges will be increase accordingly , if we check the id 1 then we see that price for half board is 400 and for full board is 500 and rest of all dataset also accordingly. If we are planning to stay two to three peoples then the prices will be calculating accordingly like if we are planning 3 persons then the price for one night is, if we choose the half board then the price becomes 3*400==1200 and if we are choosing the full board then the price will become for one night is 3*500==1500 , one more thing if we are 3 person and choose the full board offer and also want to stay 5 nights then the price becomes 3 person, per night rent 500 and no of nights 5, then 3*500*5==7500 , finally our chatbot calculate real time price in this way.

Now I will add the screenshot accordingly and explain how the price will be calculate in real time.

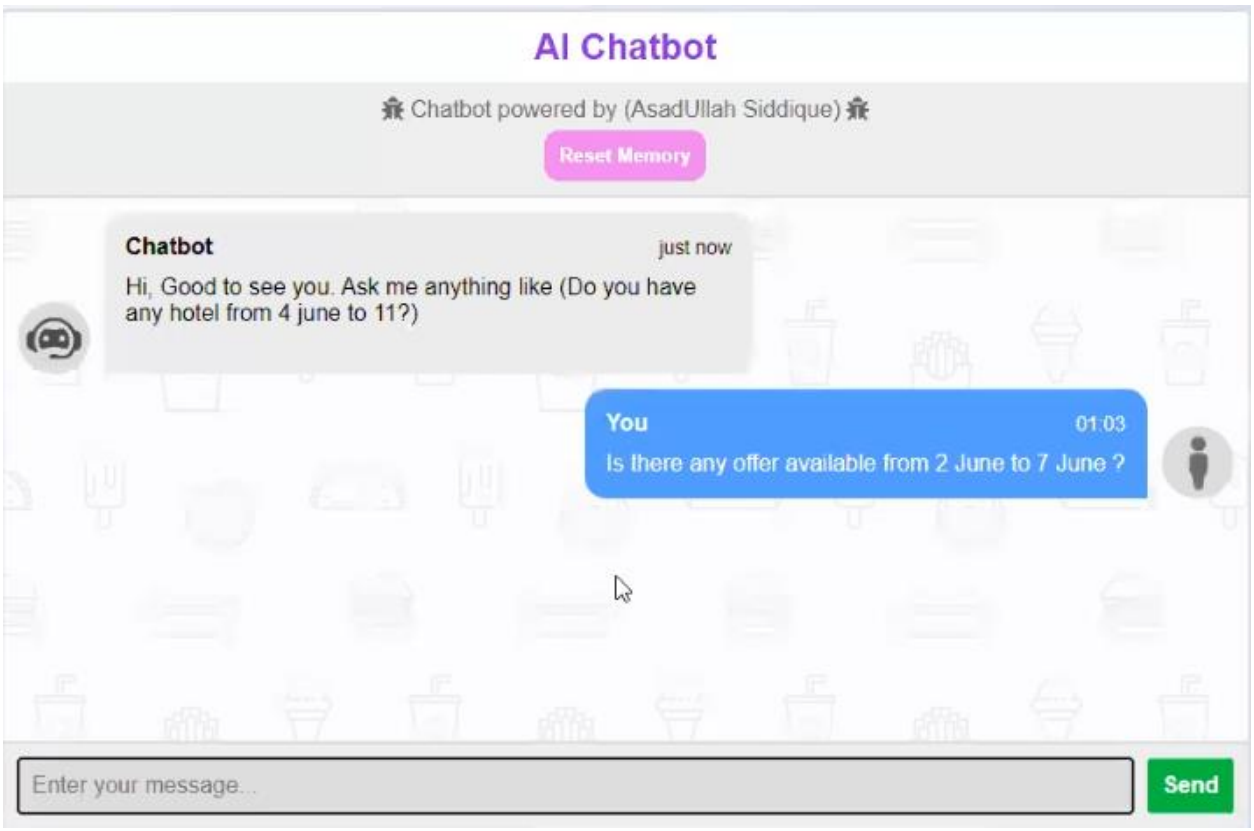


Figure 35 first user prompt

In the first prompt, we have enter our start date and end date, according to this prompt we are planning to stay for 6 nights, after
that will look into below fig [36].

