PROJECT REPORT

Intelligent Customer Help Desk With Smart Document Understanding

Category: Artificial Intelligence Developer

Application ID:
SPS_APL_20200000660
Project ID: SPS_PRO_99
Internship under SmartInternz

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1. INTRODUCTION

1.1 Overview

Every product or service comes with manual with guidelines to interact or for knowing the directions to use. But it becomes tedious to get answers to specific questions and manually hunt them down. A chatbot is a software application used to conduct an on-line chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent. Chat Bots can be useful to provide quick response to customer queries. The typical customer care chatbot can answer simple questions, such as store locations and hours, directions, and maybe even making appointments. When a question falls outside of the scope of the pre-determined question set, the option is typically to tell the customer the question isn't valid or offer to speak to a real person.

In this project, the Chatbot responds to questions related to **Phillips Automatic Coffee making machine**. The Chatbot (named CoffeeBot) performs intelligent search through training product manual data provided.

1.2 Purpose

The purpose to build a chatbot (web app) that facilitates the Smart Document Understanding feature is to automate the response for any customer queries regarding product. The project shall use the Smart Document Understanding feature of Watson Discovery to train it on what text in the owner's manual is important and what is not. This will improve the answers returned from the queries.

2. LITERATURE SURVEY

2.1 Existing problem

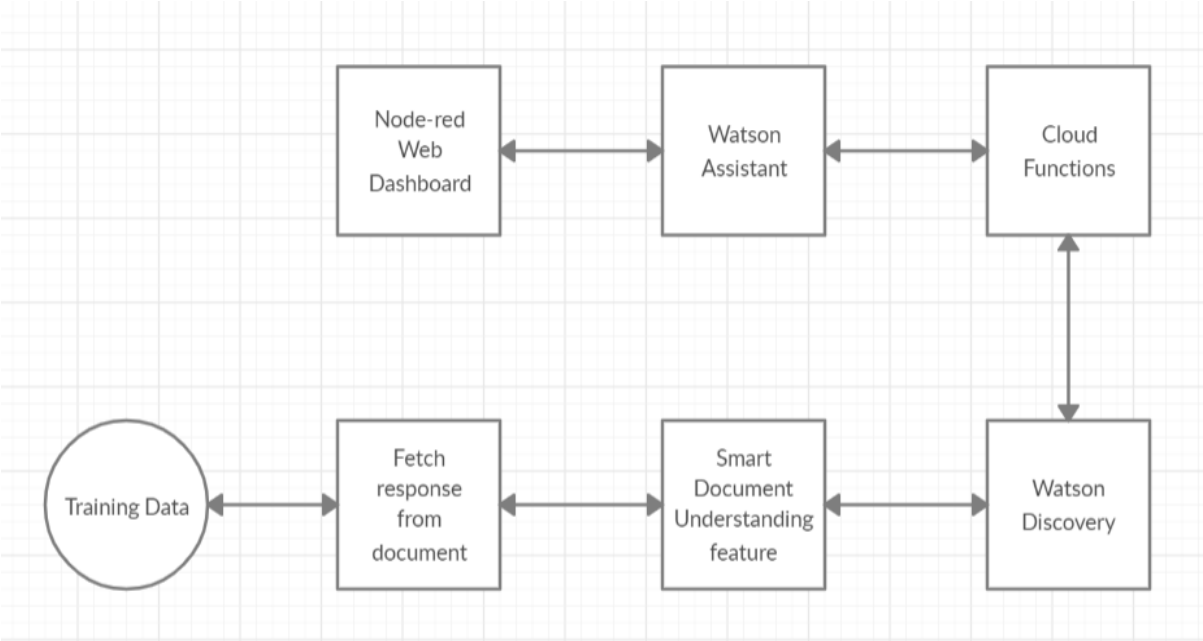
Currently, the chatbots are used to answer predefined questions such as store locations and hours, directions, and maybe even making appointments. They can be relied upon until a question falls out of its scope. There arises a complexity in answering questions which are not yet feeded as input to Chatbot already. We cannot give input to every possible question that may be asked to Chatbot. Therefore, it necessary to involve intelligence in Chatbot that enables automatic search for answers in manual/document provided. This increases the the rate at which we get response to many fold.

1.2 Proposed Solution

The project shall use the Smart Document Understanding feature of Watson Discovery to train it on what text in the owner's manual is important and what is not. This will improve the answers returned from the queries. If the customer question is about the operation of a device, the application shall pass the question onto Watson Discovery Service, which has been pre-loaded with the device's owner's manual. So now, instead of "Would you like to speak to a customer representative?" we can return relevant sections of the owner's manual to help solve our customers' problems. To take it a step further, the project shall use the Smart Document Understanding feature of Watson Discovery to train it on what text in the owner's manual is important and what is not. This will improve the answers returned from the queries.

3. THEORITICAL ANALYSIS

3.1 Block diagram



3.2 Hardware / Software designing

Hardware designing:

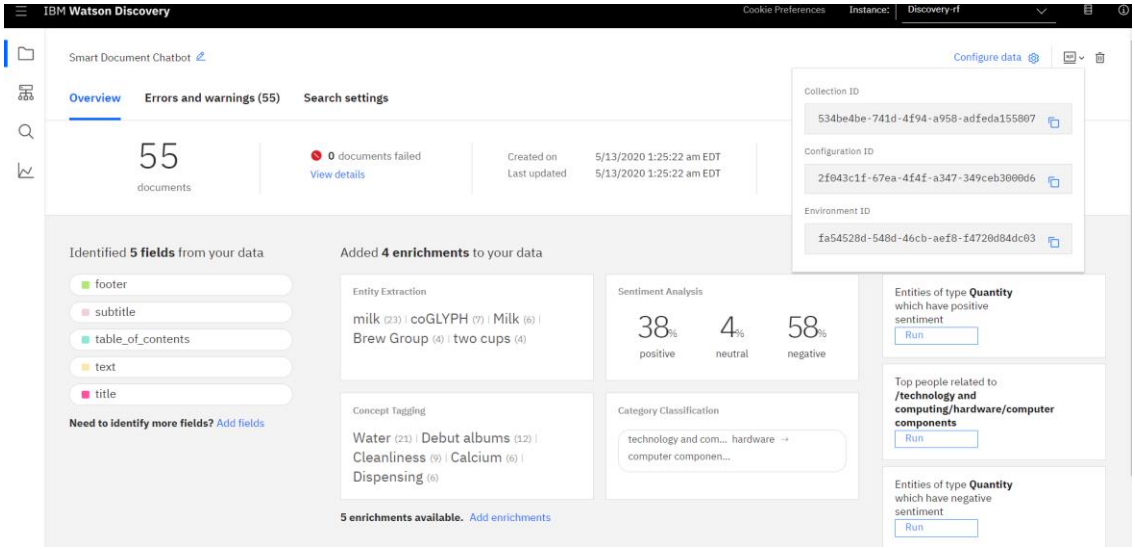
i. Laptop(with internet connectivity)

