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A Survey on E-Commerce Support Using Chatbot

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Abstract--- *The issue of consumer loyalty and experience is extremely central in any Business, for example, E-Commerce Industry. E-commerce provides a unique way which allows business globally. In well-developed economic countries, the consumer pattern has also changed because of the E-Commerce industries. E- commerce requires the interaction of both customer and retailer for a successful business. This paper provides information about various e-commerce Chatbot and techniques which simplify interaction between customers and seller. Chatbot enables the client to determine their inquiry with no additional exertion and presents another path for the client to collaborate with the framework. A Chatbot helps the user in a way such that it can ask their queries as they would ask a normal agent. A Chatbot provides a medium through which customer can ask queries and commercial Industry can answer all queries and can provide support by using Chatbot services. This will help us in reducing the time for customer support and helps to enhance business profit. Machine Learning, Natural Language Processing and Deep learning techniques are used to build Chatbot. Analysis of several Chatbot and techniques is presented in a comprehensive manner.*

Keywords--- *Chatbot, E-Commerce, Machine Learning, Natural Language Processing, Deep Learning.*

I. INTRODUCTION

As of late, the world has seen the huge development of the internet business industry. This noteworthy development can occur since web-based business offers another plan of action in which a client does not have to meet up close and personal with its dealer partner. The client may make a few inquiries before choosing to purchase an item. In the event that the vendor effectively collaborates with the client, it might build the notoriety of the merchant while the client tends to buy from a legitimate dealer. Along these lines, the vendor responsiveness in noting any client questions assumes an essential job in the achievement of an exchange. Along these lines, with the end goal to dispose of this, we can utilize Chatbot that will connect with the client simply as a typical individual would communicate even without the contribution of the merchant.

A Chatbot can be considered as an inquiry answer framework where specialists give learning to sales of a client. A Chatbot is a product intended to recreate a keen discussion with a human accomplice. A Chatbot is a PC program that endeavors to mimic the discussion or "gab" of a person by means of content or voice collaborations. A client can ask a Chatbot an inquiry or make a direction, and the Chatbot reacts or plays out the asked for activity. Chatbots have made some amazing progress from that point forward. They are based on AI innovations, including profound learning, normal dialect handling and machine learning calculations, and require enormous measures of information. The more an end client collaborates with the bot, the better voice acknowledgement progresses toward becoming at

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anticipating what the fitting reaction is when speaking with an end client. Chatbots can be stateless or state-full. A stateless Chatbot approaches every collaboration as though it was with another client. A state-full Chatbot is more modern; it can survey past cooperation and edge new reactions in the setting.

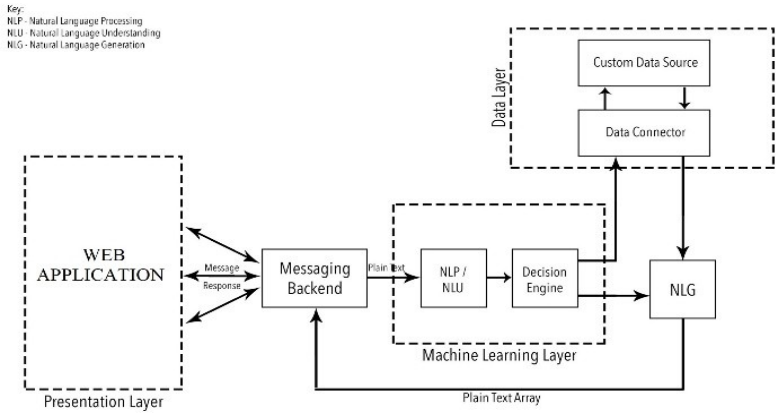

Figure 1: Chatbot Architecture

II. E-COMMERCE CHATBOTS

The following are some of the Chatbots used by various industries to increase their customer's satisfaction.

