

Health Care Chatbot Assistant System

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 30 Nov 2023 CC License CC-BY-NC-SA 4.0	Rasa stack consists of many open source AI apparatuses solely utilized in plan to make a logical chatbot. It consists of incredible APIs embedded along the Rasa stack that incorporates Natural language understanding. It incorporates the sack of words calculation helping in streamlining portrayal utilized in measurable displaying and AI stages and furthermore trend setting innovation. The proposed framework is to make an option in contrast to this ordinary strategy for visiting a clinic and making a meeting with a specialist to get analysis. From the user queries chatbot will, predicts the infection and prescribes treatment along with necessary medicine. It like wise support the utilization of this RASA stage for the client specific format according to their prerequisites and furthermore elevates in building up the system for better efficiency. Keywords: Logical chatbot, Natural language, AI

1. Introduction

It is essential to maintain a healthy body if one wishes to lead a long and happy life. Right now, a clinical chatbot is worked to be a helpful operator that inspires clients to talk about their medical problems and dependent on the issues given by client, chatbot will respond with the cause of the infection and suggests necessary treatment required, nowadays individuals are more dependent on web and they are least worried about their own well being[8]. They maintain a strategic distance from medical clinic treatment for little issues being least bothered which may turn into a significant illness in their upcoming days of life. The proposed system thought takes care of this issue. This thought around making a chatbot which is liberated from cost and very much accessible anytime required. It spares the trouble engaged in contacting the specific specialists. With the help of the RASA we can able to achieve higher level of accuracy in results criteria Rasa NLU utilizes Bag of words calculation for discovering expectation. This paper targets step by step procedures involved in Rasa Stack will be introduced in Rasa NLU and Rasa Core isolated. These are structured so that they can be utilized totally freely of one another. This permits just piece of the design to be based on Rasa platform and extra administrations to be incorporated. In spite of this reality, the two parts are very much coordinated to one another and are subsequently immediately arranged. The Rasa NLU assumes control over the errands of the plan Recognition and Entity Extraction. Rasa is open source stack for expectation grouping and substance extraction. It can be viewed as an option in contrast to well known NLP administrations, for example, Google's Dialog Flow. The fundamental bit of RASA NLU over those stacks is that you approach the whole Python operating pipeline and can expand it with your perplexing custom rationale. RASA NLU offers framework capacities, for example, model determination or HTTP get to that are required on conversational arrangements in reality.

Related Work

In this paper "Chatbot and bully free chat"[1]. The assistance of AI calculation the chatbot is developed utilizing Normal Language Processing for preparing the bot and to make up the bot act in a correct manner, with the goal that the preparation and testing should be possible utilizing AI calculation. This procedure is utilized in Educational institute, when the client pose an inquiry, the bot will break the sentence into words and check for the specific bully word and afterward begins responding to the given inquiries if it finds the bully words, then it mentions the bully word.

In this paper “An Additional Set of Eyes: Chatbots for Agile Retrospectives” [2]. The programming engineer will be able to recognize more computerization and bots being acquainted with help their work process and improvement related exercises. The primary point is to gauge and analyze the both coding exercises and improving the occasion procedure executed in groups. This procedure of utilizing chatbots in reviews goes about as an additional plan of mechanized eyes on the product project. In this paper “Chatbot Utilization for Medical Consultant System” [3]. Author has executed a chatbot advancement subject to the information of the side effects and vital treatment recorded set aside in DoctorMe application. The chatbot is prepared for sixteen indications of symptoms. The chatbot can reply to the client with legitimate direction for taking care of the symptoms. This chatbot is utilized in a few texting technology. This administration helps in limiting the activity cost on advisor support and expand administration ability and advantageous to the client. In this paper “Problem Solving Chatbot for Data Structures” [4]. They have implemented a chatbot that incorporates AI and profound calculations used in recovering by remembering data which is available. As regular PC the controller to peruse and compose Recurrent Neural Network is utilized. Here, the client can ask distinctive procedure on the information structure, the chatbot convert the voice recording into content reaction with the assistance of NLP. This content will be given to RNN and RNN retrieves the applicable data.