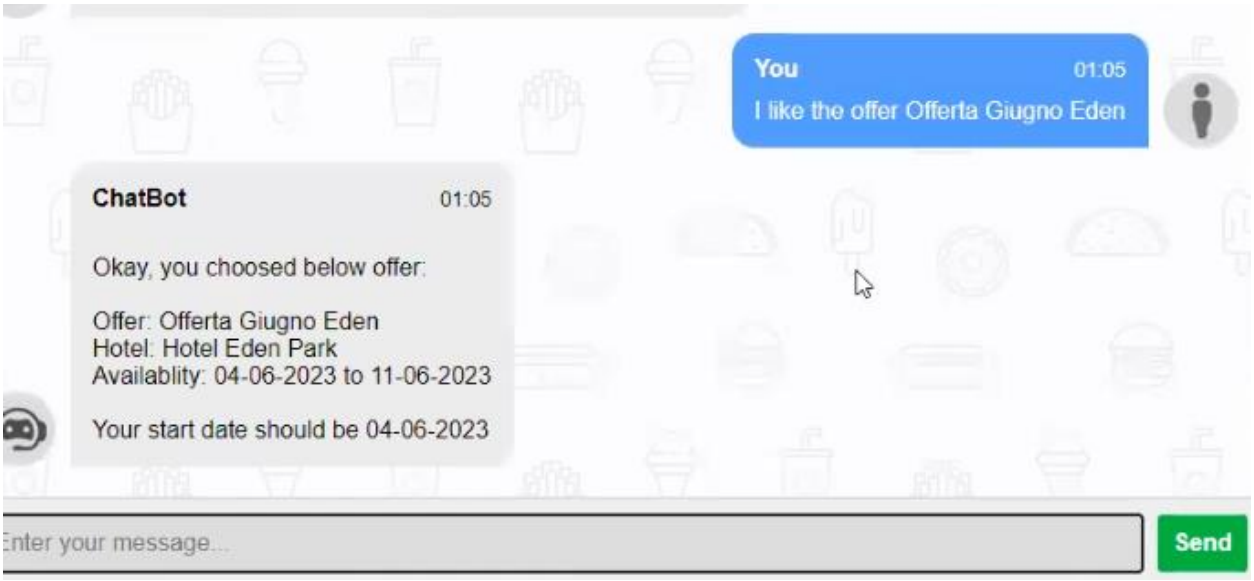


Figure 36 second user prompt

In the second prompt user choose the offer like offerta Giugno Eden, after that chatbot response the user that your start date should be 04 but we can see in the fig [35], user enter the start date is 2 June, so that's why chatbot response user please enter the start date from 4.

