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Restaurant Chat bot Using RASA NLU

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Abstract: *Machine Learning has become a most spoken word among people today, and many chatbots have emerged in the market. The rise of regional chatbots has been a cause of concern in recent years and this study is to create such a chatbot using a new machine learning technique, called RASA framework, in recent years. This paper emphasizes on the creation of an efficient chatbot as none have appeared in journals so far.*

Key Word*:Machine Learning, chat bots, RASA Framework.*

I. INTRODUCTION

Machine learning techniques have been in use nowadays. With the emergence of new technologies with programming languages like Python, and its packages like Scikit learn, matplotlib and so on are bringing machine learning and also artificial intelligence, closer to each other than previously thought. Many journal papers in the past has suggested some techniques like the naïve bayes classifier, and using an artificial intelligence language like Artificial Intelligence Machine Language (AIML), but none have given a complete idea about a new machine learning package, called RASA NLU, which can be easily deployable, with more precision and also, accuracy. Some models like using Django in the backend and using HTML and CSS in frontend, increases its maximum efficiency to just 75 percent. As its applications are everywhere in some countries like USA and China, the interaction with chatbots is very less in India. The main sector of business which concerns chatbot creation and management is restaurants. Apps like Zomato and Swiggy asking orders only via apps, the creation of the chatbot increases efficiency to 90 percent. This paper had been brought by examining 2 methods commonly used for the chatbot.

II. MATERIALS AND METHODS

The 2 types of methods are using Artificial Intelligence Language like AIML, or using other packages like Django, a popular web service. The performance metrics are as given in the following pie chart. The study for this journal was conducted by reviewing two models currently available in the market, Django and web development languages like HTML, CSS and JavaScript. The hardware and software requirements are as follows:

Hardware requirements – Intel or Ryzen generation 8 or higher, 512GB RAM, NVIDIA GTX 1650 or higher, 8GB RAM

Software requirements – Python 3.6 or 3.8, Anaconda, RASA, RASA-NLU, RASA-X

From the below pie chart based on the performance, it is evident that both the methods are efficient up to 75 percent, with the lack of backtracking user stories. The study also provides an extension to a literature review paper titled "The Use of Chatbots in Digital Business Transformation: A Systematic Literature Review" by Andrej Miklosik, Nina Evans and Athar Mahmood Qureshi from Australia. They used detailed full text analysis eligibility and also included exceptions like paper type, content, language, quality and full text unavailable. They recently used text analysis and the table of their chatbots are described in table as follows:

TABLE I
JOURNALS THAT PUBLISHED MORE THAN ONE RESEARCH PAPER

Journal	Number of articles	References	Percentage of total (%)
Computers in Human Behavior	6	van der Broeck, 2020; Gu - Sundar, 2019; Araujo, 2018; Shumanov - Johnson, 2021; Hill et al., 2015; Yoon - Yin, 2021	8.1%
International Journal of Advanced Computer Science and Applications	4	Bakoyan et al., 2018; Jasmi et al., 2020; Kar - Haldar, 2016; Navaz - Gomes, 2019	5.4%
Electronic Markets	3	Adam et al., 2020; Stoeckli et al., 2019; Li et al., 2021	4.1%
Journal of Business Research	3	Chung et al., 2020; Sheehan, et al., 2020; Roy - Naidoo, 2021;	4.1%
Communication Studies	2	Beattie et al., 2020; Westerman et al., 2019	2.7%
Interacting with Computers	2	Bertrandsen Nordheim et al., 2019; McDonnell - Baxter, 2019	2.7%
International Journal of Human-Computer Interaction	2	Chaves - Gerosa, 2021; Lee et al., 2020	2.7%
Journal of Broadcasting & Electronic Media	2	Ischen et al., 2020; Chung - Jung, 2020	2.7%
Journal of Internet Commerce	2	Trivedi, 2019; Han, 2021	2.7%
Journal of Retailing and Consumer Services	2	Rese et al., 2020; Pantano - Pizzi, 2020	2.7%
Journal of Service Management	2	Sidlauskiene et al., 2020; Sands et al., 2021	2.7%
Knowledge-Based Systems	2	Kerly et al., 2007; Nuruzzaman - Hussain, 2020	2.7%

