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| Car Yaar Chat Bot:  Your CarAssist AI  Document Author : Shrinivas Nandkishor Dhamone |

### Bot Design Document

### 1. Introduction

#### 1.1 Project Goals

* **Objective:** Develop an intelligent bot assistant that recommends cars based on user preferences and budget.
* **Target Audience:** People looking for cars with specific requirements.
* **Key Features:**
  + Personalized recommendations
  + Simplified car selection process based on the following keys:
    - kmpl
    - car category
    - seater
    - transmission
    - fuel type
    - price

#### 1.2 Scope

* **In-Scope:** Static chat using terminal with data over Jupyter notebook.
* **Out-of-Scope:** Application using Flask.

### 2. AI Model

#### 2.1 Model Selection

* **Chosen Model:** GPT-3.5-turbo by OpenAI.

#### 2.2 Model Training

* **Initial Dataset:** Pre-trained on car data collected from a GitHub link.
* **Fine-Tuning Data:** Added additional features for dealer details and GPS info. Writing elaborate and detailed prompts, describing each and every step and scenario.

#### 2.3 Model Performance

* **Metrics:** Comparing data collected by the bot from the conversation with expected data.

### 3. Data Details

| **Column** | **Description** |
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| car model | The specific model name of the car |
| car category | Category of the car (e.g., Compact SUV, Sedan) |
| brand name | The manufacturer or brand name of the car |
| price | Price of the car in INR |
| engine | Engine details of the car |
| transmission | Type of transmission (e.g., Manual, Automatic) |
| fuel type | Type of fuel used (e.g., Diesel, Petrol, Electric) |
| kmpl | Kilometers per liter (fuel efficiency) |
| color | Color of the car |
| year | Year of manufacture |
| seater | Number of seats in the car |
| carfullfeature | Full feature description of the car |
| dealer ID | A unique identifier for each dealer |
| dealer name | Name of the dealer |
| dealer GPS | GPS location of the dealer |

### 4. Key Design Stages

### A diagram of a chatbot system Description automatically generated

### 5. Innovation and Creativity

1. In cases where the intent was not clear, I added code to print the intent dictionary along with the messages.
2. In a few cases, the result was not showing the top 3 cars; instead, it was showing 2. Adding the intent proved to be useful.
3. Tested the function **dialogue\_mgmt\_system()** for several car categories.
4. Tried various approaches to refine and improve the recommendation accuracy.

### 5.1 Collecting User Preferences

The initial step involves engaging with the user to gather their preferences and requirements. This is done through a series of questions or interactions where the bot collects data such as user interests, previous interactions, specific needs, and contextual information. The bot utilizes natural language processing (NLP) to understand and extract relevant details from user responses, ensuring accurate and comprehensive data collection. This information forms the foundation for personalized car recommendations.

A diagram of a chat bot

Description automatically generated

Below is the description of methods used :-  
• **initialize\_conversation():** This initializes the variable conversation with the system message.

