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SMART INTERACTIVE FARMER-BOT

Project Implementation Report

(TY Semester II, 2021-22)

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MAHARASHTRA (INDIA)

MAY, 2022

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submitted in partial fulfilment of the
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of

Bachelor of Technology

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CERTIFICATE

It is hereby certified that the work which is being presented in the Project Implementation Report entitled **"*Smart Interactive Farmer-bot*",** in partial fulfillment of the requirements for the award of the **Bachelor of Technology in Computer Engineering** and submitted to the **School of Computer Engineering of MIT Academy of Engineering, Alandi(D), Pune, Affiliated to Savitribai Phule Pune University (SPPU), Pune** is an authentic record of work carried out during an Academic Year 2021-2022, under the supervision of **Dr. Rajeshwari Goudar, School of Computer Engineering.**

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1. Madanu Amisha sign
2. Uddhav Patil sign
3. Nikhil Kinikar sign
4. Aishwarya Chouthe sign

ABSTRACT

In India, agriculture is the primary source of livelihood for about 58% of the population holding the second position in the world in agricultural production, it also contributes a major share in the Gross Domestic Product (GDP) of the country and the technology in the field of agriculture is also developing day-by-day. Multiple software are developed for the farmers which mostly provide static information where the user has to go through many steps to get the necessary information and doesn't provide an interactive way of querying and response.

The farmer-bot system overcomes the drawbacks and provides a user-friendly interface through which the farmers can interact and get desired or accurate information.

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1. INTRODUCTION

Agriculture plays an important role in the Indian economy, today Indian farmers are facing a major issue in concern to their livelihood due to lack of information about the new upcoming technology for agriculture as well as government schemes, equipment etc.

Most of the farmers residing in rural areas don't have awareness about the technology and the information regarding the crops, soil properties, latest tools used, etc. Due to lack of knowledge about the latest technology regarding the agriculture and information about the farming techniques would lead to poor crop yield and livestock productivity.

Artificial Intelligence Machine Learning as well as Data Science with both of their help we can overcome the issue of providing qualitative solutions or information to the farmers by collecting data regarding agriculture such as the climate (especially rainfall), soil type, crop productions and many more.

Using AIML a chatbot is developed for querying which provides an interface where the user (farmers) can communicate with the chatbot efficiently. With the help of AIML algorithms user response is generated if the query is not resolved or does not provide a response, it would be forwarded to the experts.

1.1 Motivations

As agriculture is the primary source of livelihood for approx 58% of population in India yet there is not much progress seen in the agricultural sector even with the recent growth of technology which is mainly caused due to lack of knowledge and awareness.

1.2 Problem Statement

Developing an interactive chatbot software for agricultural purpose using data science and artificial intelligence

1.3 Objectives and Scope

- To develop a system with user friendly interface
- Our proposed system able to do query processing and response generation
- Our proposed system able to manipulate historic data, Agricultural data for response generation

2. LITERATURE SURVEY

A. Agriculture Chatbot Application Using Python

Talk Bot framework is a piece of regular language preparing, where it expects framework to be prepared according to the human language, with the goal that it can fulfil the requirements of the client. Horticulture area is driving wellspring of nation's development. At present ranchers are very little mindful about late advances and works on being utilized in agribusiness field. Extraction of important answer by AI methods is an issue that has been concentrated by many AI specialists just as cutting-edge AI procedures are presented. These methods are applied to remove the precise answer. We can call this as an Agriculture Question Answering System, where the rancher can inquiry the framework and the framework comprehend the question and reacts to a given question.

