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Chatbot Based Online Shopping Web Application

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Abstract: ***This study presents an innovative chatbot system aimed at transforming product recommendation and customization. It integrates feature-based input analysis and user-driven updates to provide tailored product recommendations. Users can input specific product features, leading to personalized suggestions that align precisely with their preferences. Utilizing a dynamic customization framework, the chatbot consistently refines recommendations based on user interests, ensuring a personalized and evolving user experience. The project seeks to reshape the realm of product recommendation systems by providing a seamless and adaptable interface, enhancing the exploration and acquisition of products that precisely match individual needs and preferences.***

Keywords: Chatbot Based Online Shopping Web Application

I. INTRODUCTION

The modern era of e-commerce is marked by the continuous evolution of user-centric solutions. In line with this, our project aims to revolutionize the online shopping experience by introducing an intuitive chatbot solution within a unique online shopping platform. Our platform not only facilitates the creation of custom-designed products but also serves as a virtual interface connecting customers with fashion stylists. In the era of personalization, the integration of a chatbot powered by Dialog flow stands as a key feature of our system. Customers can effortlessly explore available products, request consultations with fashion stylists, and engage in real-time conversations to refine their choices. The versatility of this chatbot application extends beyond product design, envisioning seamless integration into shopping malls and marts to cater to a broader audience.

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Their high scalability allows them to manage a substantial volume of customer inquiries simultaneously, ensuring that no customer is left waiting, even during peak shopping seasons or promotional events. Key advantages of our system include the convenience of product selection, the accessibility of a 24/7 open website, an extensive array of product options, time efficiency in decision-making, and a centralized repository of diverse products. Our platform facilitates the creation of custom-designed products. Leveraging the capabilities of Dialog flow, the chatbot ensures a natural and interactive dialogue with users, creating a personalized and enjoyable shopping experience. This project embodies the fusion of cutting-edge technology, user-centric design, and the ever-evolving landscape of online shopping. The following sections delve into the architecture, functionality, and benefits of our chatbot-powered online shopping solution, showcasing its potential to redefine the way users engage with e-commerce platforms.

II. LITERATURE REVIEW

Aim of the Paper	Authors / References	Models Used & Limitations/Results
Discussed Providing the user to have a control over the search result on the website.	Anusha Vegesna, Pranjal Jain [1][12][13]	Dialog Manager NLP, AIML. This can also enhance by improving Entity recognition with the usage of KNN algorithm.
Primary Goal is to engage customers to choose their preferred language audio support in order to Communicate before they buy in malls.	Duru Juliet, Austine Duro, Nkwocha McDonald [2]	NLP, ML techniques. Rule based, Retrieval based, Generative Model **Limitation:** It would be helpful to Test Chatbot with larger datasets In addition to a barcode Scanner.
This deals about the availability of the current stock before visiting store in person.	Victoria Oguntosin, Ayobami Olomo [3]	AIML, Rule based. **Result:** Works on Dynamic user input Thus provides relevant Responses and product Suggestions.
Working on a Super Agent, Which acts as a customer service chatbot for the e commerce websites.	Furu Wei, Chuanqi Tan, Ming Zhou [4]	ML, NLP techniques Including FAQ search. **Limitation:** Fails in Integrating a customer Query intent detection. Further investigation On Multi Turn queries.