Software designing:

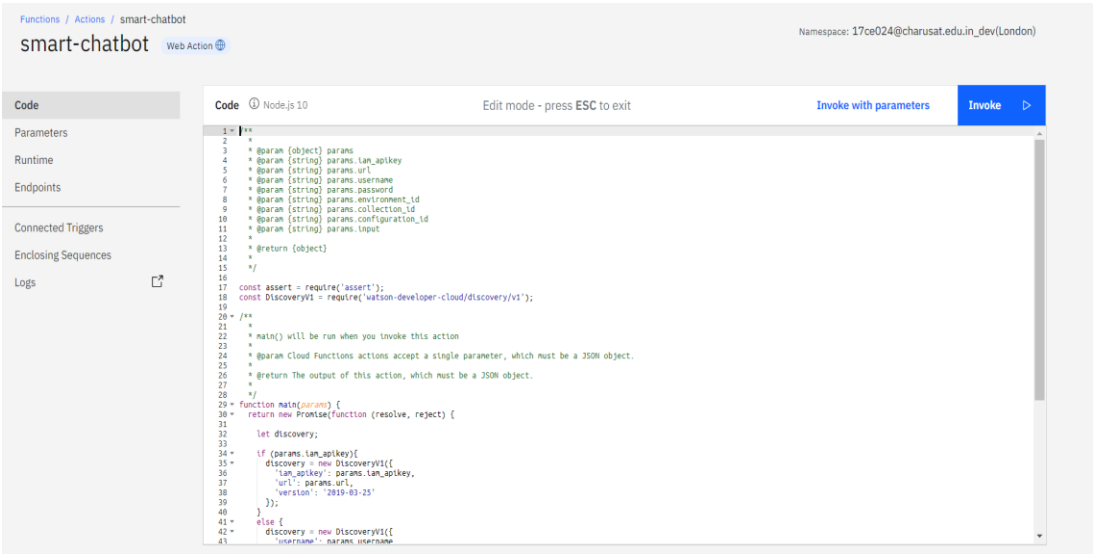
i. IBM Watson Services
ii. IBM Cloud Platform
iii. IBM Watson Discovery
iv. Manual for training data
v. Node-red flow
vi. VS Code (for Python)
vii. Github
viii. Slack
ix. Zoho Writer
x. Zoom (teleconferencing

4. EXPERIMENTAL INVESTIGATIONS

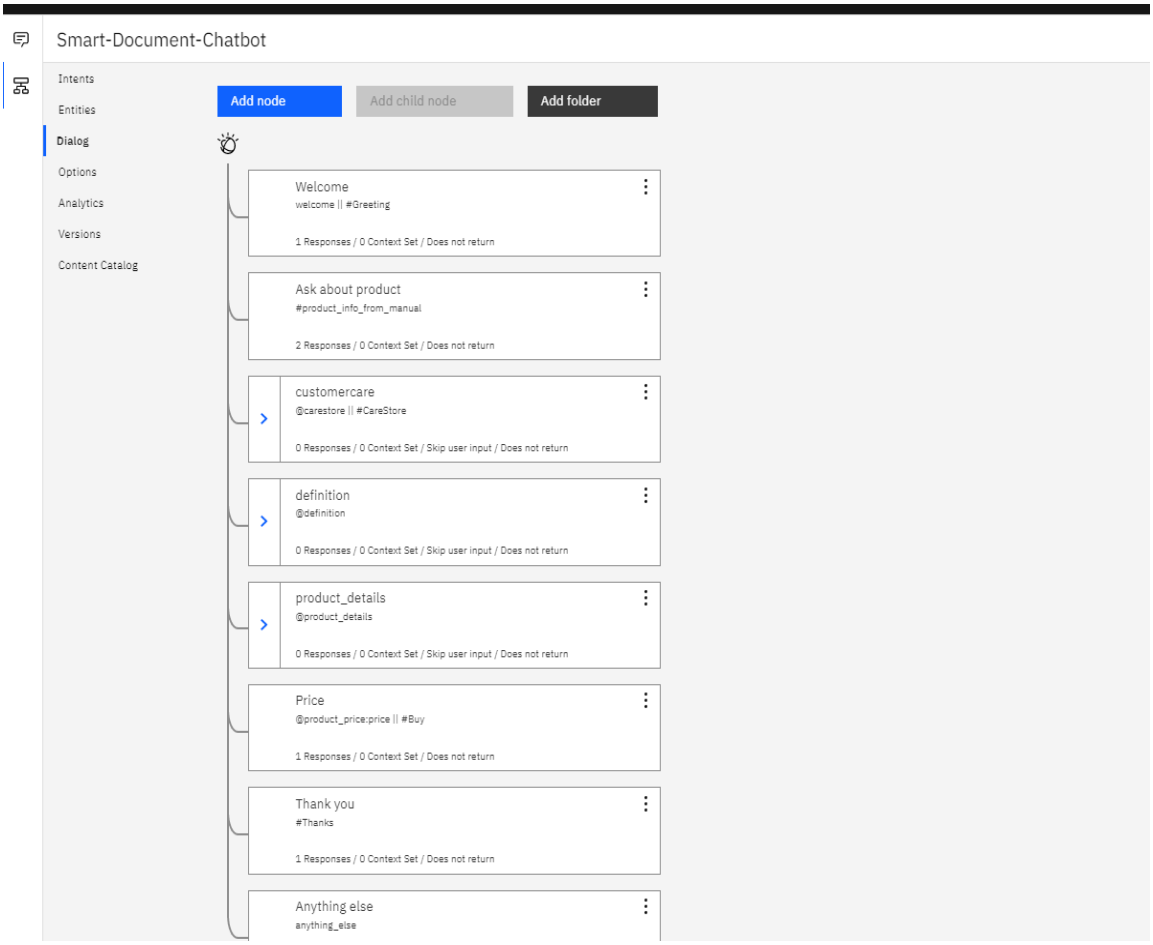
1. First, set up IBM cloud services using IBM Lite service.
2. Configure IBM cloud services: IBM Watson Discovery
   Train data by providing product manual data and annotating.



