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Chat-Bot using Rasa and Python Spacing

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Abstract - *A chat-bot is an A.I based assistant that can have interactive two-way conversations with humans. It can assist them in finding answers to their queries, do small tasks such as provide information on the questions asked by the users, suggest them places such as restaurant, hospitals, malls etc., according to the choice of users.*

Intelligent chat-bot systems are popular in the application fields of robot system and natural language processing. As the development of natural language processing and neural network algorithms, the application of artificial intelligence is increasing in Chat-bot systems, which are typically used in dialog systems for various practical purposes including customer service or information acquisition.

This paper aims to demonstrate the building of a Chat-Bot using Rasa and Python.

Key Words: Chat-Bot, Rasa, Rasa NLU, Rasa Core, Entities, Intentions,

1. INTRODUCTION

Rasa is an open source machine learning framework for automated text and voice-based conversations. It provides us a machine learning algorithm framework that helps in building contextual chat-bot.

A chat-bot is an A.I based assistant that can have interactive two-way conversations with real customers. It can assist them in finding answers to their queries, do small tasks such as provide information on the questions asked by the users, suggest them places such as restaurant, hospitals, malls etc., according to the choice of users.

This A.I based assistant understands users' messages and its intention, holds conversations, provide user requested information/data, and connect to messaging channels and APIs. It also has the ability to store user information that might help in driving the conversation further and help in future conversations.

1.1 Components of RASA

RASA machine learning framework consists of two main components. First one being the Rasa NLU (Natural language understanding) and Rasa Core (Dialogue management) model being the second one. NLU model is an algorithm that helps us to train our assistant to learn the meaning of words and intention behind them. Core is responsible for the assistant's response to the user inputs and drive the conversation ahead till the users' tasks is completed.

This paper is a review paper which discusses the use of RASA framework and Python programming language to build a chat-bot. In this paper the structure and working of RASA is explained. We also discuss history and various types of chat-bots.

2. EVOLUTION OF CHAT-BOTS

Level 1 'Notification Assistants' (last 12 years):
This level we have experienced, and it's as simple as receiving notifications on your phone. This is how push notifications work on smartphones, with basic settings. Opening the notification leads you inside the app where you can take action on the notifications.

Level 2 'FAQ's Assistants' (last 10 years):
This is the most common type of assistant right now. The assistant allows the user to ask a simple question and get a response, which is a slight improvement from basic FAQ pages. A few FAQ assistants also allow for basic conversation back and forth.

Level 3 'Contextual Assistants' (present):
As bot developers know, giving users a box to freely type into rarely ends as expected. Context matters: what the user has said before is expected knowledge. Considering context also means being capable of understanding and responding to new and unexpected inputs.

Level 4 'Personalized Assistants' (developing stage):
As human gets to know each other over time, AI assistants will start to act like a human. At this level, an AI assistant will learn when it's a good time to get in touch and proactively reach out based on this context. It will remember your preferences and give you personalized experience.

3. RASA Framework Working

3.1 Overview

Rasa framework is made up of two components, Rasa NLU and Rasa Core.

Rasa NLU is an open source natural language processing tool for intent and entities classification. Basically it processes the unstructured input from the user and extracts meaning from it. There are a lot of steps involved in this.

Tokenization, vectorization, POS tagging, intent classification etc. are some of the steps to name a few.

Rasa Core is a machine learning framework that acts as an dialogue management model. It takes the structured input from Rasa NLU and using a machine learning algorithm it predicts the output to be shown.

In simple words Rasa NLU is used to interpret the unstructured user input and convert it into structured data. Rasa core is used to decide the most probable response or action to be taken.

Rasa NLU and Rasa Core are both independent of each other and can be used separately if needed.

3.2Understanding NLP (Natural Language Processing)

Natural Language Processing (NLP) is a combination of two processes, Natural Language Understanding (NLU) and Natural Language Generation. NLP is a superset of NLU & NLG.

NLU understands the meaning of the user's input. Primarily focused on machine reading comprehension, NLU gets the chat-bot to comprehend what a body of text means. NLU is basically an understanding of the text input given and classifying it into proper intents.