Developing a Chatbot that usually Handles the sales advice convo in the basic Natural Language.	Tizian Boger [5]	AI services, Google Dialog Flow, Microsoft LUIS, NLU. **Limitation:** Chatbot Base system is displayed to improve further NLU Capabilities and helps the User to Trust More. Further Development Required.
The user can interact with chatbot with them via graphical interface. Which answer all the queries related to all activities in detail.	Ashish Pal, Tarun Lawani, Shreya Bisen [6][14]	AIML, NLP. **Limitation:** Very Tough to get all Data on a single interface Without the complications.
Chatbot which save time of user includes features like categorization, trending products and also provides user to have an idea about the product in detail.	Prof. Monika Kanojiya, Shiva, Neville [7][15]	Online app: Android studio (Java and XML) Interface: PHP, HTML, CSS Bot: Dialog flow, NLU, MYSQL. **Result:** Helpful for the people to get things done Virtually. Query Solving at that particular moment.
Ability of mimicking human conversation by oral or text as a result helps in better customer review experience.	Bouchra El Bakkouri, Samira Raki, Touhfa Belgnaoui [8]	Artificial Intelligence. **Result:** Good enhancement in customer experience which conveys the importance of virtual assistants.
This Bot is Conversational computer programming which mimic the human conversation for a better guidance and support.	Guendalina Caldarini, Sardar, Kenneth McGarry [9][16]	Deep Learning, NLP. **Limitation:** Only concentrated on single frameworks rather than multiple frameworks. Need Deeper and Refined Analysis for future aspects. It's a bit complicated in analyzing the data used to train various models.
This Bot works Online Chat Conversation via text format and text to speech conversion which provides user's response and requests.	Munira Ansari, Saalim Shaikh, Talha Khan [10]	Artificial Intelligence, Java Script Python programming Language **Result:** Handling a costumer Q&A in this platform looks easy with this chatbot. Chatbot even Experience Various user's response and request.
To enhance human-computer communication through natural language interaction,	P. Pramod Kumar P. Sindhu [11]	Limitations lie in potential constraints related to understanding complex contexts and nuanced queries.

The literature on chat-based online shopping web applications converges on the pivotal role of interactive communication in enhancing the e-commerce landscape. Scholars emphasize the potential of chat functionalities to personalize user experiences, foster customer engagement, and streamline the decision-making process. Studies underscore the importance of real-time assistance, product recommendations, and user-friendly interfaces in optimizing the effectiveness of chat-based applications. However, challenges such as privacy concerns and the need for seamless integration with existing technological frameworks are acknowledged. As the field progresses, there is a growing consensus on the need for continued exploration of user preferences and the dynamic interplay between technology and consumer behavior to refine and advance the efficacy of chat-based online shopping experiences.

III. PROPOSED METHODOLOGY

By Natural Language Processing (NLP): Intent Recognition: Use algorithms like Intent Classification (often done with machine learning classifiers) to understand the user's intent when they interact with the chatbot. This helps in recognizing whether a user is asking a question, looking for a product, or trying to make a purchase.

Named Entity Recognition (NER): Employ NER algorithms to identify entities like product names, categories, and user information in user messages. This helps in extracting essential details during the conversation.

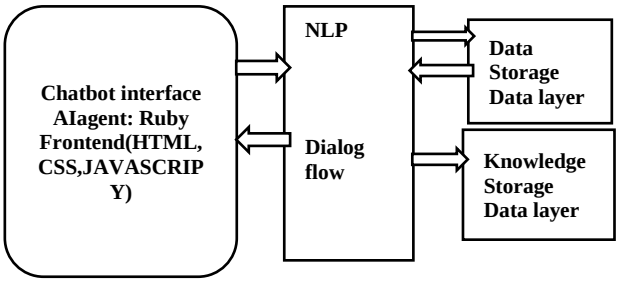


Fig. 1: Proposed Architecture

A. Dataset:

Acquiring a substantial dataset, rich in comprehensive product information, is invaluable for both businesses and researchers. This dataset serves as a foundation for numerous applications, including product recommendations, market analysis, and improved customer experiences. Businesses leverage this data to refine their understanding of product specifications and customer preferences, facilitating more informed decision-making. Researchers, in turn, gain insights into consumer behavior and preferences, contributing to the development of effective marketing strategies and product design. The wealth of information in this dataset provides a unique opportunity to unravel trends, uncover patterns, and drive innovation, customer satisfaction, and business success. In an era of data-driven insights, a comprehensive product dataset emerges as a potent tool with implications for both the business world and academia. When a user desires to locate a specific product, they are required to provide several features or details about the product of interest. If any of the key features mentioned by the user match those present in the provided and trained dataset, the chatbot will furnish comprehensive details about the identified product. In the event that there is no corresponding product within the dataset, the chatbot will responsibly inform the user that there is no match for the specified product.

Furthermore, if the user expresses a desire to customize the identified product according to their preferences, the chatbot will facilitate this customization process to meet the user's specific requirements. This ensures a tailored and responsive interaction with the user, enhancing their overall experience in the search and customization of products.