B. AgriBot - An intelligent interactive interface to assist farmers in agricultural activities

In India, agriculture plays a predominant role in economy and employment. The common problem existing among the Indian farmers today is that they fail to choose the right crop based on their region specifications and yield history. Hence they face a serious setback in productivity. Agricultural statistics and forecast is an important resource that the government has not explored commensurate to its impact. The paper proposes an intelligent portable system using data mining and analytics which assists farmers with various farming techniques, helps them decide most suitable crops as per current climate conditions, soil conditions and geographical characteristics of the specified region.The farmers do not have a single source which can cater to all their queries regarding seeds, fertilizers, market prices, storage facilities, government schemes, etc. To make this data analysis easily accessible to the farmers a chatbot is proposed which uses the Natural Language Processing technique. It helps to get responses of the farmer input queries regarding agricultural context in audio format, so as to make farmer interaction more user friendly. If the system fails to answer any specified query, the query is redirected to helpline centers. The system basically works as a virtual, handy assistant to assist farmers throughout the year helping them stay notified of any factor that would affect crop productivity and profit. The responses are generated based on various machine learning algorithms modelled around data set. Though the main audience under consideration are farmers any other user can also use the system to get advice regarding activities related to agriculture.

C. Agriculture TalkBotUsing AI

Artificial Intelligence and Machine Learning are driving IT industry to new landscape. This system "The TalkBot" overcomes this problem and provides farmers the better opportunity to obtain the desired information and to scale up with upcoming market trends and technologies in a user friendly manner. TalkBot is actually a chatbot, which is a virtual conversational assistant, through which the users can communicate with the bot as if they are conversing with humans. The focus is on developing the bot in a more intellectual way, that it can even recognize not so well grammatically defined sentences, misspelled words, incomplete phrases, etc.,. This can help people to converse easily with the bot, since this system uses the Natural Language Processing technique to parse the user queries, identify the key words, match them with Knowledge Base and respond with the accurate results. To make the responses more understandable, the responses are generated using classification algorithms and produce non textual responses so that it can be easily perceived by the users. Bot also has an ability to provide voice oriented responses using text to speech techniques.

