

# *Artificial Intelligence Based Solarbot*

Wasudeo Rahane (*Author*)

Department of Information Technology  
NBNSSOE  
Pune, India  
wasudeo.rahane@sinhgad.edu

Komal Dhondkar (*Author*)

Department of Information Technology  
NBNSSOE  
Pune, India  
dhondkarkomal1496@gmail.com

Sayali Patil (*Author*)

Department of Information Technology  
NBNSSOE  
Pune, India  
patilsayali1296@gmail.com

Tanvi Mate (*Author*)

Department of Information Technology  
NBNSSOE  
Pune, India  
tanvimate50@gmail.com

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**Abstract**— A chatbot (Also known as Chatterbox) is a computer program which conducts communication between a human and machine, commonly through aural or textual methods. Chatbots are becoming popular since they have the potential to save any individual's hassle and time by automating mundane errands. Chatbots have been witnessing an era of highest demand powered by either a set of responses and rules that are already predefined or artificial intelligence method such as Natural Language Processor. Chatbots are often built-in into the chat systems, for example automated online assistants, which gives them the power for small talk or informal conversations secluded to the scopes of their prime expert systems. Solar power in India is rapid developing industry. As of December 2017 the country's solar power had 17.05 GW total capacities. It has been seen that using solar power is better than using electricity as it is an unlimited and renewable source. More and more people prefer using solar energy, they are being more curious about the uses of solar panels. They find it difficult to acquire information related to solar panels and their facilities. To ease their work a Solarbot can be designed that would provide them with all the necessary information they need quickly and without any hassle. The chatbot provides an interface as a platform for communication between the bot and the client. For pattern matching database is used for storing data and as per for functions and procedures. Pattern matching looks for definite patterns for words in the user's input, compares it with the database and responds to the consumer. A system that would provide facilities to the user very quickly and with least amount of work would be very beneficial.

**Keywords**— *Chatbot, Artificial Intelligence, Solar, Pattern matching, Natural Language Processor.*

## I. INTRODUCTION

The growth of the information technology and communication has been convoluted in accomplishment of artificial intelligent systems. The systems be similar to human actions such as verdict support systems, robotics, NLP, expert systems etc. There are methods in artificial

intelligent fields i.e. some hybrid methods and adaptive methods that grow up to be more intricate methods. At the present time there is also a concoction of natural language and intellectual system that can identify human natural language. These systems can learn themselves and refurbish their data by understanding all electronic articles that exist on the internet. Human as user can ask questions to the system like they usually would ask each other.

In recent time, Chatbot have become the focus of better research interest. The main purpose of so called chat-bots is to perform conversation between machine and individual consumers via natural language which should be as human-like as possible. Based on the task bot was made for conversations, usually serves some definite intentions such as searching the web.

There are several approaches to human-computer interaction. One of them is via natural language (NL), which again has more sub approaches and goals. Currently the biggest challenge that existing chatbots have is maintaining the perspective and understanding the human inputs and its responses. Chatbot is used for making communication between machine and human. The device has been implanted data to indentify the sentence and finding a solution itself to reply. Chatbots can be useful for providing customer services, presenting product recommendation, attracting customers through different marketing campaigns and many more different areas of business. Anyone who has ever tried to contact a company through a spokesperson at a call center knows how deliberate and frustrating the process can be. Chatbots are trouble-free to use and many customer choose them over calling a spokesperson on the phone because it tends to be faster and less enveloping. Billions of phones already have messenger apps which are preferred as a platform for a chatbot, chances are users are already plugged in and ready for the bot.

At the moment people are moving towards the usage of solar energy for generation of electricity. Solar panels absorb the sunlight as a source of energy to generate electricity and heat. Solar energy is a renewable source and the usage of solar panels is increased due its reduction in the electricity bill. But people face a lot of problems during the installation of Solar panels as they have no idea about which brand to buy, their rates, installation, etc. For this they have to make customer service calls or surf through various websites to gather information, which takes a lot of time. Aim is to build a chatbot that would solve the queries of the users that they face while buying, installing, etc of Solar panels.

The chatbot consist of a foundation and interface that is utilized to get to that foundation in RDBMS. Solar bot is built using artificial intelligence algorithms that will explore user's query and recognize user's messages. Text classification algorithm is used to answer the queries of the user. In text classification algorithm, the bot will match the query asked by the user within the intents word by word. This is called pattern matching. The bot will answer if the query matches with the intent or else will give default answer. The bot will answer all the questions of the user regarding Solar.