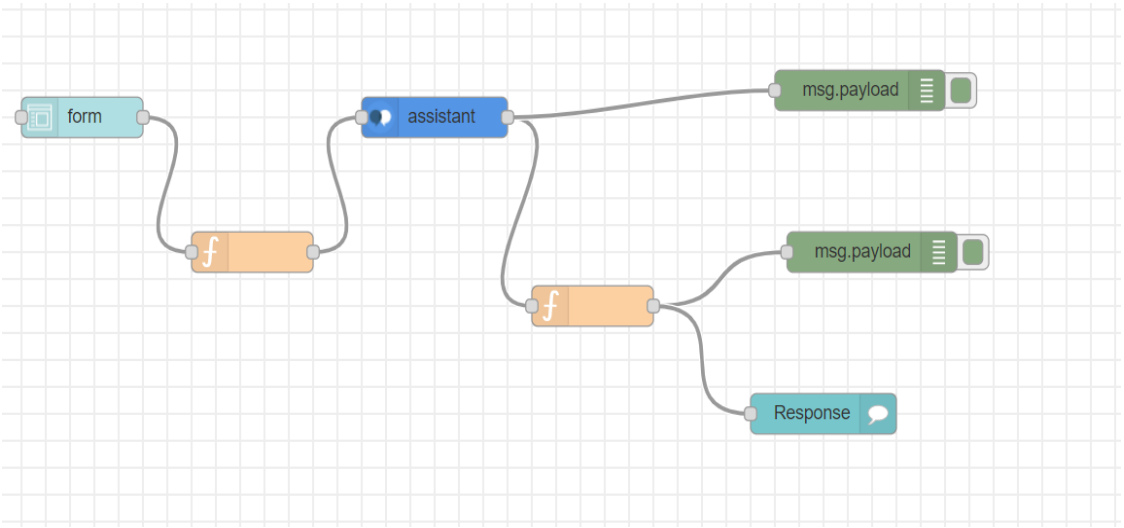
3. Configure cloud functions action:



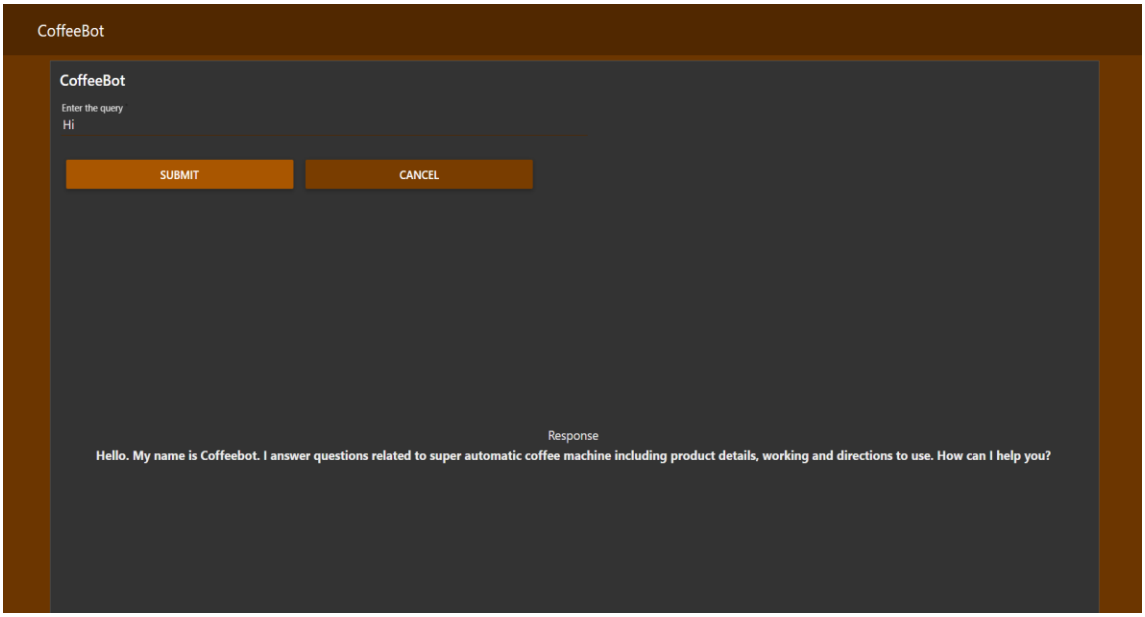
4. Configure Watson Assistant: Intent, Entities, Dialog Flow



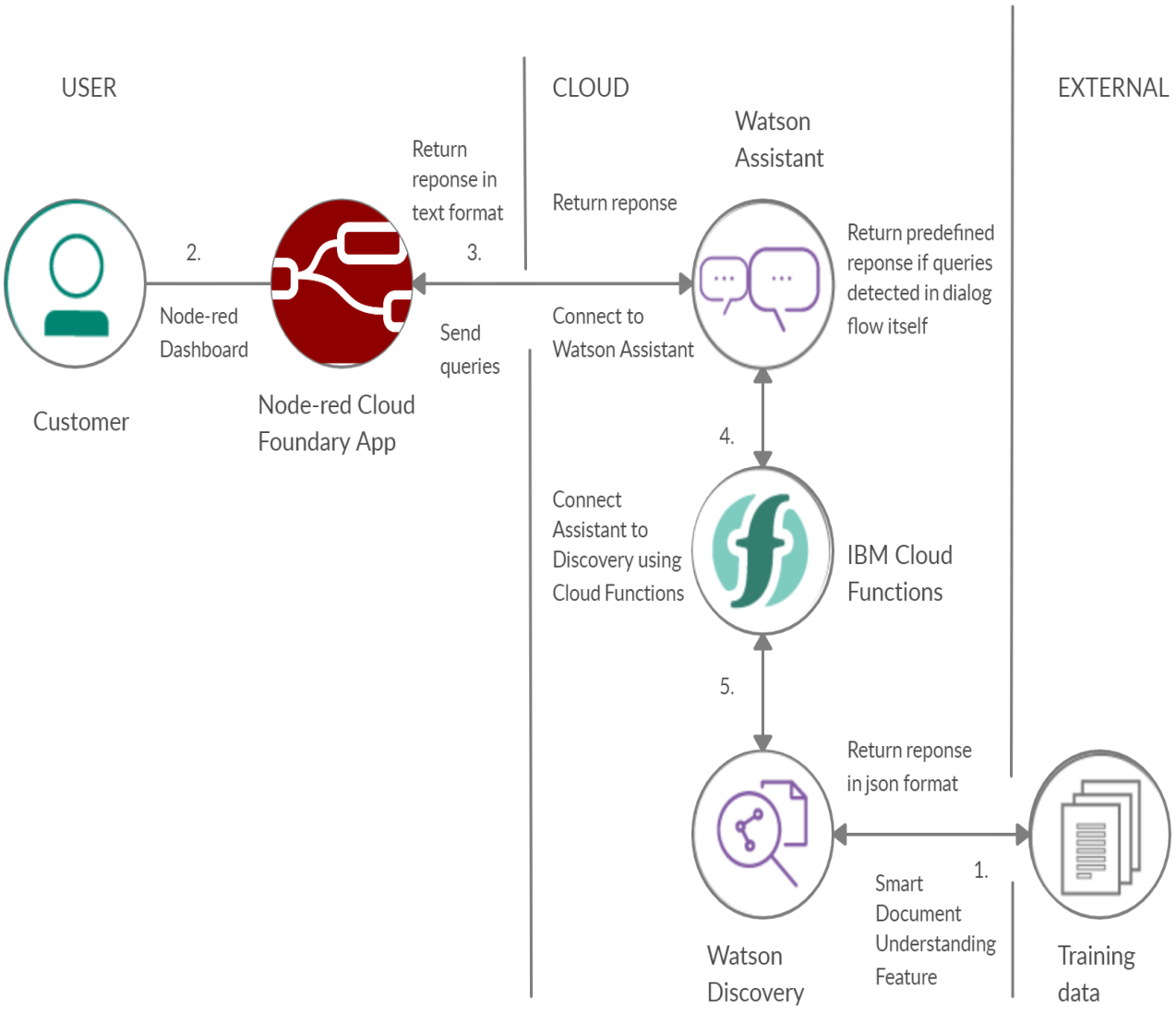
5. Build Node-red flow to integrate all services