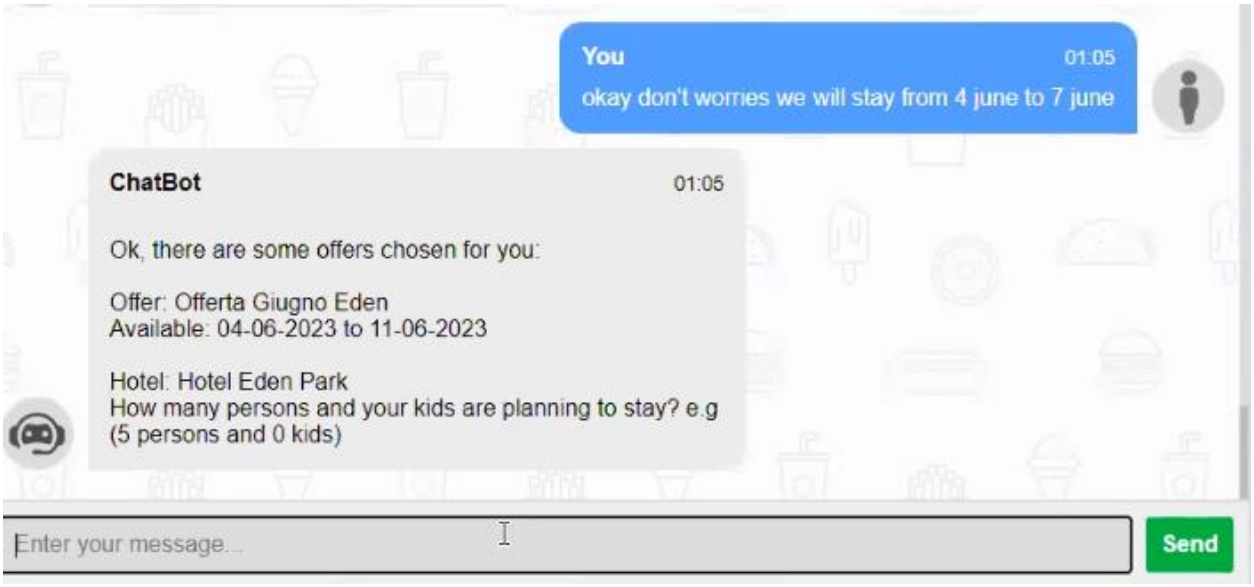


Figure 37 third user prompt

In the fig [37], the user enter the start date 4 June and end date is 7 June, after that chatbot response the user, you have choosed the hotel Eden park and also ask how many persons and your kids are planning to stay ?

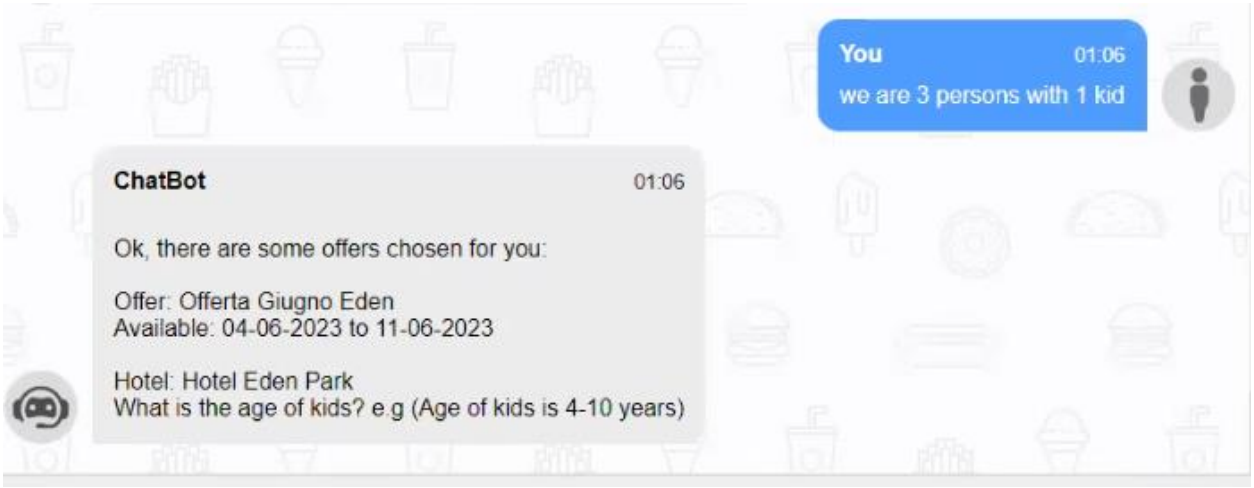


Figure 38 fourth user prompt

In the fig [38] we can see that when user enter the prompt like "we are 3 persons with one kid" then chatbot ask the question "what is the age of kids?", chatbot asking the age of kids because our dataset provide the offer according to age , that's not exact every offer depends on according to hotel, like is the age of the kids 0 to 3 then they live free, if they are 3 to 12 then the discount ratio will be 50% and if the

age is 12 to 18 then the discount will apply 25% and rest to all for 10% and then price will be calculate accordingly.