		Company	Rating	No_of_rat	Review	Size	Processor	RAM	Memory	OpSys	Price	MRP	ImgURL
2	0	HP	4.2	253	20	36	AMD Ryze	16	512 GB SSI	64 bit Win	49990	59240	https://rukminim1.flixcart.com/image/312/312/l5fnhjk0/computer/c/p/c/14s-fy1005au-thin-and-light-laptop-hp-original-i
3	1	Lenovo	4.2	974	75	36	Intel Core	8	256 GB SSI	64 bit Win	33990	60890	https://rukminim1.flixcart.com/image/312/312/keaaavk0/computer/c/q/t/lenovo-na-thin-and-light-laptop-original-imafuz
4	2	ASUS	4.4	5389	535	40	Intel Core	8	512 GB SSI	Windows 1	49990	70990	https://rukminim1.flixcart.com/image/312/312/l3rmzrk0/computer/s/z/r/-original-imagetgzg4pgszmt.jpeg?q=70
5	3	DELL	4.1	332	26	40	Processor:	8	Display: 15	Graphics &	37990	58489	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/x/o/u/-original-imaghkk994ybh4fh.jpeg?q=70
6	4	ASUS	4.2	487	53	40	Intel Core	8	512 GB SSI	64 bit Win	35990	50990	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/o/t/h/-original-imagg6t9pauha4t7.jpeg?q=70
7	5	RedmiBoo	4.1	4541	523	40	Intel Core	8	512 GB SSI	Windows 1	38990	59999	https://rukminim1.flixcart.com/image/312/312/kuwzssw0/computer/x/l/a/redmibook-15-pro-thin-and-light-laptop-redmi-
8	6	HP	4.6	9	1	40	Intel Core	8	512 GB SSI	64 bit Win	34990	44253	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/9/v/w/245-g8-business-laptop-hp-original-imagn4bctguug
9	7	Lenovo	4.3	2841	241	40	Intel Core	8	512 GB SSI	Windows 1	55990	83890	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/l/d/c/gaming-3-gaming-laptop-lenovo-original-imaghtkrg8
10	8	HP	4.2	491	50	40	Intel Core	8	512 GB SSI	64 bit Win	40450	50585	https://rukminim1.flixcart.com/image/312/312/l5h2xe80/computer/e/i/d/15s-fr2511tu-thin-and-light-laptop-hp-original-i
11	9	ASUS	4.1	1022	123	36	Intel Celer	4	256 GB SSI	64 bit Win	23990	33990	https://rukminim1.flixcart.com/image/312/312/l2m78280/computer/z/e/f/-original-imagdx9szs8xz2rk.jpeg?q=70
12	10	HP	4.2	2134	184	36	Intel Core	8	256 GB SSI	64 bit Win	37490	47278	https://rukminim1.flixcart.com/image/312/312/l5h2xe80/computer/h/i/p/14s-dy5005tu-thin-and-light-laptop-hp-original-i
13	11	Lenovo	4.2	31	3	40	Intel Core	16	512 GB SSI	Windows 1	54300	84603	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/1/b/0/15itl6-thin-and-light-laptop-lenovo-original-imagkw
14	12	ASUS	4.4	1134	138	44	AMD Ryze	8	512 GB SSI	64 bit Win	67990	94990	https://rukminim1.flixcart.com/image/312/312/l3rmzrk0/computer/z/2/c/-original-imagetjyhhtrtkdg.jpeg?q=70
15	13	HP	4.3	189	29	36	AMD Ryze	8	512 GB SSI	64 bit Win	52990	63325	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/d/w/i/-original-imagmnmsbhuxbazf.jpeg?q=70