6. Finally, building Node-red web interface.



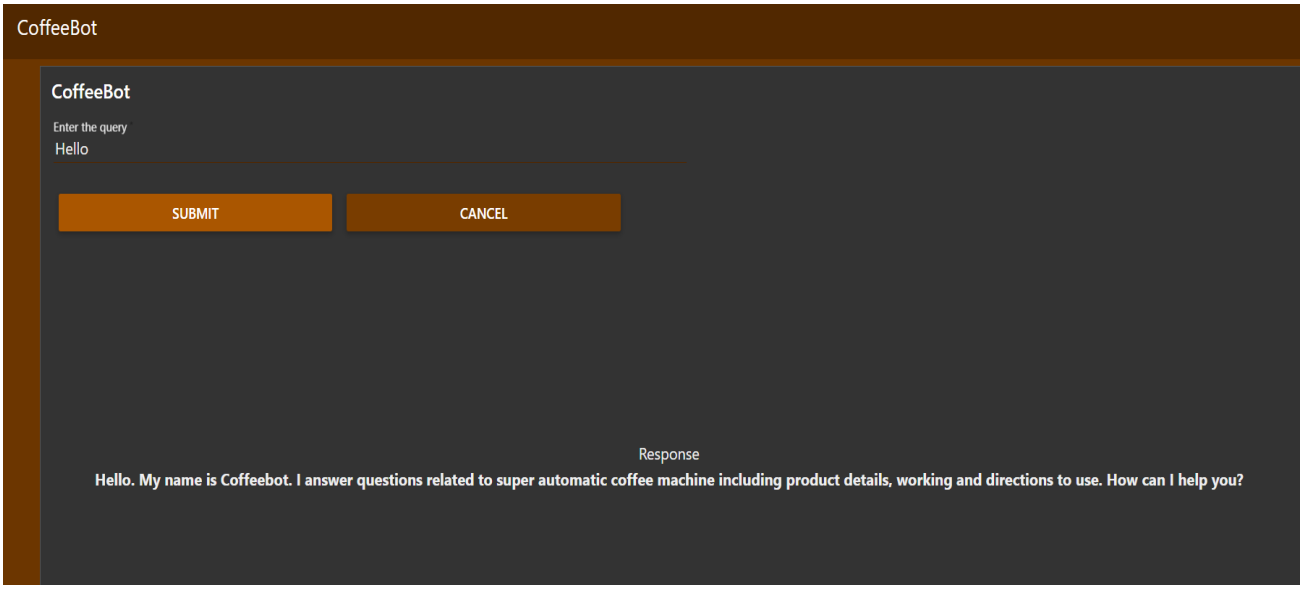
5. FLOWCHART

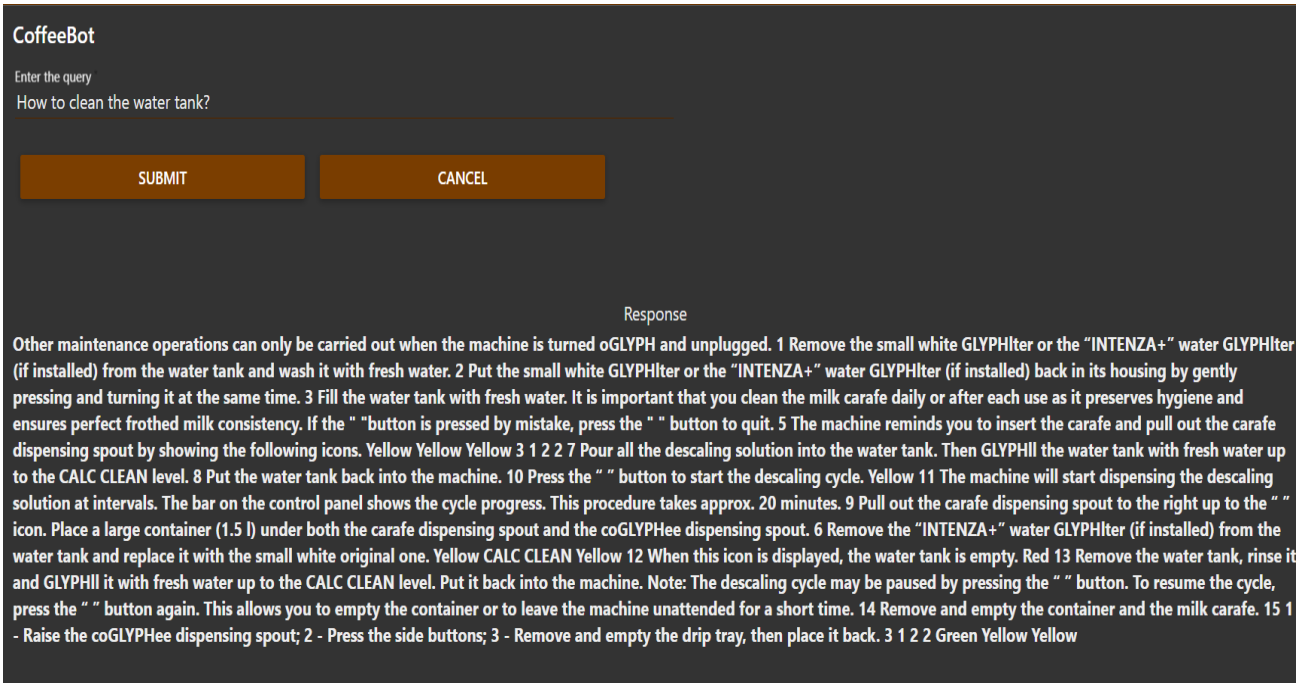


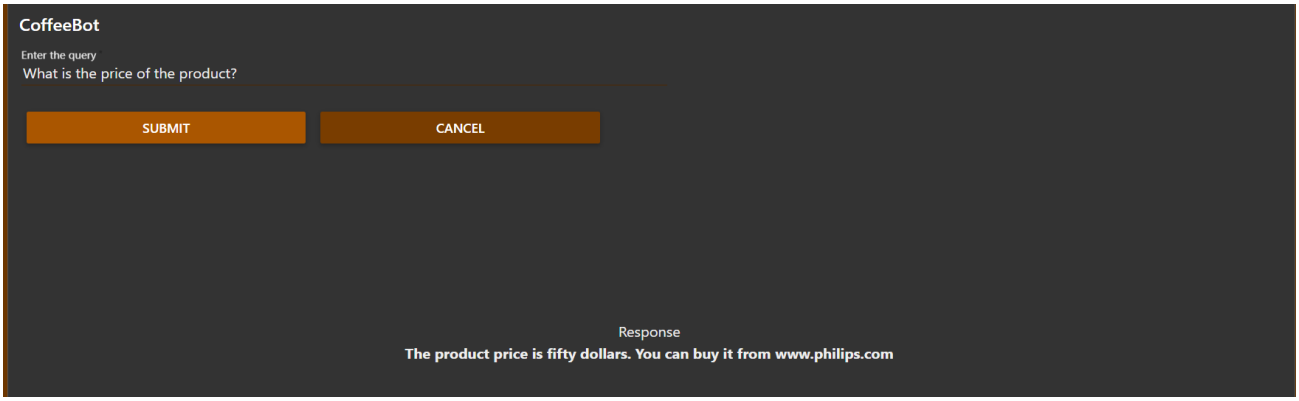