Procedure: -

The procedure of the chatbot is to detect user intents and display them as responses using the artificial neural network which maps the intents and responses efficiently using user stories. It uses NLU (Natural Language Understanding) to extract text from questions of the user and also map it with links and display them using a classifier called as DIET Classifier which handles both intents and entities respectively. Entities are defined as synonyms in RASA framework which responds to the user using both the sentences having the same subject-verb-object. For example, “I am Andrews” and “Andrews is a very good boy” means the same subject in both the mentioned sentences. The Dual Intent Entity Transformer helps in handling the chatbot entities efficiently. The Whitespace Tokenizer then splits the sentence into spaces equally, which helps in identifying the text in a sentence, that is intent. The process in the chatbot process is as follows:

- Automatic Speech Recognition to convert user speech into text
- Natural Language Understanding to interpret user input
- Dialogue Management to take decisions on the next action respect to the current dialogue status
- Natural Language Generation to generate text-based responses to the user
- Text To Speech to convert output into voice

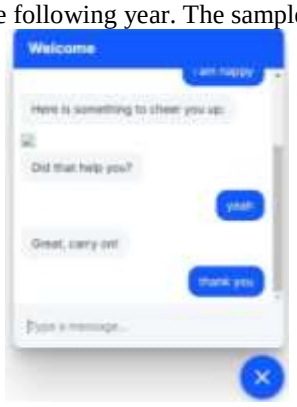
III.RESULTS AND CONCLUSION

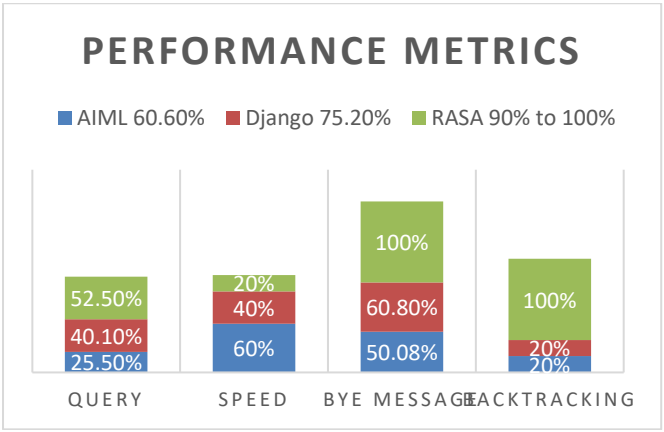
The difference between the performance of the RASA chatbot, the Artificial Intelligence Language and web development chatbot is tabulated as below:

Performance metric	AIML	Django	RASA
Greeting	60.6%	75.2%	90% to 100%
Query	25.5%	40.1%	52.5%
Speed	60%	40%	20%
Bye message	50.08%	60.8%	100%
Backtracking	20%	20%	100%

The results are obtained by creating three projects with the same python framework, but using different packages, and rigorously testing them for 3 months starting from January 2022 to March 2022. The efficiency of the different chatbots is based on different domains, a cosmetics chatbot, a restaurant chatbot by RASA, and a tourist chatbot by Django. This RASA

NLU has been implemented as a project in the following year. The sample output is shown below:





The general RASA NLU pipeline is as follows:

- At first, RASA loads the language model to define which language the user is currently using.
- The next component splits the sentence into words and words into tokens
- The next component extracts the features associated with the token sequences
- The next component extracts the named entity extraction which is defined as getting the samples from the training dataset, which is YAML files
- The next component extracts and classifies text into different entities according to the context of the user. It is also called as entity recognition
- The next component performs named intent extraction on text, similar to the entity classification.
- The output structures the predefined data into structured data, for example “It is a pleasure meeting you”, and so on.

IV. CONCLUSION AND DISCUSSION

During the course of the study, the following observations were made:

- RASA NLU has better efficiency compared to the other models
- RASA uses Tensor flow, a framework of python, which makes use of creating conventional chatbots using Artificial Neural Networks
- It can be deployed in multiple regional languages, and also supports backtracking
- It supports web development and deployment in websites easily and also has support such as Twitter, Slack, WhatsApp, Facebook and so on.
- It supports regional languages along with intelligent intent and entity tracking, which helps even people in India and abroad to type messages in their own language.
- The efficient features of machine language and web development languages, are discussed.

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