16	14	DELL	4.4	62	5	40	Processor:	8	Display: 15	Graphics &	64990	95332	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/y/h/w/-original-imaghzahgukpkyfu.jpeg?q=70
17	15	Lenovo	4.2	265	21	40	Intel Core	8	512 GB SSI	64 bit Win	54990	76890	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/a/c/3/-original-imagg56h9gat842s.jpeg?q=70
18	16	Lenovo	4.1	724	68	40	Intel Celer	8	256 GB SSI	64 bit Win	25685	44690	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/z/b/z/-original-imagmmng8dppnn4v.jpeg?q=70
19	17	HP	4	907	87	36	AMD Athlc	8	256 GB SSI	64 bit Win	25499	36359	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/l/6/o/14s-fq0568au-thin-and-light-laptop-hp-original-imag
20	18	ASUS	4.3	11170	1101	40	Intel Core	8	512 GB SSI	64 bit Win	34990	45990	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/e/1/7/-original-imag3ebnzawky4kn.jpeg?q=70
21	19	Lenovo	4.253597	2841	241	36	AMD Ryze	16	512 GB SSI	64 bit Win	97890	76890	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/9/z/x/14alc7-thin-and-light-laptop-lenovo-original-imaggu
22	20	ASUS	4.3	287	26	40	Intel Core	8	512 GB SSI	64 bit Win	44990	69990	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/o/t/h/-original-imagg6t9pauha4t7.jpeg?q=70
23	21	HP	4.2	2205	178	40	Intel Core	8	512 GB SSI	64 bit Win	58490	70234	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/y/6/4/-original-imagkqwzbryf6sp7.jpeg?q=70
24	22	Infinix	4.2	1200	209	40	Intel Core	8	256 GB SSI	64 bit Win	27990	44990	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/m/u/z/-original-imagmxurgcshfkx7.jpeg?q=70
25	23	Lenovo	4.253597	2841	241	36	AMD Ryze	16	512 GB SSI	Windows 1	92290	76890	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/9/z/x/14alc7-thin-and-light-laptop-lenovo-original-imaggu
26	24	Lenovo	4.3	42	0	40	Intel Core	8	256 GB SSI	Windows 1	33490	59390	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/p/m/w/-original-imagg5jscr4hcuqc.jpeg?q=70
27	25	acer	4.1	836	87	40	Intel Core	8	512 GB SSI	64 bit Win	34490	43999	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/j/y/l/-original-imagnpcezv5dfdew.jpeg?q=70
28	26	MSI	4.4	2436	324	40	AMD Ryze	8	512 GB SSI	64 bit Win	49990	72990	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/7/3/l/-original-imagha3pvvc2xuz2.jpeg?q=70
29	27	HP	4.2	253	20	36	AMD Ryze	16	512 GB SSI	64 bit Win	49990	59240	https://rukminim1.flixcart.com/image/312/312/l5fnhjk0/computer/c/p/c/14s-fy1005au-thin-and-light-laptop-hp-original-i
30	28	HP	4.5	84	9	40	Intel Core	8	512 GB SSI	64 bit Win	41000	51724	https://rukminim1.flixcart.com/image/312/312/xif0q/computer/l/z/u/15s-fr2512tu-laptop-hp-original-imaggmeygbtemggf