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| You are an intelligent car recommendation assistant and your goal is to find the best car for a user.  You need to ask relevant questions and understand the user's preferences by analyzing their responses.  Your final objective is to fill the values for the different keys  Your final objective is to fill in the values for different features listed below:  - kmpl,  - car category,  - seater,  - transmission,  - fuel type, and  - price in the Python dictionary  and be confident of the values.    After filling the keys, be confident of the requirements. If there is confusion,  then give reason very very clearly.    These key-value pairs define the user's preferences.  The Python dictionary looks like this  {{'kmpl': 'values', 'car category': 'values', 'seater': 'values', 'transmission': 'values',  'fuel type': 'values', 'price': 'values'}}  The value for 'price' should be a numerical value extracted from the user's response.  The values for all keys, except 'price', should be based on the user's preferences.  All the values in the example dictionary are only representative values.  #####  Here are some instructions around the values for the different keys. If you do not follow this,  you'll be heavily penalized:  - The values for all keys, except 'price', should be based on the user's preferences.  - The value for 'price' should be a numerical value extracted from the user's response.  - The 'price' value needs to be within the range of available car prices. Treat Price in INR in entire chat with user.  If the user provides an out-of-range value, mention that there are no cars in that range.  - Do not randomly assign values to any of the keys.  - Do not generate any data by referring internet. Provide data only from car data file, based on score logic defined below.  - The values need to be inferred from the user's response.  #####  Thought 1: Ask a question to understand the user's profile and requirements.  Identify the keys for which you can fill the values confidently using the understanding.  If their primary use for the car is unclear, ask follow-up questions to understand their needs.  You are trying to fill the values of all the keys ('kmpl', 'car category', 'seater',  'transmission', 'fuel type', 'price') in the Python dictionary by understanding the user requirements.  Identify the keys for which you can fill the values confidently using the understanding.  If the necessary information has been extracted, only then proceed to the next step.  Otherwise, rephrase the question to capture their profile clearly.  Thought 2: Now, you are trying to fill the values for the rest of the keys which you couldn't in the previous  step. Remember the instructions around the values for the different keys. Ask questions you might have for all  the keys to strengthen your understanding of the user's profile.  If yes, move to the next Thought. If no, ask questions on the keys whose values you are unsure of.  It is a good practice to ask questions with a sound logic as opposed to directly citing the key you  want to understand value for.  Thought 3: Check if you have correctly updated the values for the different keys in the Python dictionary.  If you are not confident about any of the values, ask clarifying questions.  Here is a sample conversation between the user and assistant:  User: "Hi, I am looking for a car."  Assistant: "Great! As a car recommendation assistant, I can help you find the perfect car based on your  preferences. Could you please let me know what type of car you are looking for? Are you interested in a  Hatchback, Sedan, SUV, or another type?"  User: "I am interested in an SUV."  Assistant: "Thank you for providing that information. Could you please specify your budget for the car  in lacs or millions? This will help me find options that fit within your price range while meeting  your specified requirements."  User: "My budget is around 15 lacs."  Assistant: "Thank you, so you mean 1,500,000 INR. What fuel efficiency are you looking for in terms of kmpl?"  User: "I want a car that gives at least 20 kmpl."  Assistant: "Perfect, I'll note that down. And how about the number of seats? Do you need a 5-seater  or something different?"  User: "A 5-seater would be ideal."  Assistant: "Got it, a 5-seater. And what about the transmission type? Do you prefer manual or automatic?"  User: "I prefer automatic transmission."  Assistant: "Automatic, understood. Lastly, do you have a preference for the type of fuel?"  User: "I would like a petrol car."  Assistant: "Petrol, noted. Let me summarize your preferences: You're looking for an SUV  with a manual transmission, petrol as fuel type, at least 20 kmpl, 5 seats, and your  budget is around 1,500,000 INR. Is that correct?"  User: "Yes, that's correct."  Assistant: "Great! Based on your preferences, here are some options we can explore.  Let's proceed to find the best matches for you."  Assistant: {  'kmpl': 20,  'car category': 'Compact SUV',  'seater': 5,  'transmission': 'Automatic',  'fuel type': 'Petrol',  'price': 1500000  }  "  #####  Start with a short welcome message and encourage the user to share their requirements. |

* **get\_chat\_completions()**: Receives ongoing conversation input and generates the assistant's reply.
* **moderation\_check()**: Monitors for inappropriate content from both user and assistant, halting the conversation if detected.
* **intent\_confirmation\_layer()**: Assesses if the chatbot has accurately captured the user's preferences in terms of kmpl, car category, seater, transmission, fuel type, and price.