D. Virtual Conversational Assistant –"The FARMBOT"

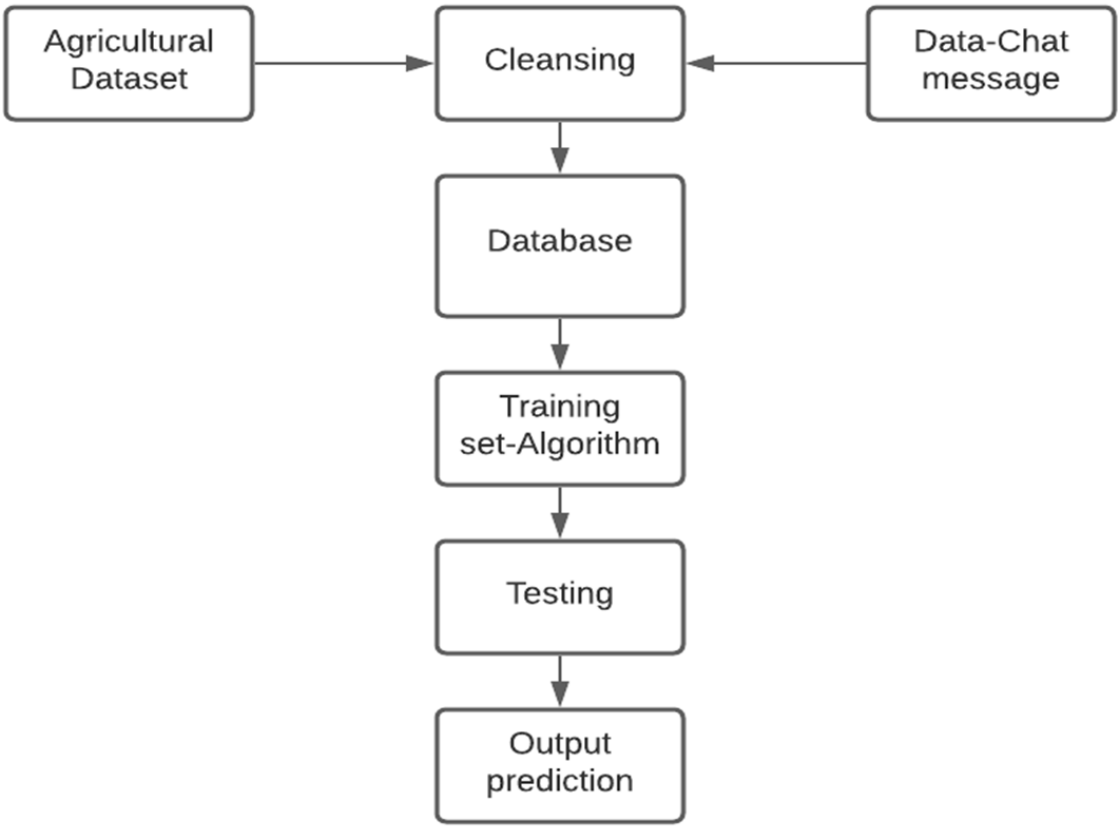
The technology has improved a lot in the field of Farming, the market trends and advancement in farming techniques are growing rapidly nowadays. But this information are not easily accessible by the farmers, since a more number of searching steps are required to obtain the desired results from the Internet sources. This system "The Farmbot" overcomes this problem and provides farmers the better opportunity to obtain the desired information and to scale up with upcoming market trends and technologies in a user friendly manner. Farmbot is actually a chat bot, which is a virtual conversational assistant, through which the users can communicate with the bot as if they are conversing with humans. The focus is on developing the bot in a more intellectual way, that it can even recognize not so well grammatically defined sentences, misspelled words, incomplete phrases, etc.,. This can help people to converse easily with the bot, since this system uses the Natural Language Processing technique to parse the user queries, identify the key words, match them with Knowledge Base and respond with the accurate results. To make the responses more understandable, the responses are generated using classification algorithms and produce non textual responses so that it can be easily perceived by the users. This system also uses prediction algorithms to predict the future data like the price of the crops for the upcoming years based on the previous records of data. Bot also has an ability to provide voice oriented responses using text to speech techniques.