NLU involves:

- Natural Language Inference (NLI) and paraphrasing
- Dialogue agent
- Semantic parsing
- Question answering
- Sentiment analysis
- Summarization of users' input

NLG is software that produces understandable texts in human languages. NLG techniques provide ideas on how to build systems that can take advantage of the knowledge and capabilities of both humans and machines.

NLG involves:

- Content determination
- Discourse planning
- Sentence aggregation
- Lexicalisation
- Referring expression generation
- Syntactic and morphological realization
- Orthographic realization

There are two components of an NLP system – Natural Language Understanding (NLU) and Natural Language Generation (NLG). When you input a text into an NLP engine, the meaning or context of the user is deciphered by the NLU construct and the response is generated by NLG.

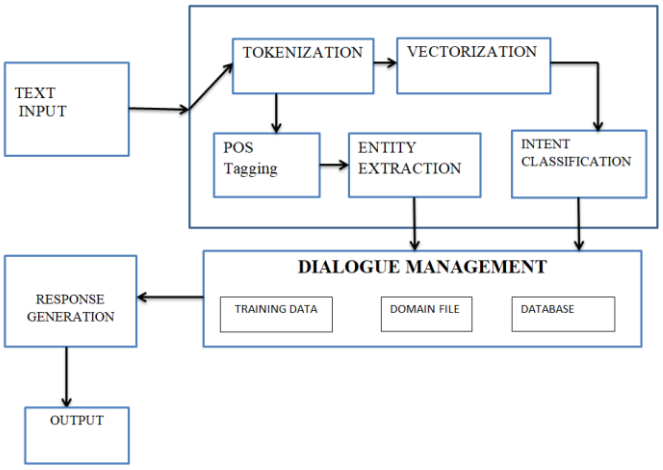

Fig-1: Working block diagram

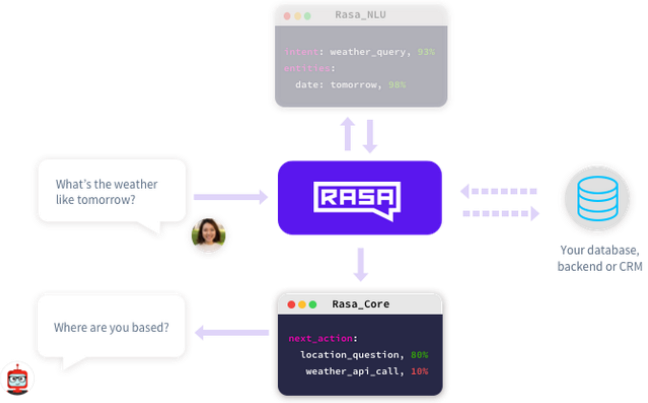

Fig-2: Example

3.3 Implementation

1. Installation of Rasa and Python and setting-up the project:

In this step all the necessary installation, configuration and library imports are done. Then using Rasa CLI commands the project is set-up.

2. Using Dataset to train the model:

In this step we you use our dataset to train the model. We enter the training data in the form of Entities and Intent in specific file called NLU.md. We also use user

conversations examples that help the chat-bot. These are mentioned in the stories.md file.

3. Custom actions/forms and Domain data:

In this step we use python to create custom actions. These custom actions will help our chat-bot to respond in certain way to a certain user input. We mention these custom actions in a file called actions.py. We have a domain.yml file in the project directory. This is used mention the domain and domain related metadata for the chat-bot.

4. Integrating with API and Database

When query or input is received by rasa from the end user, it will predict the values of entities and intents from the message, all this handling is done by RASA NLU unit.

5. Evaluate/Test the model:

This is the step where we test our model with our test data. Testing can be done using CLI. In testing we just take sample data and give it as input to the model to see if we get expected output and with what accuracy.

4. CONCLUSION

In this paper we have discussed what we mean by a chat-bot. We also saw the evolution and different levels of chat-bots. Later we discussed about Rasa framework. We discussed the components and working of the Rasa framework. We also took a look at Natural Language Processing (NLP). We understood the process of Natural Language Understanding (NLU) and Natural Language Generation (NLG). We saw how we can use Rasa framework to build a chat-bot.

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