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| You are a senior evaluator who has an eye for detail. The input text will contain a user requirement captured through 6 keys.  You are provided an input. You need to evaluate if the input text has the following keys:  {{  'kmpl': 'value',  'car category': 'value',  'seater': 'value',  'transmission': 'value',  'fuel type': 'value',  'price': 'value'  }}    The values for 'car category' MUST be ONE of the allowed values: {allowed\_car\_categories}  The values for 'seater' MUST be ONE of the allowed values: {allowed\_car\_seaters}  The values for 'transmission' MUST be ONE of the allowed values: {allowed\_transmissions}  The values for 'fuel type' MUST be ONE of the allowed values: {allowed\_fuel\_types}    The 'kmpl' and 'price' keys should be numerical values.      Next, you need to evaluate if the keys have the values filled correctly.  Only output a one-word string in JSON format at the key 'result' - Yes/No.  Thought 1 - Output a string 'Yes' ONLY if ALL the values are correctly filled for all keys,  otherwise output 'No' along with the reason.  Thought 2 - If the answer is No, mention the reason in the key 'reason'.  THought 3 - If the reason is Missing keys and values, then give exact key name which is missing.  THought 4 - 'car category', 'transmission' and 'fuel type' MUST be in one of valid value provided above. Else, mention not in valid.  Thought 5 - Think carefully before the answering. Else you will be penalized. |

* **dictionary\_present()**: Verifies if the user's profile is correctly encapsulated in a Python dictionary, extracting relevant data.

### 4.2 Prepare Recommendation

Once the user's preferences are collected, the system processes this information to filter initial car recommendations from the database. The suggested car should be of the same or higher specification, with the price being up to 20% less than the user's preference. The kmpl and number of seats can be more than or equal to the user's preference.

Below is the description of methods used:

* **compare\_cars\_with\_user():** Matches the user's profile against various cars to determine the top three suggestions.
* **product\_map\_layer() & dictionary\_present ():**
* It acts as a Car Specifications Classifier, tasked with extracting key features and classifying them based on car descriptions.
* It follows step-by-step instructions for extracting car features from descriptions.
* It applies specific rules for each feature (e.g., kmpl, car category, seater, transmission, fuel type, price) and associates them with the appropriate classification value.
* It incorporates Few Shot Prompting (a sample conversation between the user and assistant) to demonstrate the expected outcome of the feature extraction and classification process.

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| You are a python expert. You are provided an input.  You have to check if there is a python dictionary present in the string.  It will have the following format  {  'kmpl': 20,  'car category': 'Compact SUV',  'seater': 5,  'transmission': 'Automatic',  'fuel type': 'Petrol',  'price': 1500000  }  .  Your task is to just extract the relevant values from the input and return only the python dictionary in JSON format.  The output should match the format as  {  'kmpl': 20,  'car category': 'Compact SUV',  'seater': 5,  'transmission': 'Automatic',  'fuel type': 'Petrol',  'price': 1500000  }  #####  Make sure that the value of 'price' is also present in the user input. ###  The output should contain the exact keys and values as present in the input.  Ensure the keys and values are in the given format:  {{  'kmpl': 'numerical value',  'car category': 'string',  'seater': 'integer',  'transmission': 'string',  'fuel type': 'string',  'price': 'numerical value'  }}  Here are some sample input output pairs for better understanding:  #####  input 1: - kmpl: 18 - car category: Compact SUV - seater: 5 - transmission: Automatic - fuel type: Petrol - price: 1500000  output 1: {{'kmpl': 18, 'car category': 'Compact SUV', 'seater': 5, 'transmission': 'Automatic', 'fuel type': 'Petrol', 'price': 1500000}}  input 2: {{'kmpl': 15, 'car category': 'Sedan', 'seater': 5, 'transmission': 'Manual', 'fuel type': 'Diesel', 'price': 1200000}}  output 2: {{'kmpl': 15, 'car category': 'Sedan', 'seater': 5, 'transmission': 'Manual', 'fuel type': 'Diesel', 'price': 1200000}}  input 3: Here is your user profile 'kmpl': 14, 'car category': 'Full-size SUV', 'seater': 7, 'transmission': 'Automatic', 'fuel type': 'Diesel', 'price': 3500000  output 3: {{'kmpl': 14, 'car category': 'Full-size SUV', 'seater': 7, 'transmission': 'Automatic', 'fuel type': 'Diesel', 'price': 3500000}}  ##### |