In this paper “AI based Chat-bot using Azure Cognitive Services [5]”. They have utilized NLP calculations for processing the information and utilized Azure for customizing and for Hosting purpose. To perceive the information, a specific model is used which contains different types of data with the probability of recurrence. These chatbot administrations require uncommonly less number of information for setting up the model and productively gives the required result. Chatbot has become the supportive and fundamental way to deal with many issues and to obtain instant solutions. In this paper, “Artificial Intelligence Based Solarbot [6]”. The system gives a discussion interface by the given algorithm used which can answer all the questions related to the user as it integrated with MongoDB. By the help of artificial intelligence it can analyze user input and learn the pattern of questions and starts predicting the questions the user will give as input and simultaneously chat bot will answer questions posed by user. In this paper, “A Novel Approach for Medical Assistance Using Trained Chatbot [7]”. They have implemented a Personalized Medical aide that depends more on AI calculations just as the preparation information as talked about right now. The AI can anticipate the issues faces by the user and recommends medications. It encourages them to require the best possible treatment nearby.

2. Materials And Methods

The BoW model is a technique for demonstrating printed information while displaying content with ML methods. The BoW is a method for digging highlights from content demonstrating. The pack of words is a blueprint which assigns a speed of occasion of the availability words inside the record. It incorporates the two things::

- 1) Words which are known in an event
- 2) Already known words of Vocabulary

As any information about the request or get together of words in the record is disposed of. An extremely collective article deliberation forms for sentences and archives is the BOW approach. We will observe the words inside the content, for example considering each individual words from the specific article and by the content obtained we can get to know [9] the importance from the specific archive. Consider the below example for bag of words.

Bag of words example

Step 1: Gather the data and consider the three lines, and each line as a separate document

Three cats

Three cats and crocheting

Crocheting is my hobby and my passion

	1	two	cats	three	and	crocheting	is	my	hobby	passion
Doc 1	0	0	3	0	0	0	0	0	0	0
Doc 2	0	0	3	3	1	0	0	0	0	0
Doc 3	0	0	0	0	0	1	1	1	1	1

TF-IDF

	1	two	cats	three	and	crocheting	is	my	hobby	passion
Doc 1	0.10	0.40	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Doc 2	0.10	0.10	0.10	0.40	0.10	0.00	0.00	0.00	0.00	0.00
Doc 3	0.00	0.00	0.00	0.00	0.10	0.10	0.40	0.10	0.40	0.40

Figure 1: Bag of words

From the above example only recurrence of words are taken

Tf is referred as Term frequency

Idf is referred as Inverse document frequency.

It decides how significant a word is by analyzing how often it shows up in the record. it gauges the nearby significance of the word. If the particular word repeats many times at that point the word must be significant. For instance, "I love Crocheting. Crocheting is my only hobby. Crocheting is very easy, we see that the words with the most noteworthy recurrence Crocheting and is. This concurs with our instinct that high term recurrence = higher significance

The second part of tf-idf is opposite report recurrence (idf). For a word to be viewed as a mark expression of a report, it shouldn't create the impression that regularly in different archives. Accordingly, a mark word's report recurrence must be low, which means its backwards record recurrence must be high.

Structure design of vocabulary: Each sentence is divided into separate words

- "I"
- "love"
- "cats"
- "hate"
- "and"
- "Crocheting"
- "is"
- "my"
- "hobby"
- "passion"

The principle applied over is by changing each record of free content in the vector format for the ML Model.

In doc 1) I=1, love=1, cats=1, hate=0, and=0, Crocheting=0, is=0, my=0, hobby=0, passion=0

The vector format: (1,1,1,0,0,0,0,0,0,0)

In doc 2) I=1, love=0, cats=1, hate=1, and=1, Crocheting=1, is=0, my=0, hobby=0, passion=0

The vector format: (1,0,1,1,1,0,0,0,0,0)

In doc 3) I=0, love=0, cats=0, hate=0, and=1, Crocheting=1, is=0, my=2, hobby=1, passion=1

The vector format: (1,0,1,1,1,0,0,0,0,0)

Conditional random fields: It is a mainstream probabilistic strategy for organized expectation, for the most part utilized for substance expectation. To cause the accuracy of assumption more imperative they to use the information from the setting of the customer from the past name. Generative and Discriminative are the two main principles of the of Machine Learning models Choice limit between the various classes is demonstrated in that capacity. Generative models figure out how to display how the information was produced and make characterizations dependent on what is found out. Our info information is successive in CRFs, the past setting must be considered when making expectations on an information point. It is utilized to display this conduct, which has various information[10] esteems, which are as per the following

- Total number of information vectors, V
- Expecting data point location of the i
- i-1 by V data point information
- i by V data point information