## II. RELATED WORK

- The work in this paper is based on the vector space model IR framework and how it is used in evaluation of data driven Chatbot. The data from both the existing user input and the saved chatting history is considered strategically but base line system only uses current user input verification [9].
- S.Sinha, S.J. du Preez and M. Lall offered the design and improvement of an intelligent voice detection chatbot. While designing a black box approach is used this allows the clients to communicate to the web-server from any platform As far as the development of the bot is considered a third party expert system is used while communication which archives the response, which improves the artificial grain capabilities of the chatbot. [3].
- In a paper published in 2016, a chatbot is developed by provided that knowledge to identify user's input and act in response to the user. The response is based on the corresponding the input from user. It is built using Java and Pascal [11].
- An IEEE paper states that users can access database by using keywords that are easy and thus improve quick knowledge curvature of mastering a designed query language and accepting intricate data schemas. [5].
- David Ameixa along with his co authors introduced Filipe, a chatbot that provides answers to users demands by taking advantage of compilation of text obtained from movie subtitles. Filipe is a tool liable

for indexing a corpus and selecting the most suitable answer [10].

- A 2011 IEEE conference paper provided a solution for intellectual communication agents with a vibrant and supple performance. It allowed a parallel and cooperative use of diverse techniques which provided acceptable method for an administration of specific attribute of the field or of the user activities [6].
- The paper published in 2013, design of chatbot is explained that is particularly made to order for providing FAQ bot system for university students. User writes the query in natural language where chatbot accepts it and goes through the data in warehouse and answers to the students in human language. The information repository can be without difficulty tailored and focus on particular matter without recreating the code design [7].
- A.Geilbuch published a paper in 2005 stating that Natural Language Processor (NLP) is a foremost area of artificial intelligence. The paper focuses on the contemporary trends in NLP and the applications of AI techniques and their blend [1].
- A 2013 IEEE paper studied the various characteristics of compressed and uncompressed data. After comparing them on the basis of pattern matching an application was designed this would give character matching count of these two types of texts. [8].
- The paper published in 2010 discussed about the on the rise problems of malevolent Chatterbots. The paper provides a solution for above problem by gross communication and behavioral patterns. They are also used to make a distinction between humans and chatbots [4].
- In a 2008 IEEE from online forum automatic chatbot knowledge acquirement in which ensemble learning is used to make a decision and categorization of model is done based on irregular set. First the various rough set classifiers are constructed and skilled, then the texts are classified using the rough set classifiers and then considered as chatbot [2].
- In March 2017, a college inquiry chatbot was built using artificial algorithms which understands the users input. This Chatbot is used to solve queries of the students very skillfully. Student can ask their query to the bot anytime. They just have entered the query to the bot for the solution. The system is a web based application which gives appropriate responses to the students using certain AI. Students can use the chatbot to solve their queries anytime . [12].

## III. METHODOLOGY AND PROPOSED WORK

This Solarbot is designed using some specific methods. The text classification algorithm and pattern matching are the most important algorithms that are

applied to a chatbot. A Natural Language Processor allows communication between user and bot using natural languages. Api.ai is a NLP that allows the bot to understand by converting the input to machine understanding language and respond to the user in human understanding language. The data has been given as an input to the bot needs to be stored in a database as it can be referred from there for further interactions. In this Solarbot MongoDB is used as a database for storing the user's data. MongoDB is used to store knowledge and some set of functions and procedures are used for pattern matching. Machine learning helps in identifying the queries of the user and providing a solution with pattern matching. The communication between bot and the user is done via chat interface. There are various chat interfaces available such as twitter, Skype, slack, webhook etc. The chat interface used for this system is Facebook messenger. Solarbot is an online application which is displayed on messenger using Node.js which is also used to integrate database with the chat interface.

Following are the requirements for that Chatbot:

#### *Chatting:*

1. The system would allow the user to chat.
2. The system shall inform the user if the answer is unavailable.
3. The system shall inform user about spelling mistakes.

#### *Searching:*

1. The consumer should be able to search about rates.
2. The consumer should be able to search about installation.
3. The consumer should be able to search about installing companies.

#### *Log:*

The system should maintain a log of all the questions and answers if the user is not satisfied.