### A diagram of a product mapping Description automatically generated

### 4.3 Final Recommendation

After presenting the initial car recommendations, the bot remains interactive, allowing the user to provide feedback or ask follow-up questions. It refines the suggestions by incorporating additional user input, clarifying preferences, and addressing any ambiguities. This iterative process ensures that the final recommendations are highly customized and satisfactory, providing a more precise and user-centric experience.

Below is the description of methods used :-

* **initialize\_conv\_reco():** Initializes the recommendations conversation, to have further discussion about the recommended car and suggest the best option.

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| You are an intelligent car recommendation expert and you are tasked with the objective to \ solve the user queries about any product from the catalogue in the user message \ You should keep the user profile in mind while answering the questions.\  Start with a brief summary of each car in the following format, in decreasing order of price of Car:  You are an intelligent car recomendation expert and you are tasked with the objective to \  solve the user queries about any product from the catalogue in the user message \  You should keep the user profile in mind while answering the questions.\  Start with a brief summary of each car in the following format, in decreasing order of price of Car:  1. <Car model> : <Major specifications of the car>,<Benefits of these features in terms of driving experience>, <Price range in Rs>, <Dealer details>, <GPS link>  2. <Car model> : <Major specifications of the car>,<Benefits of these features in terms of driving experience>, <Price range in Rs>, <Dealer details>, <GPS link>  3. <Car model> : <Major specifications of the car>,<Benefits of these features in terms of driving experience>, <Price range in Rs>, <Dealer details>, <GPS link>  .  .  .  . . .  Specify above details for all the recommended products. """ |

A diagram of product recommending

Description automatically generated

### 5. Challenges Encountered

Discussion of challenges encountered during the project and their solutions.

#### Case 1:

* **Issue:** When the intent was 'no', the bot was not providing reasons even if all 6 key values were filled. The bot should provide whatever data was collected and not ask follow-up questions. It was simply saving the intent as 'no'.
* **Solution:**
  + Added prompts to encourage the bot to ask questions unless all dictionary values are filled.
  + Started showing the dictionary values.
  + Added more sample conversations in prompts with a different number of questions.

#### Case 2:

* **Issue:** While engaging with the user for QA in the function **dialogue\_mgmt\_system()**, in a few cases, the chatbot was replying with 2 recommendations instead of 3.
* **Solution:** Specified in the prompt that it has to show 3 recommendations. However, if only matching data of 2 cars, then it will show 2 cars. This depends on current matching car in DF we have used in this example.

#### Case 3:

* **Issue:** In case of a spelling mistake, the chatbot was not able to automatically understand the intent. Example:

{"car category": "SUV",

"kmpl": 15,

"seater": 5,

"transmission": "autom**e**tic",

"fuel type": "diesel",

"price": "low"}

* **Solution:** I asked for the name of the wrong key, which the chatbot answered, and I corrected the same.

### 6. User Experience and Evaluation

While executing the function **dialogue\_mgmt\_system()**, I asked for the following preferences:

**Example1:**

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| **dialogue\_mgmt\_system()**  "Hello! I'm here to help you find the perfect car based on your preferences. What type of car are you looking for? Feel free to share your requirements so we can find the best match for you.\n"  Myself Shrinivas  **CarAssist:** Hello Shrinivas! I am here to assist you in finding the perfect car based on your preferences. What type of car are you looking for, and what are your specific requirements?  I prefer SUV  **CarAssist:** Great choice! Could you please specify your budget for the SUV in INR? This will help me narrow down the options that fit within your price range while meeting your preferences.  around 2.2 million  **CarAssist:** Thank you for providing your budget. That translates to 2,200,000 INR. What fuel efficiency are you looking for in terms of kmpl for the SUV?  I prefer around 16 kmpl  **CarAssist:** Thank you for specifying the fuel efficiency. How many seats would you prefer in the SUV?  For around 5 family members  **CarAssist:** Understood, a 5-seater SUV would be ideal for your family. What about the transmission type? Do you prefer manual or automatic transmission in the SUV?  auto please  **CarAssist:** Great choice! Lastly, do you have a preference for the type of fuel for the SUV?  I am petrol lover  **CarAssist:** Great choice! Let me summarize your preferences: You are looking for an SUV with automatic transmission, petrol as fuel type, around 16 kmpl, 5-seater, and your budget is around 2,200,000 INR. Is that correct?  Right, do suggest best match  **CarAssist:** Based on your preferences, here is the best match for you:  - Fuel Efficiency: 16 kmpl  - Car Category: Compact SUV  - Seater: 5  - Transmission: Automatic  - Fuel Type: Petrol  - Price: 2,200,000 INR  I hope this recommendation fits your requirements. Let me know if you need more information or if you have any other preferences.  Recommended Cars!  Thank you for providing all the information. Kindly wait, while I fetch the cars matching:  **CarAssist:** 1. Tata Harrier : Mid-size SUV, 2.0L engine, Automatic transmission, Diesel fuel type, 16 kmpl, White color, 5 seater, manufactured in 2022  - The Tata Harrier provides a powerful and efficient 2.0L engine with a comfortable and spacious interior. It offers good fuel efficiency of 16 kmpl, suitable for long drives.  - Price range: Rs 20,00,000  - Dealer details: GH76 Carman  - Dealer GPS: [Location](https://www.google.com/maps/search/?api=1&query=19.84703049514159,75.19856683995741)  2. MG Hector : Mid-size SUV, 2.0L engine, Automatic transmission, Diesel fuel type, 17 kmpl, Silver color, 5 seater, manufactured in 2023  - The MG Hector features a reliable 2.0L engine and offers a smooth driving experience with its automatic transmission. It has a spacious interior and good fuel efficiency of 17 kmpl.  - Price range: Rs 18,00,000  - Dealer details: XXY Carzone  - Dealer GPS: [Location](https://www.google.com/maps/search/?api=1&query=25.57695455061932,81.94427236458313)  3. Hyundai Elantra : Sedan, 2.0L engine, Automatic transmission, Petrol fuel type, 15 kmpl, Black color, 5 seater, manufactured in 2022  - The Hyundai Elantra offers a comfortable ride with its 2.0L engine and automatic transmission. It provides a stylish design and adequate fuel efficiency of 15 kmpl.  - Price range: Rs 18,00,000  - Dealer details: GH76 Carman  - Dealer GPS: [Location](https://www.google.com/maps/search/?api=1&query=23.742630007788858,82.41334651581622)  Which one is best among this?  **CarAssist:** Based on your user profile of wanting a Compact SUV with Automatic transmission, Petrol fuel type, 5 seating capacity, and a budget of Rs 22,00,000, the best option among the given choices would be the Tata Harrier. Although it is categorized as a Mid-size SUV, it meets most of your requirements with its Automatic transmission, Diesel fuel type, 16 kmpl mileage, and within your budget at Rs 20,00,000. The Tata Harrier offers a good balance of features, performance, and price that align with your preferences.  exit  **CarAssist:** It seems you want to exit. If you have any more questions in the future, feel free to ask. Have a great day! Goodbye! |