Flowchart for Chatbot

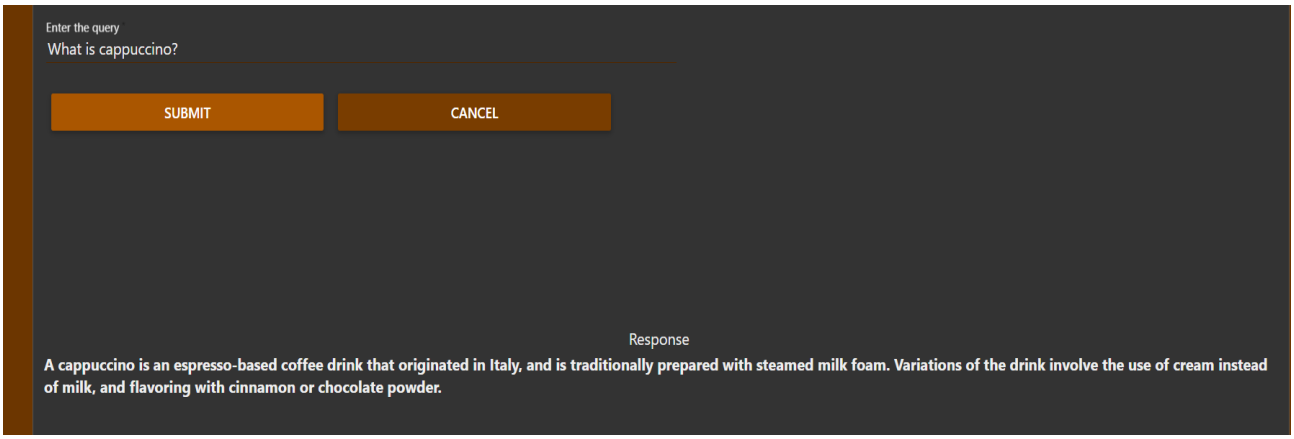
6. RESULT

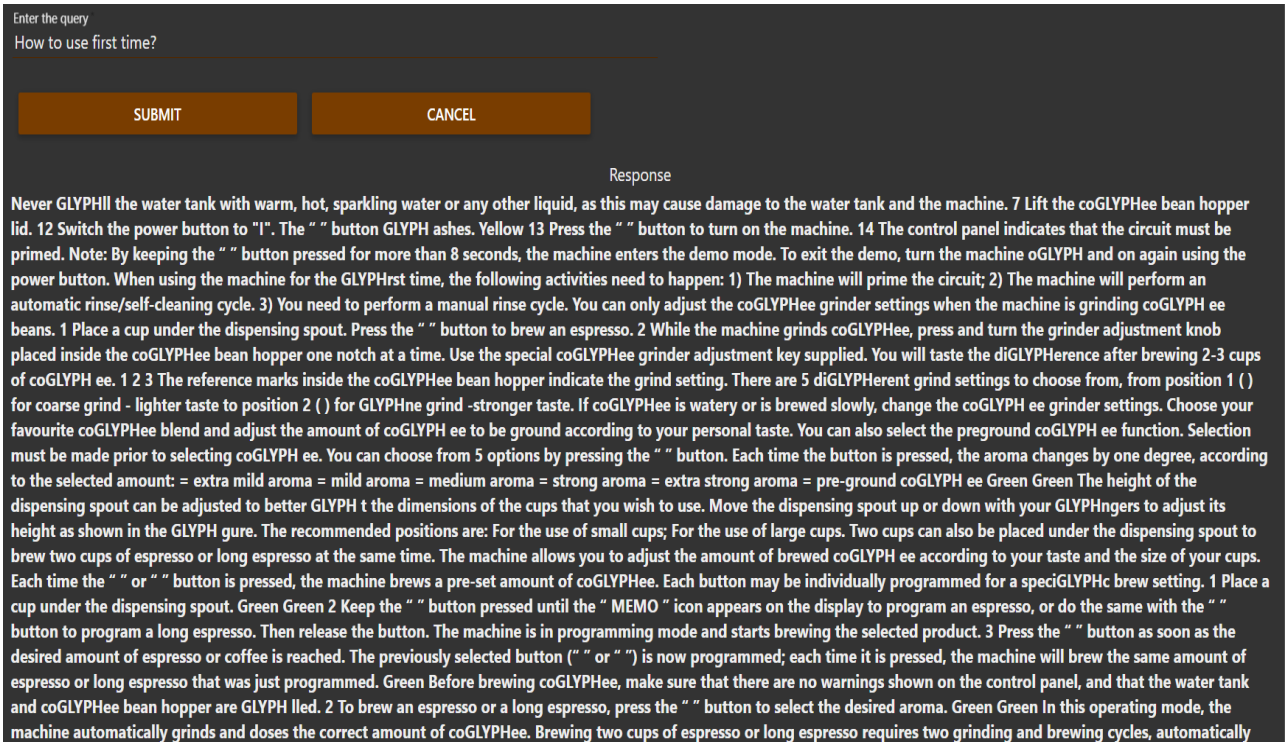
The following images depict the results from chat bot to queries that were given as input.