Component work is characterised by : $f(V, j, j-1, l_i)$ To communicate a trademark [11] of the arrangement which the information point speaks to include work is utilized. For instance, CRFs is utilized for Parts-of-Speech labeling, at that point. The $W\{j-1\}$ can be Noun,

$W\{j\}$ is a Verb at that point $f(V, j, W\{j-1\}, W\{j\}) = 1$

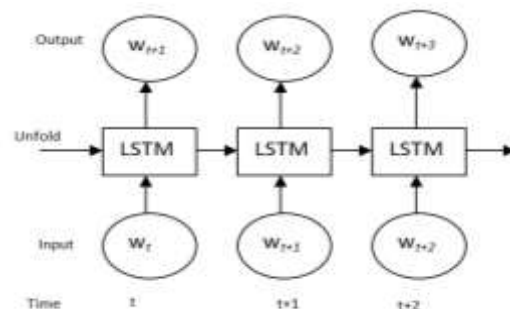
else

$f(V, j, W\{j-1\}, W\{j\}) = 0$.

In a diagram utilized is Conditional Random Fields at first characterizing by component capacities required later on afterward instating loads in irregular qualities, and applying Gradient Descent dreadingly until the parameter esteems [12]. We see that CRFs are like Logistic Regression which utilizes a contingent likelihood circulation, yet the fundamental contrast is calculation can be reached out by applying Feature work as our successive information sources [13].

Rasa Lstm

The authorization results in neurons is bring spread by a two direction manner, unlike single direction expansion in activation yields in the feed forward neural networks. It engages circles plan in the neural framework that fills in by the 'memory state' for neural frameworks. It enables a neural frameworks by holding what they have understood. A memory upkeep is definitely an upgrade over the standard n frameworks yet inclined into wonder of 'Vanishing Gradient'. It is the spot LSTM frameworks comes in, they adjust for the better tuning of the boundaries of the previous



layersframeworks.

Figure 2: Long Short Term Memory Block Diagram

This data stream consists of balanced utilizing the extra layer , by this technique it empowers the LTSM model to recollect or overlook its learnings [14].

The model consists of four layer :

Layer 1 : Accepts the progression of words as information

Layer 2 : It Registers the outcome using Long term short memory units. Routinely hundred data point units have incorporated into it and it is flexible in tuning when required.

Layer 3 : It basically kills actuation of specific neurons in drop out layer of long term short memory layer.

Layer 4 : It determines likelihood with respect to the upcoming names by outcome known as yield layer.

RASA Structure

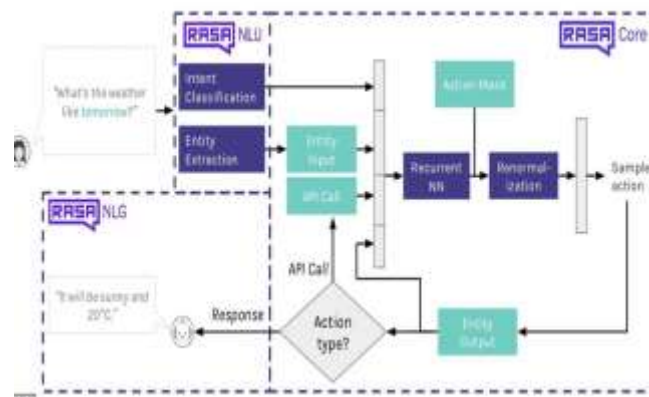


Figure 3: Architecture of RASA

Rasa NLU is open-source characteristic language preparing device for aim grouping and substance extraction in Conversational AI chatbots.

Rasa Core predicts which move to make from a predefined list. An activity can be a straightforward articulation, for example making an impression on the client, or it very well may be a self-assertive capacity to execute. At the point when an activity is executed, it is passed a tracker case, thus can utilize any significant data gathered over the historical backdrop of the discourse: openings, past articulations, and the consequences of past activities. Activities can't straightforwardly transform the tracker, however when executed may restore a rundown of occasions. The tracker devours these occasions to refresh its state.

3. Results and Discussion

For example, when the client asks the question "Suggest tablet for fever?"

The JSON yield acquired unmistakably distinguishes the goal of the question is to suggest tablet which is portrayed under "getsymptoms", identified with the recognized entity – "symptoms" which is fever.