Fig. 2: Sample Dataset Images

B. Architecture:

Data Collection and Preprocessing

1. Website-specific Data: Gather data directly from the online shopping website, including product descriptions, FAQs, and customer support interactions.
2. User Queries: Collect real user queries from the website's customer support logs or conduct surveys to understand the language and intent of potential users.
3. Diverse Scenarios: Ensure a diverse set of scenarios, covering different products, order-related queries, and common user interactions.
4. Custom Responses: Craft unique responses tailored to the online shopping website. Avoid directly copying generic responses from other sources.
5. Product Descriptions: Write original product descriptions or obtain permission to use existing ones in a way that aligns with fair use policies.
6. Intents Labeling: Categorize user queries into specific intents relevant to the online shopping context (e.g., product search, order tracking, account management).
7. Avoid Copying Existing Intent Sets: Create unique intent labels for your chatbot instead of replicating intent structures from other sources.
8. Identify Entities: Recognize and label entities like product names, categories, and user details within the user queries.

C. Model Architecture:

a. Natural Language Processing (NLP):

In the context of chatbots, Natural Language Processing (NLP), specifically Intent Recognition, is a crucial element for understanding and responding to user inputs. Intent Recognition utilizes algorithms, often implemented with machine learning classifiers, to identify the underlying intent behind a user's message or query. This is essential as it empowers the chatbot to discern whether the user is seeking information, posing a question, expressing a desire to make a purchase, or engaging in other types of interactions. Accurate identification of the user's intent enables the chatbot to generate an appropriate response, whether it involves offering product recommendations, addressing queries, or guiding the user through the purchasing process. This capability not only allows the chatbot to comprehend the user's needs but also streamlines the conversation, enhancing efficiency and user-friendliness. Intent Recognition serves as the foundation for effective and context-aware interactions between users and chatbots, contributing to an improved overall user experience, whether in online shopping or any other domain where chatbots are deployed.

b. Natural Language Understanding (NLU):

NLU in Dialogflow for an online shopping chatbot involves training the system to recognize user intents, extract relevant entities, manage conversation context, and handle variations in language. This iterative and trainable approach ensures the chatbot can understand and respond effectively to a wide range of user queries in the context of an online shopping web application.

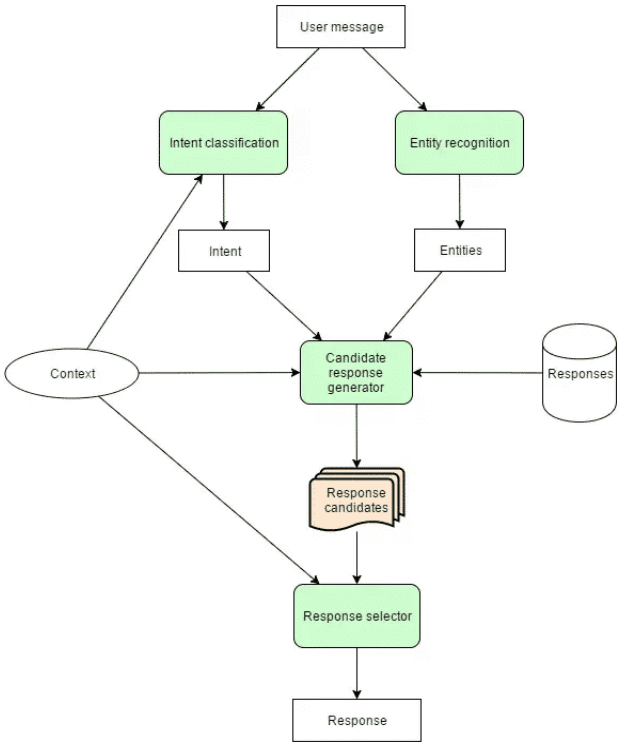


Fig. 3: NLP Architecture

Named Entity Recognition (NER):

Named Entity Recognition (NER) is a Natural Language Processing (NLP) technique that focuses on identifying and classifying named entities in text into predefined categories. In the context of chatbots for online shopping, NER plays a crucial role in extracting specific information such as product names, categories, and user details from user input.

How NER works in a chatbot for online shopping:

1. Identification of Entities:

NER algorithms analyze user messages to identify entities, which can include product names, brands, quantities, user names, locations, and more.

2. Predefined Categories:

Chatbots are trained with predefined categories for named entities relevant to online shopping. These categories are tailored to extract information specific to the domain, such as product details or user-specific information.

3. Context Understanding:

NER takes into account the context of the conversation, enabling it to understand the relationship between words and accurately identify entities.

For example, it can differentiate between a brand name and a generic reference to a product.

4. Improving User Queries:

By recognizing named entities, the chatbot can enhance user queries by understanding and extracting specific details. This is particularly valuable in scenarios like product searches or order inquiries.

5. Personalization and Recommendations:

NER assists in personalizing the user experience by extracting information related to user preferences. It enables the chatbot to offer tailored product recommendations based on the recognized entities.

6. Order Processing:

In online shopping, NER can facilitate order processing by extracting relevant details like product names, quantities, and delivery addresses, streamlining the purchasing journey.

7. Enhanced Conversational Understanding:

Integrating NER into chatbots improves conversational understanding by allowing the system to grasp the nuances of user requests and respond more accurately.

8. Data Security Measures:

NER in a chatbot should be implemented with robust data security measures to ensure the safe handling of sensitive information extracted from user input.