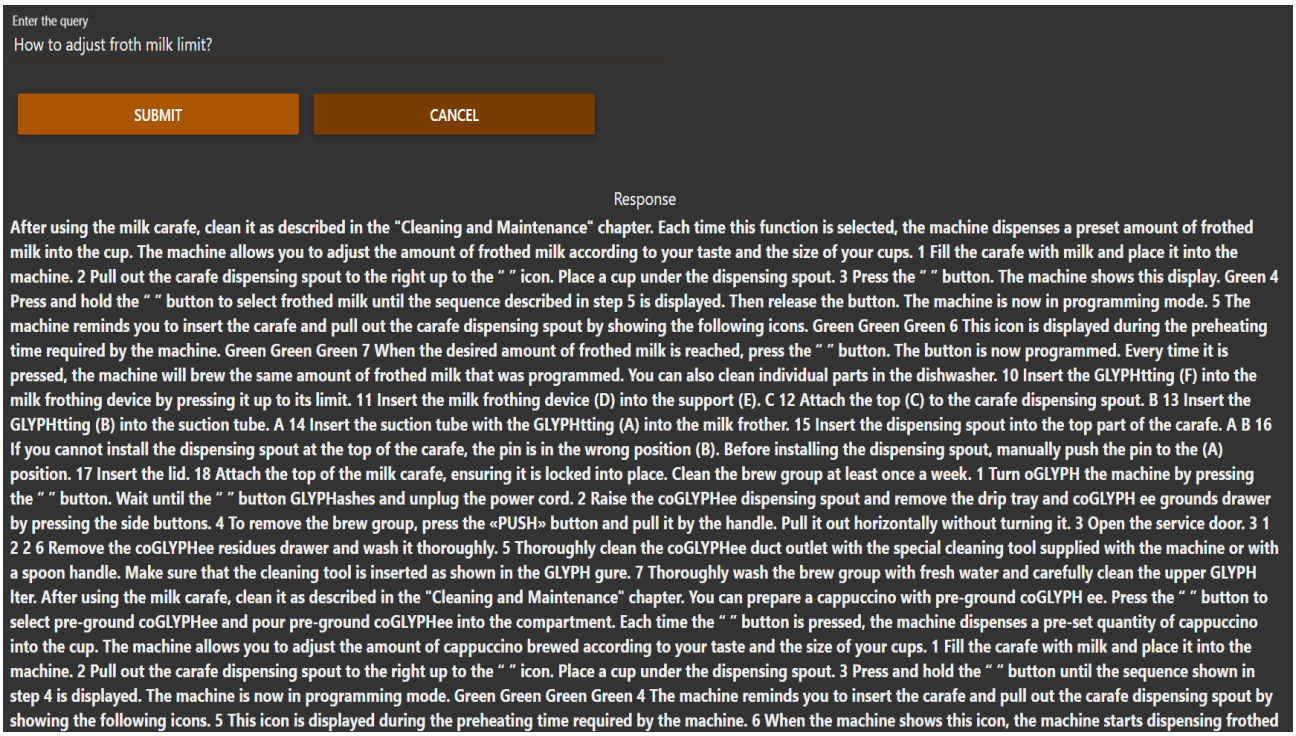


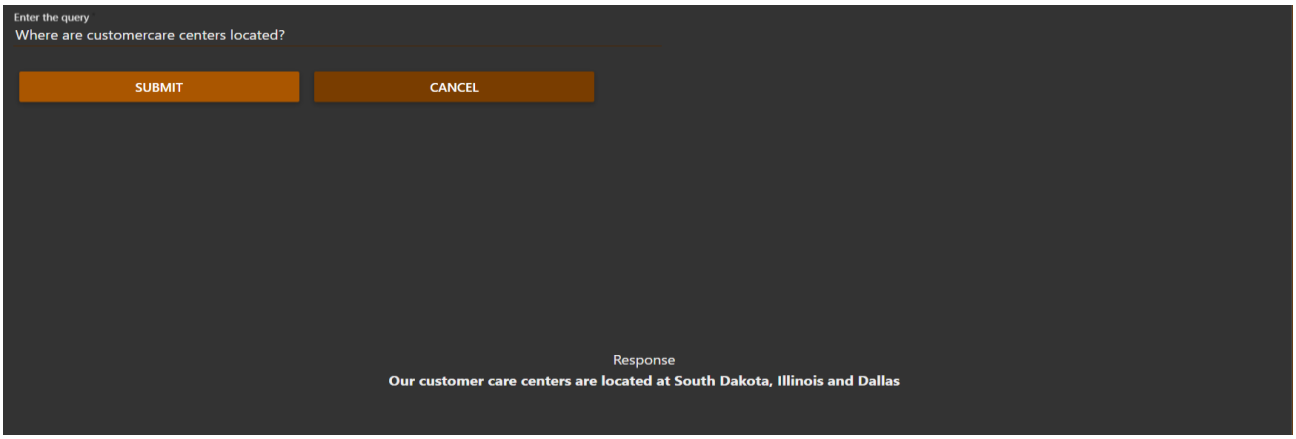


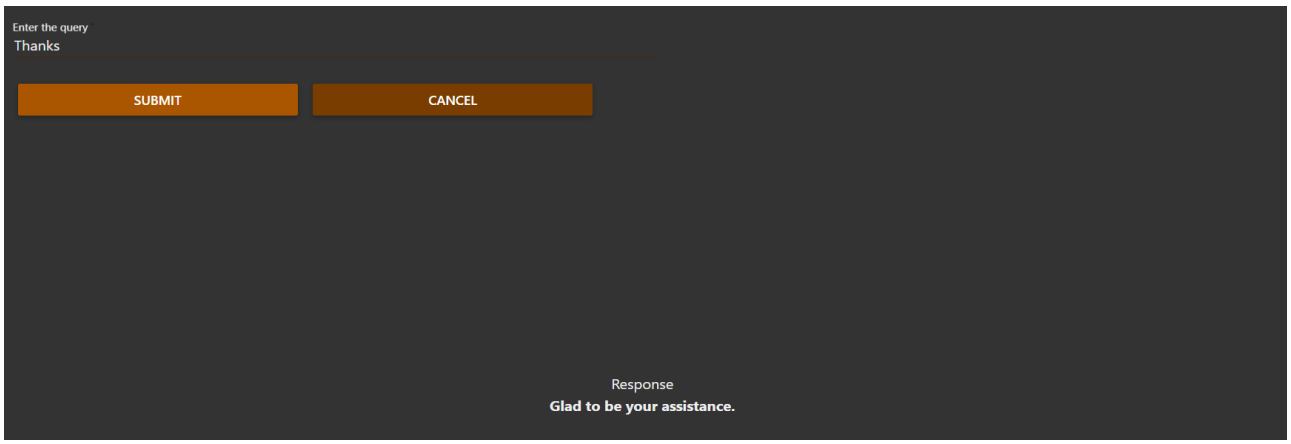

CoffeeBot
Enter the query
What is the price of the product?
SUBMIT
CANCEL
Response
The product price is fifty dollars. You can buy it from www.philips.com


Enter the query
What is cappuccino?
SUBMIT
CANCEL
Response
A cappuccino is an espresso-based coffee drink that originated in Italy, and is traditionally prepared with steamed milk foam. Variations of the drink involve the use of cream instead of milk, and flavoring with cinnamon or chocolate powder.


Enter the query
How to use first time?
SUBMIT
CANCEL
Response
Never GLYPHll the water tank with warm, hot, sparkling water or any other liquid, as this may cause damage to the water tank and the machine. 7 Lift the coGLYPHee bean hopper lid. 12 Switch the power button to "|". The “ ” button GLYPH ashes. Yellow 13 Press the “ ” button to turn on the machine. 14 The control panel indicates that the circuit must be primed. Note: By keeping the “ ” button pressed for more than 8 seconds, the machine enters the demo mode. To exit the demo, turn the machine oGLYPH and on again using the power button. When using the machine for the GLYPHrst time, the following activities need to happen: 1) The machine will prime the circuit; 2) The machine will perform an automatic rinse/self-cleaning cycle. 3) You need to perform a manual rinse cycle. You can only adjust the coGLYPHee grinder settings when the machine is grinding coGLYPH ee beans. 1 Place a cup under the dispensing spout. Press the “ ” button to brew an espresso. 2 While the machine grinds coGLYPHee, press and turn the grinder adjustment knob placed inside the coGLYPHee bean hopper one notch at a time. Use the special coGLYPHee grinder adjustment key supplied. You will taste the diGLYPHerence after brewing 2-3 cups of coGLYPH ee. 1 2 3 The reference marks inside the coGLYPHee bean hopper indicate the grind setting. There are 5 diGLYPHerent grind settings to choose from, from position 1 ( ) for coarse grind - lighter taste to position 2 ( ) for GLYPHne grind -stronger taste. If coGLYPHee is watery or is brewed slowly, change the coGLYPH ee grinder settings. Choose your favourite coGLYPHee