E. Artificial Intelligence Based Farmer Assistant Chatbot

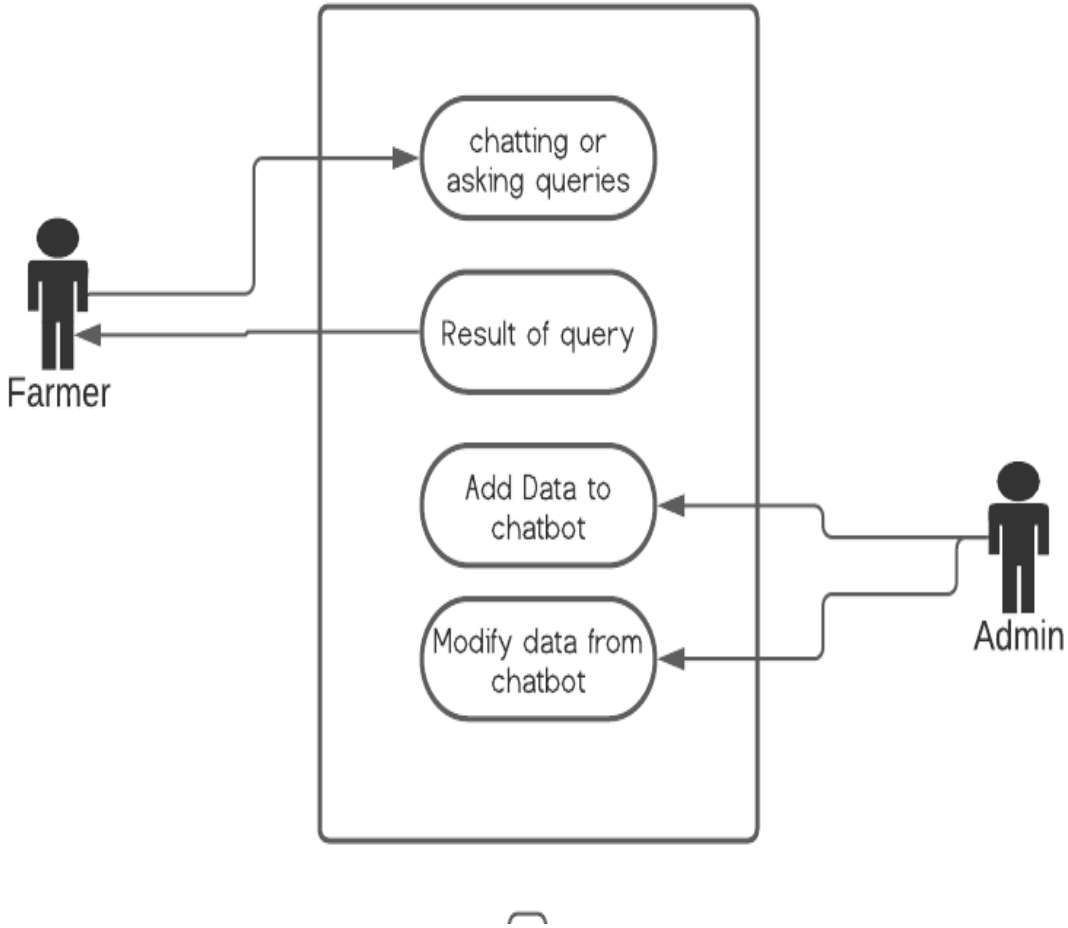
Automatic talk bot will be created. The Automatic talk bot will be able to answer user questions without any human assistance. These talk bots will be trained with different type of questions. When user types a question, it will apply Naive Bayes algorithm to identify appropriate answer from list of trained question. The talk bot provides answer to the query of the farmer. The farmer will have any query; the bot replied the corresponding queries by the way of chat and voice. If the farmer has any query about the agriculture, the bot will send the answers to them through the voice or text, If the farmer needs any route assistance, the bot will show the route for Google map. In case the farmer forgets agriculture related details or some important queries it will remind the farmers.

3. SYSTEM DESIGN

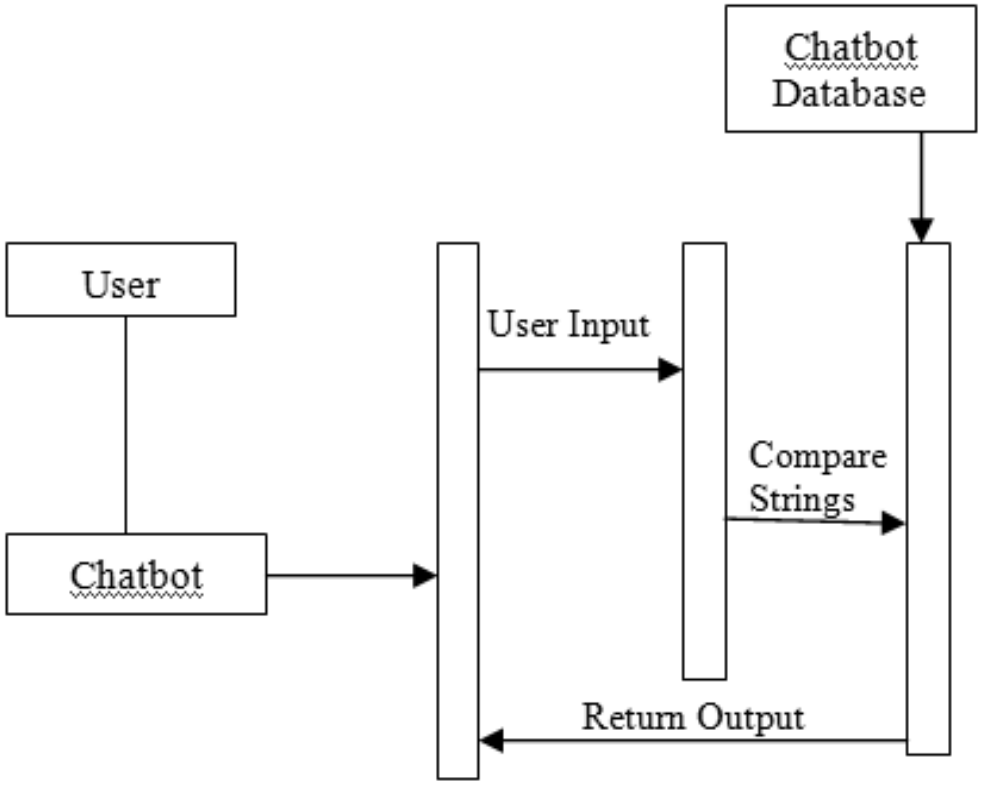
3.1 Block diagram/ Proposed System setup