Sephora

Sephora is a Chatbot which provides a vast amount of personalized knowledge on makeup according to the user. When the Chatbot is opened for the first time for a user, it asks the user a few questions as a quiz. Then according to the answers supplied by the user, personalized products are shown. It also gives relevant beauty tips and many more functionalities. This Chatbot can also ask more questions to improve the personalized results in just the same way as a real sales agent would do. Then the user would purchase the items from the messaging app itself. So, in short, Sephora Chatbot not only allows the user to do purchase and show deals but also helps in showing personalized products and tips. This type of service is not provided by any other E-

eBay

In the initial days, eBay used tools like Facebook Messenger to interact with their users. But now, with the growing technology, they started using Chatbot which was capable of learning the behavior of their users and then show them the relevant products. Now, in order to know the behavior of the customer, the ShopBot asks some questions related to the size, color and fit of the product. The ShopBot is expected to raise 3 times more queries as compared to that raised by a normal eBay inventory.

SnapTravel

SnapTravel is a kind of a messenger bot which alerts the user about the deals on hotels. It starts sending alerts after the user feeds in the travel destination and the check in and check out date. The messenger app can also help you to book the hotel right through the app. The SnapTravel provides the deals of their websites through the messenger app itself. It eliminates the need to go to other websites in search for some deals. All you need to do is to give the required details to the SnapTravel and then it will give you personalized deals.

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H&M

H&M, a well-recognized clothing brand brought their Chatbot to interact easily with their customers which would help them to increase their sales. It does so by giving the customers a personalized recommendation of clothes whenever a user comes in. It shows a range of pictures to the user and asks them to select from it. In the next step, it asks to select the personal style. According to the input provided, it created a list of items which may be similar to the user's liking. Once this process is done, it shows them to the user and eventually increases customer satisfaction.

Burberry

A veteran British clothing brand, Burberry always look forward to adopting new and recent technologies like a Chatbot. The bot handles easily the queries raised by the user and also show some personalized items. It also provides the option to talk with a real Burberry agent. By adopting these new technologies, this brand is able to create profits.

III. CHATBOT IMPLEMENTATION ALGORITHMS

Extension and Prerequisite

Extension and Prerequisite is a type of Chatbot implementation Algorithm which helps the Chatbot remember the past conversation. Normally, the Chatbot are designed in such a way that it gives the answer to a single query and after that it expects for a new query without having any connection with the previous one. So, in order to eliminate this issue, we use the Extension and Prerequisite algorithm. In this, we define two variables namely, Extension and Prerequisite with their default value as "0". If any conversation is linked with their previous one, then the value of these variables are changed and then updated accordingly.

General Word Percentage (GWP)

General Words Percentage (GWP) is also a type of Chatbot implementation algorithm which gives the answer to a query which is more appropriate at that point of conversation. It uses a technique which gives the most suited keyword at that point of the talk. In order to achieve this, the algorithm will look for a word to calculate the GWP, i.e. (total count of general words / total count of all words) * 100. The higher calculated GWP, the more likely to be returned as an answer.

Synonyms and Root words

Synonyms used during a conversation can become a hindrance for the Chatbot algorithm to run efficiently. So, in order to eliminate this, all synonyms are reduced to a word which is more likely used during a normal conversation. Also, there may be redundant words used in a flow, so the root-word concept is introduced, which tends to break the words into their root-words. The algorithm step includes. 1) Incremental parsing technique is used to look for words which can be reduced to root-word. 2) If such a word is found, then it is replaced by the relevant root-word from the database. 3) If the database contains a data which needs to be exchanged, then that particular root is exchanged from the database.

IV. LITERATURE SURVEY

Adhitya Bhawiyuga et al. [1] proposes a system consisting of two parts: intelligent system and communication system. When user or customer perform any action such as asking a question or query, Telegram server will get

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updated than communication agent will fetch the question or query from Telegram server with help of HTTP protocol. After when the communication system gets the question or query for telegram server, it forwards the question to the Intelligent system. Intelligent system than performs an action to find a similar question or query from the question-answer database which is already available. To find the similarity and dissimilarity between the question or query asked by the customer and question which is already available in the database they used Levenshtein distance. When an intelligent agent finds the similar type question from the database it sends the answer of that question to the customer or user using Telegram chat service. The Levenshtein distance is calculated using the formula or operation to convert the query string of the user to the target string. It is a numerical value which depends on actions such as insertion, replacement, deletion etc. When these activities are performed to convert user query string to target string, the Levenshtein distance increases. The more the value of Levenshtein distance, the dissimilarity between the question is more.