blend and adjust the amount of coGLYPH ee to be ground according to your personal taste. You can also select the preground coGLYPH ee function. Selection must be made prior to selecting coGLYPH ee. You can choose from 5 options by pressing the “ ” button. Each time the button is pressed, the aroma changes by one degree, according to the selected amount: = extra mild aroma = mild aroma = medium aroma = strong aroma = extra strong aroma = pre-ground coGLYPH ee Green Green The height of the dispensing spout can be adjusted to better GLYPH t the dimensions of the cups that you wish to use. Move the dispensing spout up or down with your GLYPHngers to adjust its height as shown in the GLYPH gure. The recommended positions are: For the use of small cups; For the use of large cups. Two cups can also be placed under the dispensing spout to brew two cups of espresso or long espresso at the same time. The machine allows you to adjust the amount of brewed coGLYPH ee according to your taste and the size of your cups. Each time the “ ” or “ ” button is pressed, the machine brews a pre-set amount of coGLYPHee. Each button may be individually programmed for a speciGLYPHc brew setting. 1 Place a cup under the dispensing spout. Green Green 2 Keep the “ ” button pressed until the “ MEMO ” icon appears on the display to program an espresso, or do the same with the “ ” button to program a long espresso. Then release the button. The machine is in programming mode and starts brewing the selected product. 3 Press the “ ” button as soon as the desired amount of espresso or coffee is reached. The previously selected button (“ ” or “ ”) is now programmed; each time it is pressed, the machine will brew the same amount of espresso or long espresso that was just programmed. Green Before brewing coGLYPHee, make sure that there are no warnings shown on the control panel, and that the water tank and coGLYPHee bean hopper are GLYPH lled. 2 To brew an espresso or a long espresso, press the “ ” button to select the desired aroma. Green Green In this operating mode, the machine automatically grinds and doses the correct amount of coGLYPHee. Brewing two cups of espresso or long espresso requires two grinding and brewing cycles, automatically