The bot at that point gets the comparing medication for the ideal manifestation and sends the client.

```

1 {
2   "text": "Suggest tablet for fever?",
3   "intent": "getsymptoms",
4   "entities": [
5     {
6       "start": 12,
7       "end": 15,
8       "value": "fever",
9       "entity": "symptom"
10    }
11  ]
12 }
```

Figure 4.1: Json output(1/2)

Likewise, in the beneath model it is seen that the closest matches to the manifestation alongside their certainty esteems are gotten when the specific worth of indication isn't characterized in symptoms

```

{
  "aim": {
    "title": "getsymptom",
    "certainty": 0.9264873825283617
  },
  "entity": [symptoms],
  "aim_rank": [
    {
      "title": "getsymptom",
      "certainty": 0.9264873825283617
    },
    {
      "title": "welcome",
      "certainty": 0.0754347289452672
    },
    {
      "title": "bye",
      "certainty": 0
    }
  ],
  "text": "My body temperature high?"
}
```

Figure 4.2: Json output(2/2)



Figure 4.3: Bot Application

The results were obtained in a Higher-level of accuracy by BOW and CRF techniques

4. Conclusion

The client can specify the issues he's facing regarding his health and the Bot will respond to client queries with grater accuracy and also recommending the medicines required and this paper explains in detail about the technologies used in RASA and how it can be intergrated to Chat bot application with the custom needs and the necessity of chat bot. As RASA can be accessed by everyone it shall enable better growth related to Chat Bot.

References:

- [1] Mrs.v.Selvi,M.E,Ms.Saranya.S,Ms.Chidida.K, Ms.Abarnaa.R“Chatbot and bully free Chat”Proceeding of International conference on Systems Computation Automation and Networking 2019
- [2] T Christoph Matthies, Franziska Dobrigkeit “An Additional set of Eyes Chatbots for agile Retrospectives” IEEE/ACM 1s International Workshop on Bots in Software Engineering 2019
- [3] Nudtaporn Rosruen, Taweesak Samanchuen “Chatbot Utilization for Medical Consultant System” The Technology Innovation Management and Engineering Science International Conference 2018
- [4] Ankhil Shah, Bhargav Jain, Bhavin Agrawal, Saurabh Jain, Simon Shim “Problem Solving Chatbot for Data Structures” IEEE 8th Annual Computing and Communication Workshop and Conference 2018
- [5] Kapil Tajane,Saransh Dave,Pankaj Jahagirdar, Abhijeet Ghadge, Akash Musale “AI based Chat-bot using Azure Cognitive Services” Fourth International Conference on Computing Communication Control and Automation 2018
- [6] Wasudeo Rahane, Sayali Patil, Komal Dhondkar, Tanvi Mate “Artificial Intelligence Based Solarbot” Proceedings of the 2nd International Conference on Inventive Communication and Computational Technologies 2019
- [7] Divya Madhu, Neeraj Jain C. J,Elmy Sebastain , Shinoy Shaji , Anandhu Ajayakumar “A Novel Approach for Medical Assistance using Trained Chatbot” International Conference on Inventive Communication and Computational Technologies 2017
- [8] Rohit Binu Mathew, Sandra Varghese, Sera Elsa Joy, Swanthana Susan Alex “Chatbot for disease Prediction and treatment Recommendation using Machine Learning” Proceedings of the Third International Conference on Trends in Electronics and Informatics 2019
- [9] Rong Jin,Zhi-Hua”Understanding bag-of-words model: A statistical framework” page-1,Article in International Journal of Machine Learning and Cybernetics •
- [10] An introduction to conditional random fields Charles Sutton, Andrew McCallum Foundations and Trends® in Machine Learning 4 (4), 267-373,
- [11] Conditional random field based named entity recognition in geological text N Sobhana, Pabitra Mitra, SK Ghosh International Journal of Computer Applications 1 (3), 143-147, 201
- [12] Automatic keyword extraction from documents using conditional random fields Chengzhi Zhang Journal of Computational Information Systems 4 (3), 1169-1180,
- [13] Conditional random fields meet deep neural networks for semantic segmentation: Combining probabilistic graphical models with deep learning for structured prediction. Anurag Arnab, Shuai Zheng, Sadeep Jayasumana, Bernardino Romera-Paredes, Måns Larsson, Alexander Kirillov, Bogdan Savchynskyy, Carsten Rother, Fredrik Kahl, Philip HS Torr
- [14] Wenpeng Yin, Katharina Kann, Mo Yu, Hinrich Schütze ,Comparative Study of CNN and RNN for Natural Language Processing arXiv:1702.01923 , 7 Feb 2017