Basic steps that will be implemented for this bot are as following:

- 1) Get the user input via chat interface.
- 2) Preprocessing of the input is done by a text classification algorithm to select intent from group of intents.
- 3) Fetching the main keywords from the input.
- 4) Matching the fetched keyword with the existing intents to provide an correct response. Pattern

matching algorithm is used to match the keywords.

- 5) Returns an appropriate answer to the user via chat interface.(OUTPUT)

The flowchart drawn below shows the working of this Solarbot. When the message is sent to the bot by the consumer the bot will try to understand the question.

Then with the help of machine learning algorithms and pattern matching it will try to recognize a similar problem in the exiting database. If the answer is available in the database it will be sent to the NLP and it will respond with an appropriate answer.

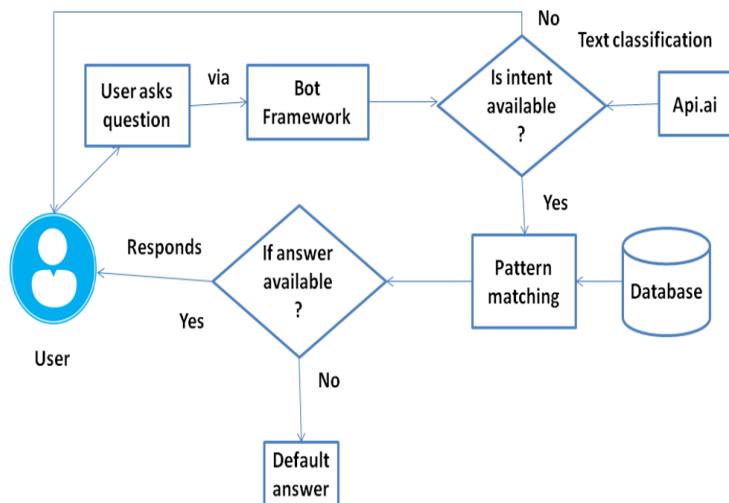
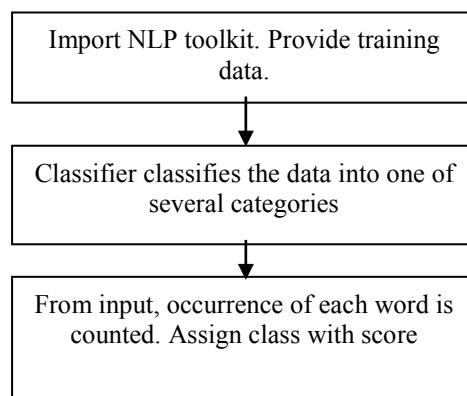


Fig 1. Working of Solarbot



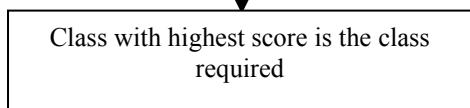


Fig 2. Flowchart of text classification algorithm

### Text Classification in NLP—Naïve Bayes

Given:

- An agent B
- a fixed number of intents  $I = \{a_1, a_2, \dots, a_n\}$
- a training set of d solution that have been pre-defined to belong to a specific intent.
- Classifier is trained using the number of intents
- $Y(B) = I$  represents our classifier, where  
 $Y()$  = classifier,  
 $B$  = Agent,  
 $I$  is an intent assigned to the agent.

This chatbot is designed to understand what the user said will store it for the current scenario and will respond that answers the user's input. The information will be stored in the database and will reply with appropriate answer for any user. Certain rules are specified to understand if the chance of a user saying truth is high or not and store the information for future.

Matching of user's input with the intent is done using pattern matching. Pattern matching matches the input with the intent word by word and not category by category. The following system ignores the punctuations marks and prepositions and focus only on main keywords of the user's input. Solar bot is a chatbot that will help users to find the solutions to their queries. In this system, the bot will take input from the users. From the given user input, the bot will try to find the appropriate solution by matching the main keywords from the input with the intents. If the main word matches with the main keywords of the intent, then bot will answer, otherwise the default will be answered.