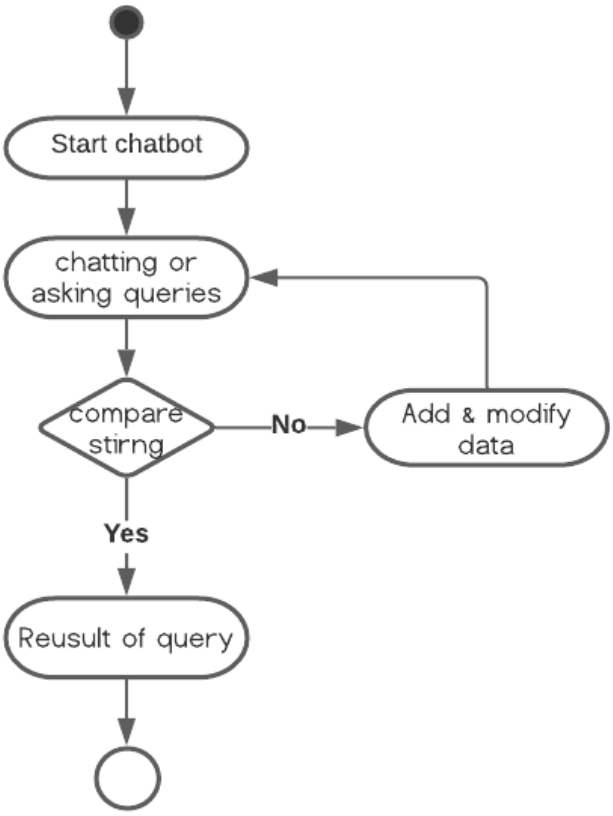
3.2 Use Case Diagram



3.3 Sequence Diagram



3.4 Activity Diagram



3.5 Hardware and Software Requirements

1. Hardware : Computer (8GB RAM & 500GB ROM)
2. Software: PyCharm, openrefine

4. METHODOLOGY

4.1 BAGGING METHOD

Ensemble learning is a widely-used and preferred machine learning technique in which multiple individual models, often called base models, are combined to produce an effective optimal prediction model.

Bagging is a type of ensemble learning that use numerous algorithms to vote and provide a result. In bagging, we employed a random forest and a decision tree.

Steps involved in random forest algorithm:

- Step 1: In Random forest n number of random records are taken from the data set having k number of records.
- Step 2: Individual decision trees are constructed for each sample.
- Step 3: Each decision tree will generate an output.
- Step 4: Final output is considered based on Majority Voting or Averaging for Classification and regression respectively.