In summary, Named Entity Recognition in chatbots for online shopping involves the identification and classification of specific entities within user messages. This capability enhances the chatbot's ability to understand, process, and respond to user queries in a more context-aware and personalized manner, contributing to an improved overall shopping experience.

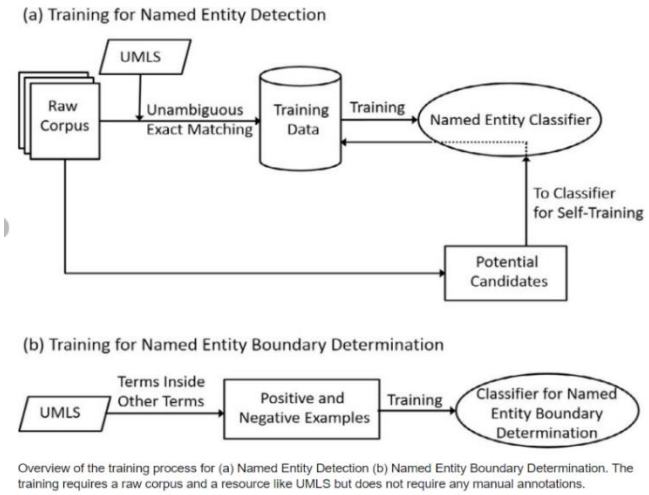


Fig. 4: NER Architecture

A. Model Training

Dialogue Flow:

In the culmination of chatbot development, the pivotal step is the implementation of the entire dialogue flow, achieved through the creation of classifiers. These classifiers act as a mapping structure, enabling the chatbot program to interpret incoming queries, analyze contextual information, retrieve an appropriate response, and generate a fitting reply in alignment with the conversational architecture. Regardless of the chosen development solution, the efficacy of the overall dialogue flow is instrumental in ensuring a seamless and coherent chat experience with a user.

In Dialog flow, the backend plays a pivotal role in housing an array of language-related data and configurations, serving as the foundation for proficient natural language understanding and adept conversation management. This repository of language-related information is indispensable for the accurate interpretation of user queries and the generation of contextually fitting responses. The following components pertaining to language intricacies are stored within the backend:

Retrieval Number:100.1/ijdcn.B978213020124
DOI:10.54105/ijdcn.B9782.03040623
Journal Website: https://www.ijdcn.latticescipub.com

Published By:
Lattice Science Publication (LSP)

Language Models: Dialog flow's backend encapsulates trained language models encompassing intents, entities, and assorted parameters acquired during the training phase. These models are instrumental in capturing linguistic patterns, enabling the system to recognize user intents and extract entities from their inputs.

Entity Data: Information regarding entities, comprising entity types, synonyms, and reference values, is stored in the backend. This repository aids in the precise identification and extraction of specific information from user queries.

Training Data and Examples: The backend retains training data furnished by developers, including example phrases for each intent and entity. These examples play a vital role in instructing the system on user query phrasing and the diversity of expressions to anticipate.

Language-specific Configurations: Configuration settings pertaining to language processing, such as tokenization rules, language-specific nuances, and localization settings, are housed in the backend. This ensures accurate language comprehension tailored to different locales.

Contextual Information: Throughout a conversation, the backend preserves contextual information, storing pertinent details to comprehend the conversation's flow and deliver responses that align with the ongoing context.

Language-specific Models and Algorithms: The backend may leverage language-specific models or algorithms customized for distinct languages. This may include specialized natural language processing algorithms optimized for various languages or dialects.

Multilingual Support Configurations: For agents designed to accommodate multiple languages, the backend stores configurations for efficient language management. This encompasses language detection, translation services, and the selection of language-specific models.

In essence, Dialog flow's backend infrastructure intricately manages a diverse array of language-related data and configurations. These elements collectively contribute to robust natural language understanding and support seamless multilingual capabilities within conversational agents.