This system develops a database where all relevant information about keywords, logs, feedbacks and questions

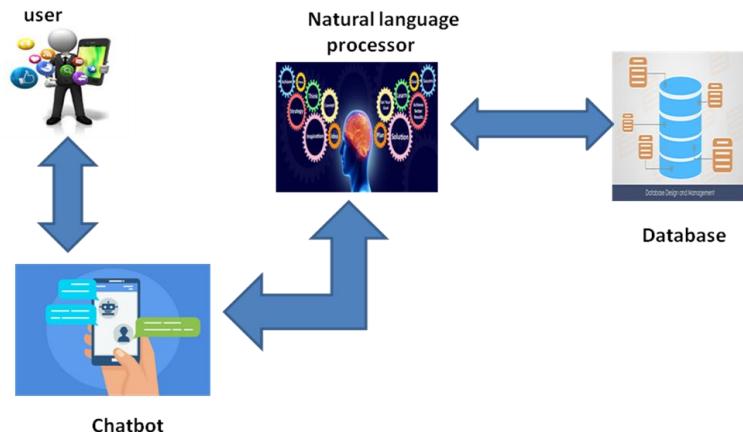


Fig 3. Architecture of Solarbot

will be stored. A keyword matching algorithm and a string distance algorithm is used for searching accurate answer to all the questions asked. These two algorithms are combined to retrieve the best possible answers.

When a question is answered, the bot will compare the question with the database. A different score is given to all the inputs in the database. The input is compared with the information in the database and the information with the highest score is presented as the answer. It is important that accurate answers are given to the user thus maintaining the efficiency of the bot.

The user will ask query via chat interface and the Solarbot will respond to the user via chat interface. The Solarbot will give a default answer if the query asked by the user does not match with the database.

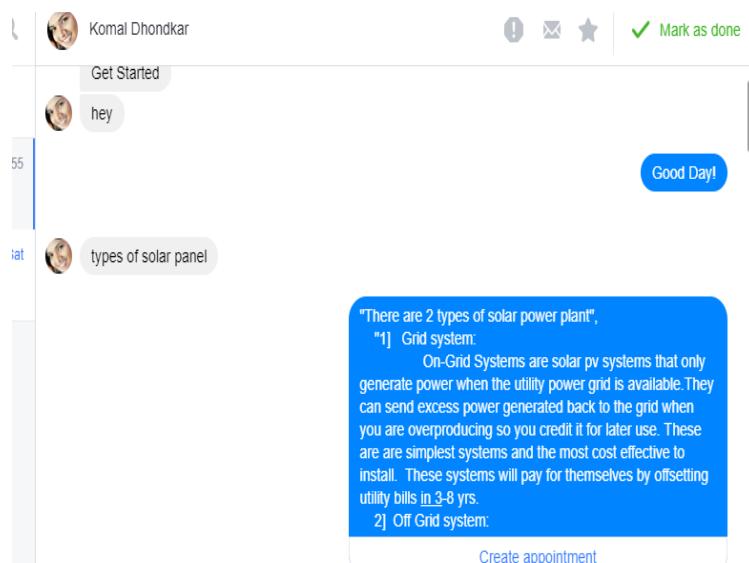


Fig 4. Solar Chatbot

#### IV. FUTURE SCOPE

At the moment, people are turning towards the usage of textual applications. People refer texting versus calling as they find it an easy way of communication. Also people tend to find ways to reduce human effort at any tasks. Hence a Solarbot will help them in future to minimize their work.

In future, technology will over power every field and hence creating a Solarbot would be beneficial for everyone. A mobile application can also be created of this Solarbot. As each and every person has a smart phone Solarbot application will be very handy and would be able to access anytime they want. The long term goal is to provide a chatbot that would ease the work of the user as well as the installer by reducing the time required to surf through the websites.

#### V. CONCLUSION

As everyone is moving away from the traditional methods of communication these days, it is expected for new methods like chatting to rise. It has been observed that use of internet and technology has been growing from past few years. Use of mobile messaging application and entire generation of mobile users who are at ease with messaging is growing as an interaction prototype. As use of a chatbot saves time and is efficient, it is attractive for companies for increasing their sales. The long term goal is to build a chatbot that will reduce the work of the user by providing the solution to the query through the text.

The role of this system is to provide a chat interface for the user that will be able to answer questions related to the solar which consists of database, algorithms. The chatbot provides answers to recurring questions using Artificial Intelligence. This system provides an online interface for the users for getting solution for their queries. This bot will be very efficient for the users as it will provide answers to the users through text. The user no longer has to surf through various websites or call any company to gather information.

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