Enter the query
How to adjust froth milk limit?
SUBMIT
CANCEL
Response
After using the milk carafe, clean it as described in the "Cleaning and Maintenance" chapter. Each time this function is selected, the machine dispenses a preset amount of frothed milk into the cup. The machine allows you to adjust the amount of frothed milk according to your taste and the size of your cups. 1 Fill the carafe with milk and place it into the machine. 2 Pull out the carafe dispensing spout to the right up to the “ ” icon. Place a cup under the dispensing spout. 3 Press the “ ” button. The machine shows this display. Green 4 Press and hold the “ ” button to select frothed milk until the sequence described in step 5 is displayed. Then release the button. The machine is now in programming mode. 5 The machine reminds you to insert the carafe and pull out the carafe dispensing spout by showing the following icons. Green Green Green 6 This icon is displayed during the preheating time required by the machine. Green Green Green 7 When the desired amount of frothed milk is reached, press the “ ” button. The button is now programmed. Every time it is pressed, the machine will brew the same amount of frothed milk that was programmed. You can also clean individual parts in the dishwasher. 10 Insert the GLYPHtting (F) into the milk frothing device by pressing it up to its limit. 11 Insert the milk frothing device (D) into the support (E). C 12 Attach the top (C) to the carafe dispensing spout. B 13 Insert the GLYPHtting (B) into the suction tube. A 14 Insert the suction tube with the GLYPHtting (A) into the milk frother. 15 Insert the dispensing spout into the top part of the carafe. A B 16 If you cannot install the dispensing spout at the top of the carafe, the pin is in the wrong position (B). Before installing the dispensing spout, manually push the pin to the (A) position. 17 Insert the lid. 18 Attach the top of the milk carafe, ensuring it is locked into place. Clean the brew group at least once a week. 1 Turn oGLYPH the machine by pressing the “ ” button. Wait until the “ ” button GLYPHashes and unplug the power cord. 2 Raise the coGLYPHee dispensing spout and remove the drip tray and coGLYPH ee grounds drawer by pressing the side buttons. 4 To remove the brew group, press the «PUSH» button and pull it by the handle. Pull it out horizontally without turning it. 3 Open the service door. 3 1 2 2 6 Remove the coGLYPHee residues drawer and wash it thoroughly. 5 Thoroughly clean the coGLYPHee duct outlet with the special cleaning tool supplied with the machine or with a spoon handle. Make sure that the cleaning tool is inserted as shown in the GLYPH gure. 7 Thoroughly wash the brew group with fresh water and carefully clean the upper GLYPH lter. After using the milk carafe, clean it as described in the "Cleaning and Maintenance" chapter. You can prepare a cappuccino with pre-ground coGLYPH ee. Press the “ ” button to select pre-ground coGLYPHee and pour pre-ground coGLYPHee into the compartment. Each time the “ ” button is pressed, the machine dispenses a pre-set quantity of cappuccino into the cup. The machine allows you to adjust the amount of cappuccino brewed according to your taste and the size of your cups. 1 Fill the carafe with milk and place it into the machine. 2 Pull out the carafe dispensing spout to the right up to the “ ” icon. Place a cup under the dispensing spout. 3 Press and hold the “ ” button until the sequence shown in step 4 is displayed. The machine is now in programming mode. Green Green Green Green 4 The machine reminds you to insert the carafe and pull out the carafe dispensing spout by showing the following icons. 5 This icon is displayed during the preheating time required by the machine. 6 When the machine shows this icon, the machine starts dispensing frothed


Enter the query
Where are customercare centers located?
SUBMIT
CANCEL
Response
Our customer care centers are located at South Dakota, Illinois and Dallas


Enter the query
Thanks
SUBMIT
CANCEL
Response
Glad to be your assistance.

7. ADVANTAGES & DISADVANTAGES

Advantages:

- The Chatbot responds to questions that are not manually answered.
- It responds to questions intelligently by searching for them in manual.
- It returns relevant sections from manual to help solve problems.
- We can improve results by training data to our choice of parameters.
- No need to search answers in manual.
- Easy to use and has a friendly user interface to work with.

Disadvantages:

- Requires all services that handles requests and renders responses.
- Requires some complex integration of services.
- Requires premium plan to train data with images.
- If one service fails, then the whole integration is disrupted.

8. APPLICATIONS

- The chatbot can be used to answer questions that are not in predefined question set.
- Several companies can use the chatbot service and deploy it. This would save time and money as it can answer questions directly.
- The service can be provided to users in application along with other features.

9. CONCLUSION

With the help of Smart Document Understanding feature of Watson Discovery, Chatbot that responds to queries that are out of scope of predefined question set. The experimental investigations showed the integration of different IBM cloud services. The results show that the responses from the Chatbot were relevant and helpful.

Although, the Chatbot demands complex integration of services it can be deployed easily to leverage the Smart Understanding of product manuals. In conclusion, this project solves the problem of only returning response of "Would you like to speak to a customer representative?".

10. FUTURE SCOPE

For future research can be guided to improve relevant results and response time.
Simplification of integration of services can be achieved by reduction of api keys.
More attractive user-interface design can implement with help of node-red dashboard.
There can be storage of responses so that every time it should not search for same answers to already asked questions.
More features of Watson Assistant can be implemented in Node-red so that there can be direct change to node-red flow.

11. BIBLIOGRAPHY

Below are the links that were referred to build the ChatBot:

i. To create meeting agenda
ii. To create project scope document
iii. Knowing Slack
iv. Knowing Zoho Writer
v. Creating IBM cloud account
vi. Getting started with node-red
vii. About Watson Assistant
viii. Building sample chatbot with Assistant
ix. Using Webhook with Watson Assistant
x. Search skills for Watson Assistant
xi. Getting started with Cloud Functions
xii. Setting up Cloud Functions
xiii. Setting up Watson Discovery
xiv. Using Smart Document Feature of Watson Discovery

12. APPENDIX

A. Source Code

Cloud Functions Action :

```
/**
 *
 * @param {object} params
 * @param {string} params.iam_apikey
 * @param {string} params.url
 * @param {string} params.username
 * @param {string} params.password
 * @param {string} params.environment_id
 * @param {string} params.collection_id
 * @param {string} params.configuration_id
 * @param {string} params.input
 *
 * @return {object}
 *
 */
const assert = require('assert');
const DiscoveryV1 = require('watson-developer-cloud/discovery/v1');

function main(params) {
  return new Promise(function (resolve, reject) {

    let discovery;

    if (params.iam_apikey){
      discovery = new DiscoveryV1({
        'iam_apikey': params.iam_apikey,
        'url': params.url,
        'version': '2019-03-25'
      });
    }
    else {
      discovery = new DiscoveryV1({
        'username': params.username,
        'password': params.password,
        'url': params.url,
        'version': '2019-03-25'
      });
    }

    discovery.query({
      'environment_id': params.environment_id,
      'collection_id': params.collection_id,
      'natural_language_query': params.input,
      'passages': true,
      'count': 3,
      'passages_count': 3
    }, function(err, data) {
      if (err) {
        return reject(err);
      }
      return resolve(data);
    });
  });
}
```