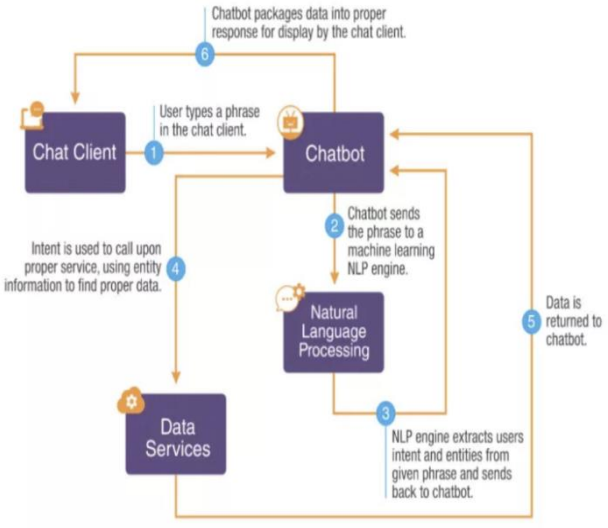


Fig. 5: Working Architecture

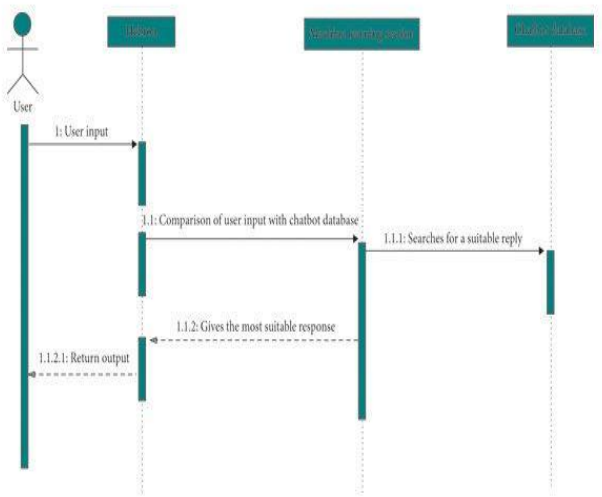


Fig. 6: Working of Proposed System

B. Working of Proposed System.

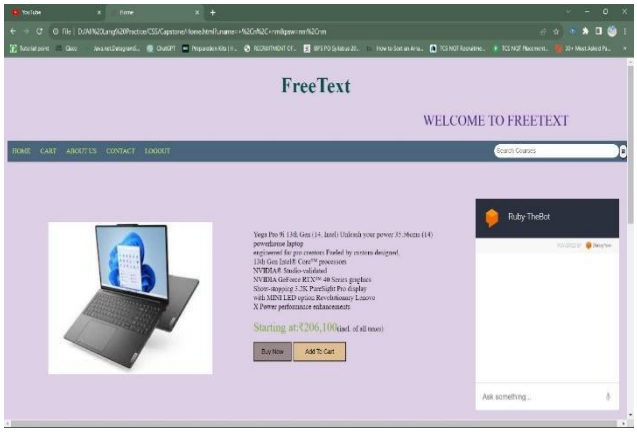
1. User Input:
   Users provide key features of the product they are looking for.
2. Search in Dataset:
   The chatbot searches the dataset, collected and trained by developers, to check if the mentioned key feature is present.
3. Feature Recognition:
   If the key feature is identified in the dataset, the chatbot recognizes similar features of products.
4. Display Similar Products:
   The chatbot displays a list of products with similar features to the user.
5. No Match in Dataset:
   If the key feature is not found in the dataset, the chatbot informs the user that there is no matching product.
6. Customization Request:
   Users have the option to request customization according to their preferences, which will be forwarded to the product company.
7. Product-related Queries:
   If users have specific questions about a product, and the dataset lacks answers, the chatbot stores the question in the backend.
8. Backend Update:
   During backend updates, the chatbot retrieves stored questions and updates the dataset with relevant answers for future inquiries.

This approach ensures a comprehensive interaction where users can efficiently search for products, receive suggestions based on key features, request customization, and obtain accurate information about products, even if it requires a backend update to address specific queries.