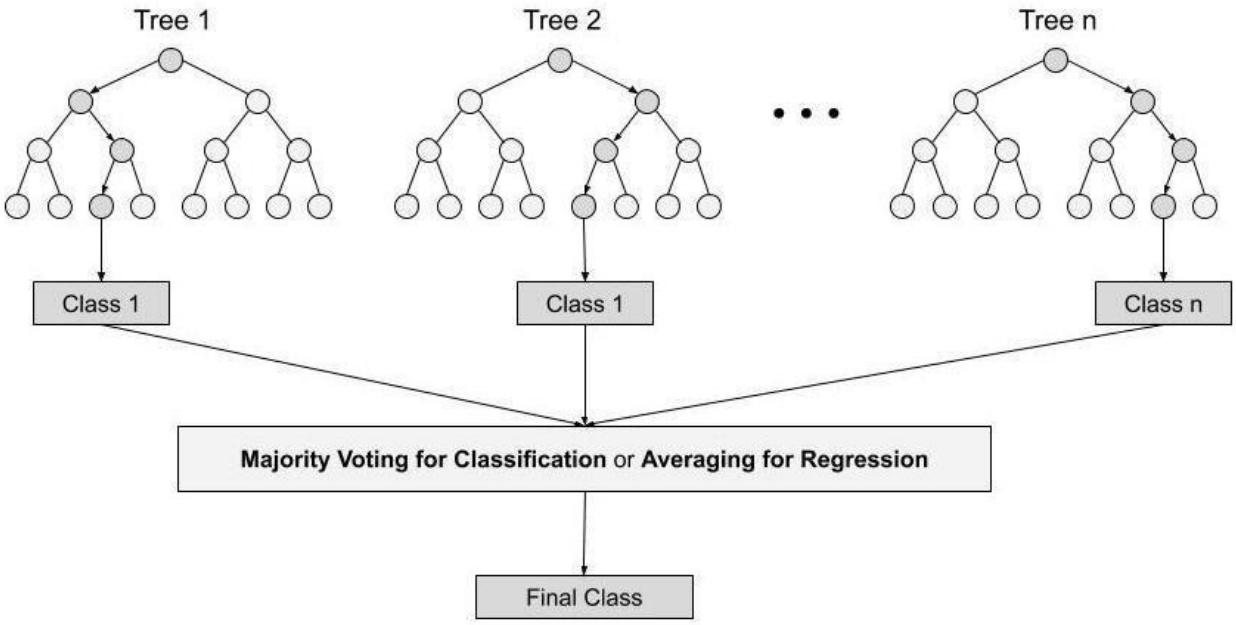


Fig 4.1 Bagging Method

4.2 NATURAL LANGUAGE PROCESSING

Natural Language Processing is the technology that is used by machines to understand, analyze, manipulate, and interpret human's languages. It enables the system to understand the user input even if they are not grammatically correct or incomplete sentences. Also, this increases the efficiency of the classification algorithm.

- The steps involved in the NLP-
- **Tokenization** : Tokenization is the process of splitting the input sentences into a list of words. Input query will be converted into tokens.
- **Noise Removal and Stop Words** : Noise removal deals with removing the stop words (noise) that are not relevant to the context and Stop words like “is, the, was, are, be, will, etc.” are removed, so that they do not account for the probability of the classification.
- **Lexicon Normalization** : Lexicon normalization is the process of converting the multiple representations of input to their single representation.
- **Bag Of Words or Vector Space model** : Stemming is one of the methods of this technique, where the suffixes of a word are stripped off. The words which are extracted from the above process are converted to a feature vector, in which a binary value is used as a weight, to represent each feature (1 if the feature is present, 0 if the feature is not present).