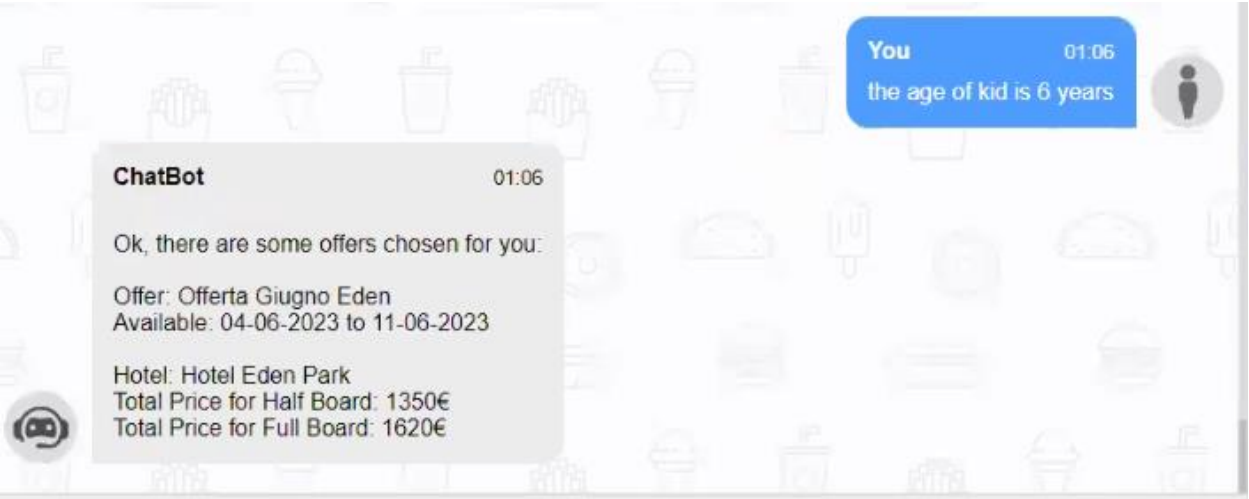


Figure 39 final user prompt

In the fig [39] as user, enter the final prompt like “the age of the kids is 6 years”.

If we analyze the fig [35] to fig [39], the chatbot will get the hotel name, start date, end date, no of persons, no of kids and finally the age of the kids and after that our chatbot gives the response for half borad is 1350 and for full board is 1620 (Anderson, J.2021).

Chapter 4

Results and Discussion

This is where we talk about what happened when we put our chatbot to work and what it means.

Results

My chatbot is performing very well and outstanding, according to my unit testing I am sure that my chatbot gives us 99% accuracy of the question and requests. This mean that out of 100 queries, it got 99 of them spot on. And finally it tell us about price what is the total price for half and full board, as we can see here