Bayu Setiaji et al. [2] proposes a system for Chatbot which uses Bigram to find the similarity between the sentences or query which perform the action of breaking the sentence into two parts or letters of the input sentence. All the information which a Chatbot requires is present in the database. The Chatbot comprises of some services such as interface and core which help to access the information from the relational database management systems (RDBMS). The database used in Chatbot perform one of the important action of storing information and knowledge and the interpreter present in Chatbot consists of special function, programs, procedure and method for matching patterns and other requirements. The Chatbot build by the author mainly focuses only on Indonesian conversational pattern. The relational database management systems used to build this project is MySQL. When the pattern is matched in the Chatbot, it will send a suite template to the user as a response. In this Chatbot, the author uses pattern template as it is convenient to use as all the information is stored in the database. The only purpose of using MySQL is storing of information. The program and function for pattern matching are written in specific programming language, so for adding new service in another language, the code for program and function should be rewritten and executed. The bigram equation used by author in this model can be represented as

$$\rho\left(\psi_i \middle| \psi_0 \ldots \psi_{i-1}\right) \approx \rho\left(\psi_i \middle| \psi_{i-1}\right)$$

Lei Cui et al. [3] proposes a SuperAgent Chatbot, which provides service to the customer on large scale using an open source e-commerce data. SuperAgent can extract knowledge or information from the product description page and website so that it allows the answer to the general query of customer and allows support staff to answer higher value question. SuperAgent gives the best answer to the customer after selecting from the list of available option. If the SuperAgent didn't find the required answer it will notify the customer. Chatbot application consists of three types of question answering: 1) For Product Information the fact question answering is used; 2) For frequently asked Questions & Answers, the FAQ search engine is used; 3) For Customer Reviews and rating an opinion mining and text question answering is used. The author makes use of NLP and Machine Learning techniques for creating a SuperAgent.

S Reshmi et al. [4] proposes the implementation of a self-learning Chatbot which can detect the missing field in question and asked the customer or user about the missing field by asking a question.

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To provide this feature the Chatbot uses Knowledgebase engine with the present system and connected it with the database so to respond to different queries. When a user asks a query, it gets searched in the AIML, then AIML should consist of the method so that it can tell KB engine to search the query in the database. The author uses modified AIML for KB engine processing so that it can properly answer to the customer or user question. This Chatbot can also be used for finding missing field or information through asking a question from the user.

Supratip Ghose et al. [5] proposes a Chatbot which allows university student to ask questions. The Chatbot is specially designed answering FAQs. Chatbot accepts an input by student or user than it stores the query asked by the user and searches the query in the database or repository. The Information Database consists of related information and connected graph where information is stored in nodes and links are used to join various nodes. The Chatbot uses AIML (Artificial Intelligence Markup Language) to design semantics. Chatbot also designs a new information database using natural language module.

The author performed an experiment in which three systems that are natural language knowledge-based entries for pure dialogue systems, an information database for domain knowledge systems and a hybrid system, integrating dialogue and domain information. The Chatbot information database can easily be updated without writing the code again. The result of the experiment parameters and outcome suggest that to get the maximum dialogue session topic-specific dialogue coupled with conversational information to be used.

Ryuichiro Higashinaka et al. [6] proposes an architecture which consists of natural language processing techniques in its modules. The author using this architecture achieves better and higher naturalness than a retrieval-based baseline which depends on the rule- based system which consists of 149K hand-written rules. The three main parts: dialogue control, utterance or query understanding and utterance or query generation is used in the architecture. Ranking utterance candidates using a general coherence criterion is done by the dialogue management part. The design is roughly constant as conventional dialogue systems; but, the interior design is changed which enable open-domain speech communication. The Twitter conversation corpus is used to create a database for retrieval.

Jincy Susan Thomas et al. [7] explains about the model which uses deep learning method gated end to end memory network to build a Chatbot in which all the conversation dialog is learnt from the dialogs themselves. As the traditional Chatbot uses rule based algorithm to answer to user's question which cannot be used for real world domain, deep learning method eliminates this limitation.