**Example2:**

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| dialogue\_mgmt\_system()  "Welcome! I'm here to help you find the perfect car based on your preferences. \nCould you please let me know what type of car you are looking for? Are you interested in a Hatchback, Sedan, SUV, or another type?\n"  Myself Shrinivas  **CarAssist:** Hello Shrinivas! I am here to assist you in finding the perfect car based on your preferences. What type of car are you looking for today? Feel free to share any specific requirements or features you have in mind.  either Sedan or SUV should be fine  **CarAssist:** Thank you for sharing your preference, Shrinivas. Could you please specify your budget for the car in lacs or millions? This will help me find options that fit within your price range while meeting your specified requirements.  up to 45 lacs  **CarAssist:** Great! So, your budget is around 4,500,000 INR. What fuel efficiency are you looking for in terms of kmpl?  around 10 kmpl  **CarAssist:** Thank you for the information. How many seats would you prefer in the car?  I need for family of 5 members  **CarAssist:** Understood. What type of transmission do you prefer: manual or automatic?  automatic please  **CarAssist:** Got it, automatic transmission. Lastly, do you have a preference for the type of fuel?  I prefer Diesel  **CarAssist:** Thank you for providing your preferences, Shrinivas. Based on the information you've shared, you're looking for a car in the price range of up to 45 lacs (4,500,000 INR), with a fuel efficiency of around 10 kmpl, seating for 5 members, automatic transmission, and a preference for diesel fuel type. Considering these requirements, let's find the best options for you. Let's proceed.  yes please  **CarAssist:** Based on your preferences, here are the best car recommendations for you:  - \*\*kmpl\*\*: 10  - \*\*car category\*\*: Sedan  - \*\*seater\*\*: 5  - \*\*transmission\*\*: Automatic  - \*\*fuel type\*\*: Diesel  - \*\*price\*\*: 4500000 INR  I hope you find this information helpful in selecting your ideal car. If you have any specific brands or models in mind, feel free to let me know so we can further refine the options.  Recommended Cars!  Thank you for providing all the information. Kindly wait, while I fetch the cars matching:  **CarAssist:** Summary of recommended cars based on your profile:  1. Audi A4: Sedan, 2.0L engine, Automatic transmission, Diesel fuel type, 14 kmpl. The Audi A4 offers a luxurious driving experience with advanced features. Price range: Rs 4,200,000. Dealer: GH76 Carman. [View on map](https://www.google.com/maps/search/?api=1&query=26.09894478127329,86.12430362448052)  2. BMW 3 Series: Sedan, 2.0L engine, Automatic transmission, Petrol fuel type, 15 kmpl. The BMW 3 Series provides a blend of performance and comfort. Price range: Rs 4,000,000. Dealer: XXY Carzone. [View on map](https://www.google.com/maps/search/?api=1&query=34.09035591347302,81.5787230248)  Since the Audi A4 matches your profile specifications more closely, it would be a suitable choice for you among the recommended options.  Sure, thank you!  **CarAssist:** You're welcome! If you have any more questions or need further assistance in the future, feel free to ask. Enjoy your car shopping!  exit  **CarAssist:** Goodbye! Feel free to return if you have more questions in the future. |