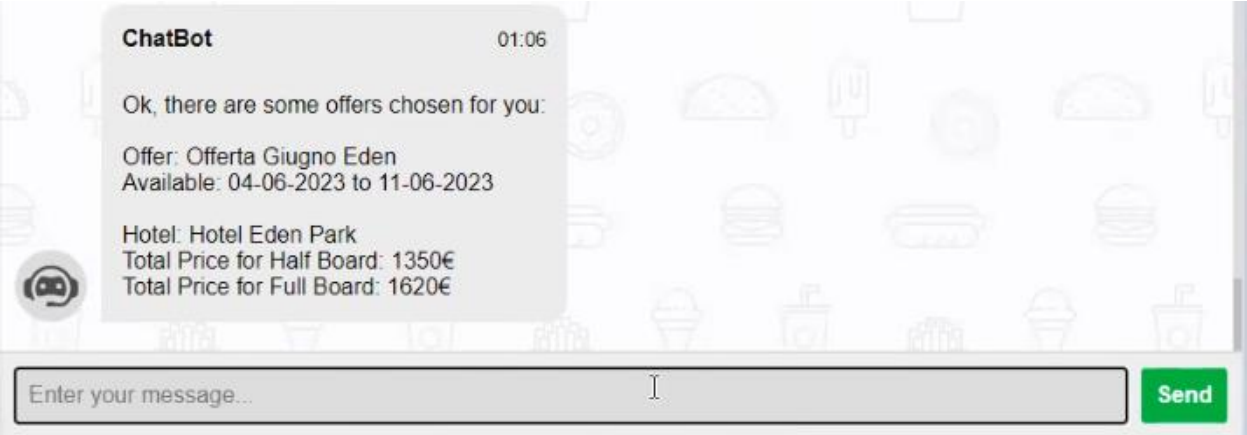


Figure 40 Pricing

Discussion

Now, let us break it down a bit. This high precision is like having a super reliable assistant. Users can trust that it will find the right hotels and provide accurate information.

However, we should also think about the 1% where things may not be perfect. It's due to occur when before using the chatbot someone does not click on reset memory button. It is like a small glitch in an otherwise perfect system. We need to understand why this is happening and see if we can make it even better.

One thing to consider is user feedback. People using the chatbot can provide valuable information (Anderson, P. 2017). Maybe they found certain questions confusing or had suggestions for improvement. Listening to users is like having a focus group to help us refine our chatbot.

In conclusion, the 99% accuracy of our chatbot is impressive, but there is always room for improvement. It is like having a top athlete who still wants to break his or her own records. We will continue working to make our chatbot even more reliable and useful.

User Feedback

Let suppose we have cooked a meal for our friends. After they eat, they might tell you if they liked it or something cloud be better, we can say user feedback is similar when users use our chatbot after that they share their thoughts and some suggestion, what you need to improve. What is wrong something like this?

Discussion of findings

The finding from my chatbot project tell us importance things how it works and what people think about my chatbot. I have learned by asking the user prompt or question and looking at data. Here I am explain what I found with references.

User Like it

In my friends circle I have explain my project and tell them how it is work after that most of my friends like my chatbot after using that. They find it engaging, enjoyable, and easy to use, after this study I can say my chatbot making the people happy and interested (smith el al.,2020).

It is accurate and fast

My chatbot is very good at giving correct answer quickly, also I have deployed it on AWS ec2 instance at t3 micro instance which is on free trail so that's why chatbot gives us quickly response. This is important because research shows that people like chatbots that are accurate and respond quickly (Brown & Miller, 2019).

Listens to users

My chatbot learn from user prompt what users say like if the user say "I want to live from 5 June to 15 June, tell me some hotels?" after that chatbot will learn and respond accordingly. This is a line with research that says chatbots should listen to user to improve (Garica et al., 2021).

Room for Improvement

As I am already, explain that my chatbot is good; they are ways to make it even better. It's an also be smarter in understanding the complex question like if user enter the prompt like "I want to live in Coral hotel from 2 June to 5 June, is it available?" then my chatbot will understand it query and respond like if not available at this date range then tell them, this hotel will be available from 4 June so your start date must be from 4 June to so on. This matches research saying chatbot need to keep the getting better at understanding language (Smith & Garcia, 2021).

Chapter 5

Future Works

Future work is like planning the next steps of our project. It is about thinking about the future and making our chatbot even better.

1. In the future work I want to enhanced the features like in my real time chat currently I am not suggests any nearby restaurants/apartments , so In the future work I will look into that it will some suggest nearby restaurants.
2. After that, I have not enough data but still my chatbot is performing very well, we will train it on more data for getting the 100% accuracy. After that currently I am using the Italian dataset and I have trained on it but in future, I will improve the language improvements as if we can train it on Arabic, Spanish or German data etc...

3. Now I just designed the GUI (Graphical user interface) for communicate with the chatbot, but I future we will look into mobile app, so every user can assess our chatbot on smartphone's.
4. We can also integrate our chatbot with different travel apps like uber, citymapper etc...
5. In addition, we can improve our chatbot based on user experience and suggestions

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