Fig 4.2 Process of NLP

4.3 Software Results

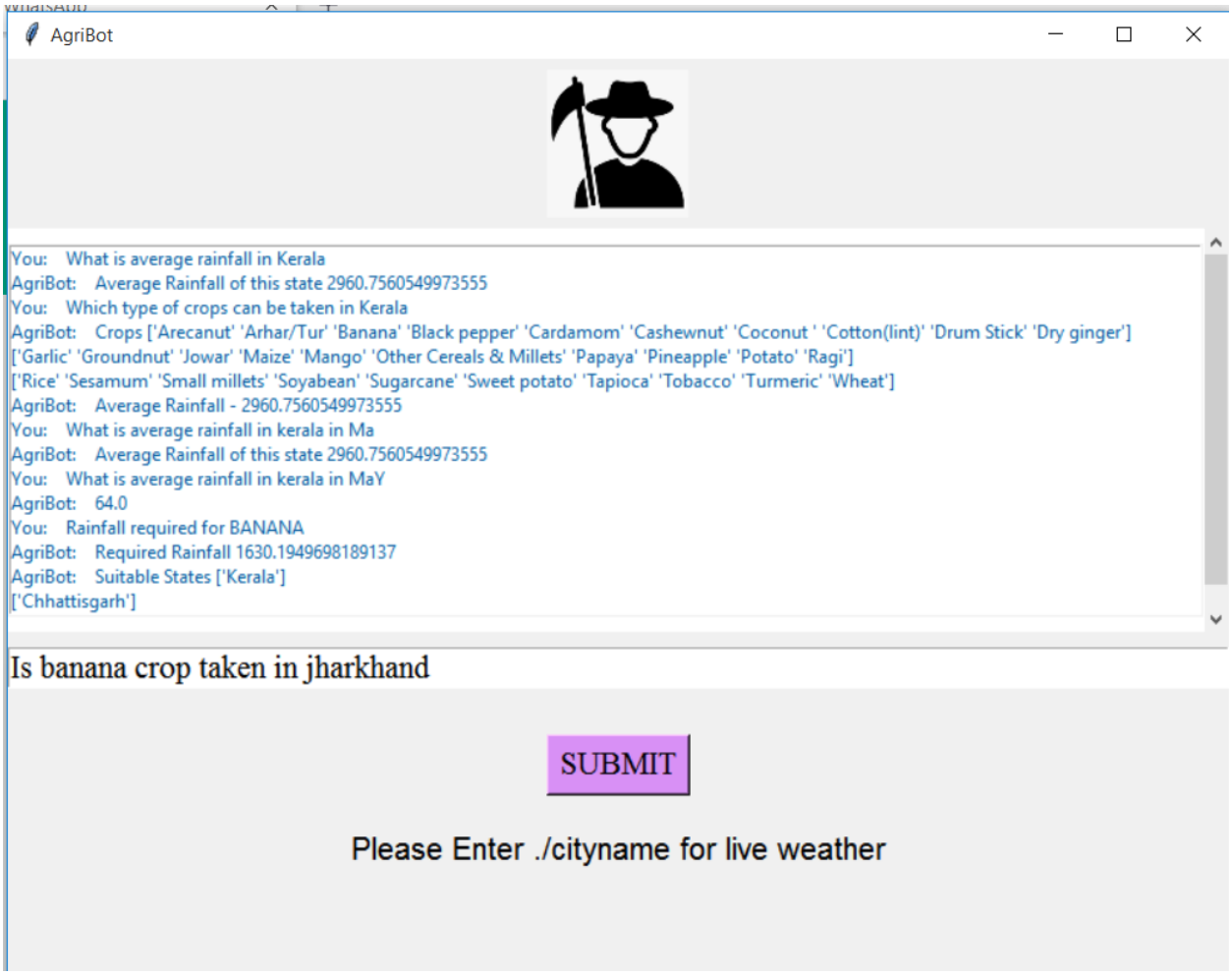


Fig 4.3.1 Software result of chatbot implementation

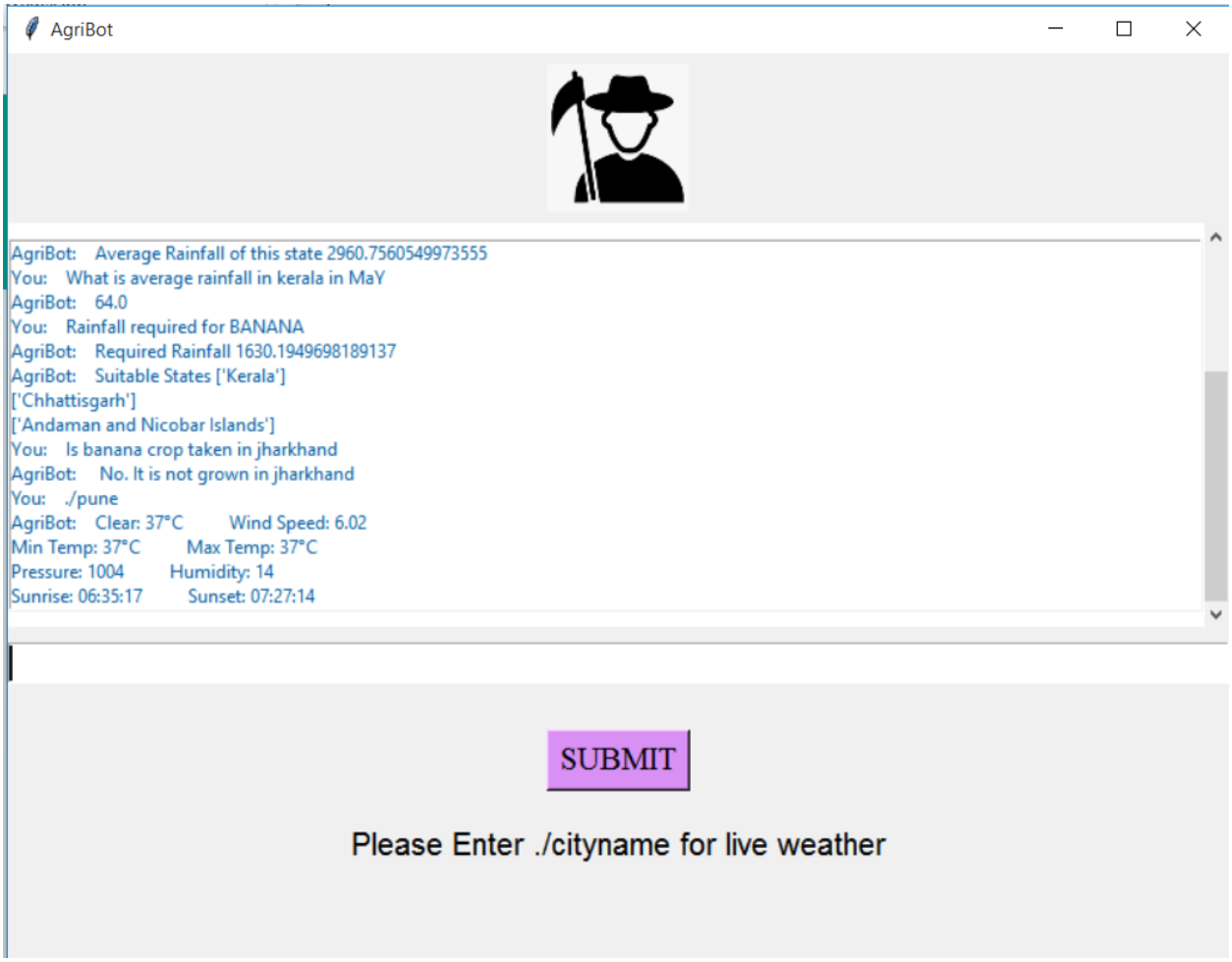


Fig 4.3.2 Software result of chatbot implementation

5. CONCLUSION

In the conclusion of our project work, we completed the project implementation, which consists of three modules: NLP for text extraction and bagging.

With a solid UI for ease of comprehension, the chatbot will assist farmers in answering questions about the weather and crop. We can create an IoT-based model in the future to identify temperature abnormalities in crop fields.

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