This model learns without any extra administration. The end to end memory network architecture consists of two parts: final answer prediction and supporting memories. It helps to understand context connection using input memory and embedding of question to provide answer to user's question. In this author uses Api for request and response purpose. The conversation based on memory network provides better result compared to previous algorithms.

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Table 1: Literature Survey

A. Topic, B. Author/Year	**C. Description**	**D. Method**	**E. Findings**
Design of E Commerce Chat Robot for Automatically Answering Customer Question. *Adhitya Bhawiyu, M. Ali Fauzi, Eko Sakti Pramukanoro, Widhi Yahya (2017)*	A Chatbot is developed which automatically answers the questions of the user. The user asks the question about the product to the seller which is handled by the Chatbot itself.	Levenshtein distance concept is used in its implementation. Each word is given a Levenshtein distance value according to its contents. This value then speaks the similarity between two words.	By using these concepts, the Chatbot can give faster replies to the queries. To be precise, it can give replies 5 seconds faster than other Chatbots.
Chatbot Using a Knowledge in Database. *Bayu Setiaji, Ferry Wahyu Wibowo (2016)*	A Chatbot is developed which uses the Indonesian language and uses some predefined facts to understand the chat pattern and then reply accordingly.	The Chatbot used RDBMS as a database which stores the predefined facts. It then matches the pattern of the conversation and then accordingly queries out the relevant word from the RDBMS database.	SQL was used to make the core part of the Chatbot mechanism. Stored facts help in giving more accurate results to the user.
SuperAgent: A Customer Service Chatbot for E-commerce Websites. Lei Cui, Shaohan Huang, Furu Wei, Chuanqi Tan, Chaoqun Duan, and Ming Zhou (2017)	A Chatbot is developed which uses the data large E-Commerce websites across the internet and then provide the required solution.	When a user inquires about something, then it selects the answer from the predefined information. It selects that according to a particular algorithm. If it fails in finding one, then a null response is sent to the user.	When a page contains a lot more of information, then this algorithm helps in finding them easily and returns the relevant information to the user.
Implementation of an inquisitive Chatbot for database supported knowledge bases. S RESHMI* and KANNAN BALAKRISHNAN (2016)	This paper proposes the implementation of a self-learning Chatbot which can detect the missing field in question and asked the customer or user about the missing field by asking a question.	Chatbot uses Knowledgebase engine with the present system and connected it with the database so to respond to different queries.	It uses modified AIML for KB engine processing so that it can properly answer to the customer or user question. This Chatbot can also be used for finding missing field or information by asking a question from the user.
Toward the implementation of a Topic specific Dialogue based Natural Language Chatbot as an Undergraduate Advisor. Supratip Ghose, Jagat Joyti Barua (2013)	In this paper, a Chatbot which allows university student to ask questions. The Chatbot is specially designed answering FAQs. Chatbot accepts an input by student or user than it stores the query asked by the user and searches the query in the database or repository.	The author performed an experiment in which three systems that are natural language knowledge-based entries for pure dialogue systems, an information database for domain knowledge systems and a hybrid system, integrating dialogue and domain information.	For better result for correction rate and topic switching. Using this better result of 19.4% and 21.1% over simple conversational and topic-specific chat.
Towards an open-domain conversational system fully based on natural language processing. Ryuichiro Higashinaka, Kenji Imamura (2014)	This paper proposes an architecture which consists of natural language processing techniques in its modules. The interior design of architecture is changed which enable open-domain speech communication	The three main parts: dialogue control, utterance or chat understanding and utterance and chat generation is used in the architecture.	Architecture achieves better and higher naturalness than a retrieval-based baseline which depends on the rule-based system which consists of 149K hand-written rules.

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V. CONCLUSION AND FUTURE WORK

Chatbots is increasing its popularity day-by-day because of its wide range of applications. Some of them include Virtual support, in E-Commerce and social networking. It is also increasing its popularity in the field of science, commerce and entertainment industry. Currently, there is mainly text-based Chatbot, so voice-based Chatbot has a greater scope in future. Chatbots present today are unilingual, i.e. they can communicate in only one language. They are also not able to understand colloquial usage. So, a Chatbot with multiple language support has a very good scope in future. Also, the training data can be improved to eliminate the problem of different accents.

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