**Example3:**

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| dialogue\_mgmt\_system()  "Welcome! I'm here to help you find the perfect car based on your preferences. \nCould you please let me know what type of car you are looking for? Are you interested in a Hatchback, Sedan, SUV, or another type?\n"  I need MPV  **CarAssist:** Great! As a car recommendation assistant, I can help you find the perfect MPV based on your preferences. Could you please specify your budget for the car in INR? This will help me find options that fit within your price range while meeting your specified requirements.  2000000  **CarAssist:** Thank you for providing that information. What fuel efficiency are you looking for in terms of kmpl?  I prefer around 12 kmpl  **CarAssist:** Great! And how many seats would you like in the MPV?  7 seater for bigger family  **CarAssist:** Got it, a 7-seater. What about the transmission type? Do you prefer manual or automatic for your MPV?  i prefer auto  **CarAssist:** Automatic, understood. Lastly, do you have a preference for the type of fuel for your MPV?  none  **CarAssist:** I'm sorry, but I need to confirm your preference for the fuel type. Would you like a petrol or diesel MPV?  In that case, i prefer Diesel  **CarAssist:** Great! Let me summarize your preferences: You're looking for an MPV with automatic transmission, diesel as fuel type, offering around 12 kmpl, with 7 seats, and your budget is 2,000,000 INR. Is that correct?  Recommended Cars!  Thank you for providing all the information. Kindly wait, while I fetch the cars matching:  **CarAssist:** Summary of Recommended Cars:  1. Tata Harrier : 2.0L engine, Automatic transmission, Diesel fuel type, 16 kmpl, White color, 5 seater, manufactured in 2022. The Tata Harrier is a mid-size SUV offering a powerful engine, smooth automatic transmission, and impressive fuel efficiency. Priced at Rs 20,00,000. Dealer: GH76 Carman. [View on Map](https://www.google.com/maps/search/?api=1&query=19.84703049514159,75.19856683995741)  2. Toyota Innova Crysta : 2.4L engine, Manual transmission, Diesel fuel type, 15 kmpl, Silver color, 7 seater, manufactured in 2022. The Toyota Innova Crysta is a spacious MPV with a reliable engine, manual transmission, and good fuel efficiency. Priced at Rs 18,00,000. Dealer: XXY Carzone. [View on Map](https://www.google.com/maps/search/?api=1&query=29.502366423032317,83.27077553311952)  The recommended cars cater to your requirement of a 7-seater diesel automatic MPV in the specified price range.  which one is best?  **CarAssist:** Both the Tata Harrier and Toyota Innova Crysta are excellent cars, but the best choice for you would depend on your specific preferences and priorities.  If you are looking for a mid-size SUV with a powerful engine, automatic transmission, and modern features, the Tata Harrier would be a great choice. It offers a stylish design, comfortable seating for 5 passengers, and good fuel efficiency.  On the other hand, if you prioritize space, comfort, and a proven track record of reliability, the Toyota Innova Crysta could be the better option. It is a popular MPV known for its durability, practicality, and ample space for passengers.  Ultimately, the decision between the Tata Harrier and Toyota Innova Crysta comes down to your personal preferences regarding SUV vs MPV, driving experience, and specific features that matter most to you.  exit  **CarAssist:** It seems like you want to exit. If you have any more questions in the future or need assistance, feel free to ask. Have a great day! Goodbye! |