IV. CONCLUSION

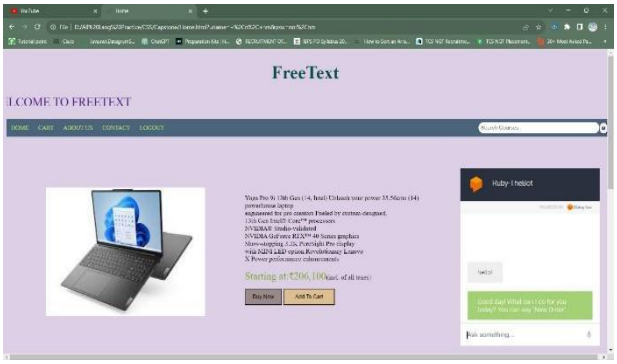
Our application provides an online shopping platform for everyone so that they can design dresses as per their choice and requirement.

Our application provides an interface between customers and the fashion stylist. Customers can chat with chatbot and can check for available products. Customers can request for a chat with the available stylist and can chat with them. We can also extend this Chatbot application for further use like shopping malls, marts.



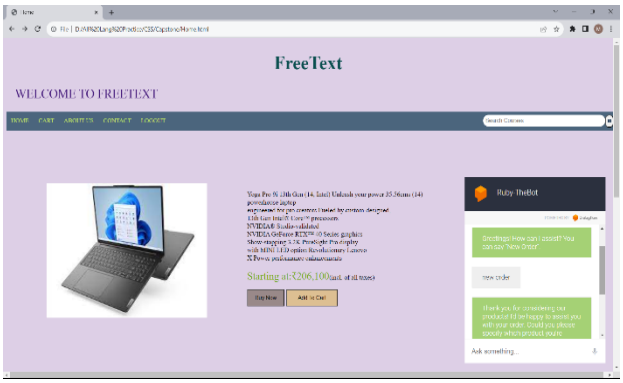
The image provided features our website, which includes a chatbot interface

Fig. 7: Result 1



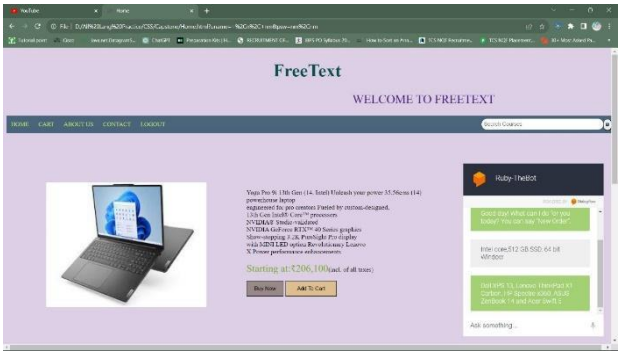
When a user engages with the chatbot by saying "hi" or "hello," the chatbot responds with a greeting such as "good day! What can I assist you with today? Feel free to mention 'new order' if that's your query."

Fig. 8: Result 2



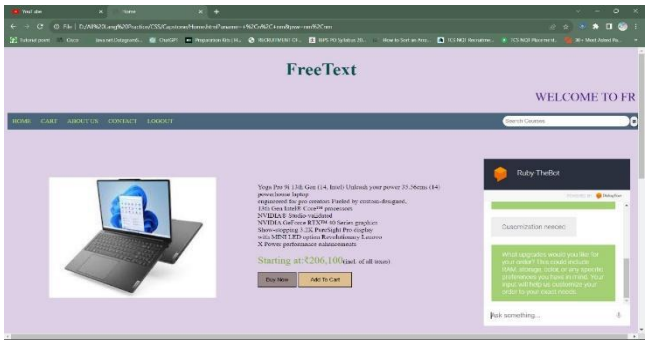
When a user communicates "new order" to the chatbot, the chatbot generates a response asking for clarification, requesting the user to specify the particular product they are interested in.

Fig. 9: Result 3



When a user provides specific features of the product they are looking for, the chatbot responds by presenting products from the dataset that match those specified features.

Fig. 10: Result 4



If a user desires customization for a particular product, they are required to text the phrase "customization needed" along with the product name and specify the upgrades they are seeking. Subsequently, the chatbot initiates a request to the respective product company to implement the requested upgrades on that particular product.

Fig. 11: Result 5

DECLARATION STATEMENT

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Authors Contributions	All authors have equal participation in this article.

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