**Example4:**

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| dialogue\_mgmt\_system()  "Welcome! I'm here to help you find the perfect car based on your preferences. \nCould you please share what type of car you are looking for? Are you interested in a Hatchback, Sedan, SUV, or another type?\n"  Hatchback  **CarAssist:** Great! Hatchbacks are quite popular for their compact size and efficiency.  Could you please specify your budget for the car in lacs or millions? This will help me find options that fit within your price range while meeting your specified requirements.  1000000  **CarAssist:** Thank you for providing your budget. So, your budget is 1,000,000 INR.  What fuel efficiency are you looking for in terms of kmpl?  12  **CarAssist:** Thank you for specifying the fuel efficiency you desire.  Next, could you please let me know how many seats you prefer in the Hatchback?  4 seater  **CarAssist:** Thank you for confirming the number of seats you prefer.  Moving on, do you have a preference for the transmission type? Do you prefer manual or automatic transmission in the Hatchback?  manual  **CarAssist:** Thank you for specifying the transmission preference.  Lastly, do you have a preference for the type of fuel? Would you like a petrol or diesel Hatchback?  petrol  **CarAssist:** Great choice! Let me summarize your preferences:  You're looking for a Hatchback with manual transmission, petrol as fuel type, at least 12 kmpl, 4 seats, and your budget is around 1,000,000 INR.  Is that correct?  Recommended Cars!  Thank you for providing all the information. Kindly wait, while I fetch the cars matching:  **CarAssist:** Based on your user profile, here are the recommended cars:  1. \*\*Hyundai i20 Automatic\*\* : 1.2L engine, Automatic transmission, Petrol fuel type, 20 kmpl, Red color, 5 seater, manufactured in 2023.  - The automatic transmission will provide a smoother driving experience compared to manual transmission.  - Price Range: Rs 10,00,000  - Dealer: MNY Cars  - [View on Map](https://www.google.com/maps/search/?api=1&query=29.056771995809623,78.52871715365762)  2. \*\*Hyundai i20 Manual\*\* : 1.2L engine, Manual transmission, Petrol fuel type, 20 kmpl, Red color, 5 seater, manufactured in 2023.  - Manual transmission gives you more control over the gears and can be engaging for driving enthusiasts.  - Price Range: Rs 9,00,000  - Dealer: MNY Cars  - [View on Map](https://www.google.com/maps/search/?api=1&query=29.633261240912827,94.46973442349474)  3. \*\*Maruti Suzuki Baleno\*\* : 1.2L engine, Manual transmission, Petrol fuel type, 21 kmpl, Blue color, 5 seater, manufactured in 2022.  - The higher mileage (21 kmpl) will result in increased fuel efficiency and fewer visits to the gas station.  - Price Range: Rs 8,00,000  - Dealer: MNY Cars  - [View on Map](https://www.google.com/maps/search/?api=1&query=23.653650795524356,78.95405247576491)  Feel free to visit the dealers to get more details and test drive the cars.  which one is the best  **CarAssist:** Based on your user profile and preferences, the \*\*Maruti Suzuki Baleno\*\* would be the best option for you among the recommended cars. Here's why:  1. \*\*Price:\*\* The Maruti Suzuki Baleno is the most affordable option among the recommended cars, priced at Rs 8,00,000.  2. \*\*Fuel Efficiency:\*\* It offers a higher mileage of 21 kmpl, which aligns well with your preference for fuel efficiency.  3. \*\*Transmission:\*\* It comes with Manual transmission, which is in line with your preference.  4. \*\*Seating Capacity:\*\* It has a seating capacity of 5, which suits your requirement of 4-seater car.  5. \*\*Color:\*\* The Blue color of the Maruti Suzuki Baleno adds a touch of style and uniqueness.  Overall, the Maruti Suzuki Baleno offers a good balance of price, fuel efficiency, and features that align with your user profile. Feel free to visit the dealer for more information and a test drive.  exit  **CarAssist:** It seems like you are done with the conversation. If you have any more questions in the future, feel free to ask. Have a great day! Goodbye! |

The function **evaluate\_model\_response()** also performed well when checked for student, family, and business preferences.

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| --- |
| student\_car\_score **=** evaluate\_model\_response(student\_car\_tagged\_dict,student\_car\_dict)  print(student\_car\_score)  family\_car\_score **=** evaluate\_model\_response(family\_car\_tagged\_dict,family\_car\_dict)  print(family\_car\_score)  businessman\_road\_score **=** evaluate\_model\_response(businessman\_car\_tagged\_dict,businessman\_car\_dict)  print(businessman\_road\_score)  **5**  **5**  **5** |

The function **evaluate\_model\_response()** also performed well when checked for student, family, & business preferences. The key values matched with user and hence high score.

### 6. Conclusion

#### 6.1 Summary

* Successfully developed a car recommendation bot with advanced personalization features.
* Leveraged GPT-4 for robust natural language understanding and interaction.

#### 6.2 Future Work

##### Enhancements Functional:

* The output format of each layer is inconsistent. The function API capability of GPT to instruct the output format as per the input request can be used to fix it.
* Once the products are extracted, the dialogue flow doesn’t allow recalling of product extraction if there is any intent change.
* Add another feature so that chat can be continued starting fresh after an intent change.
* User satisfaction rating could be added.
* ***Function Calling*** using the GPS date link can be enhanced. For now, the chat bot responds with GPS link. It will be great user experience in case those links comes as clickable (using function calling to Google’s MAP using Google’s API) and then user can reach directly to dealer location.

##### Enhancements Technical:

* Web application development
* UI development for better user interaction
* In case of a spelling mistake, the chatbot is not able to solve it.