

Project Report Topic: Intelligent Customer Helpdesk with Smart Document

Understanding Category: Machine Learning/Artificial Intelligence

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Contents:

1. INTRODUCTION

1.1. Overview

1.2. Purpose

2. Analysis Report

2.1. Present Problem

2.2. Proposed Solution

3. THEORETICAL ANALYSIS

3.1. Block diagram

3.2. Hardware/Software requirements

4. PROCEDURAL ANALYSIS

5. FLOWCHART

6. RESULTS

7. ADVANTAGES AND DISADVANTAGES

8. APPLICATION

9. CONCLUSION

10. FUTURESCOPE

11. BIBLIOGRAPHY

APPENDIX Source Code

1. INTRODUCTION

1.1.Overview

A customer helpdesk, chatbot, is designed for Ecobee3. Ecobee3 is a smart thermostat which is a smart home device. The chatbot helps the user to get information by asking a question. This chatbot accesses an unstructured document (user manual) of Ecobee3, by smart understanding of the document it replies to any query related to Ecobee3.

1.2.Purpose

The main aim is to enhance the efficiency of the chatbot (CustomerHelpdesk) by incorporating Smart Document Understanding. So that all questions get an answer.

2. Analysis Report

2.1.PresentProblem

The general chatbots are able to help customers with specific queries ,like "What is the store location?" , "What is the operation time?" , "Book me an appointment." and soon. They are unable to give details about a particular device and its operations .When the question is outside the scope it is unable to reply.

2.2.ProposedSolution

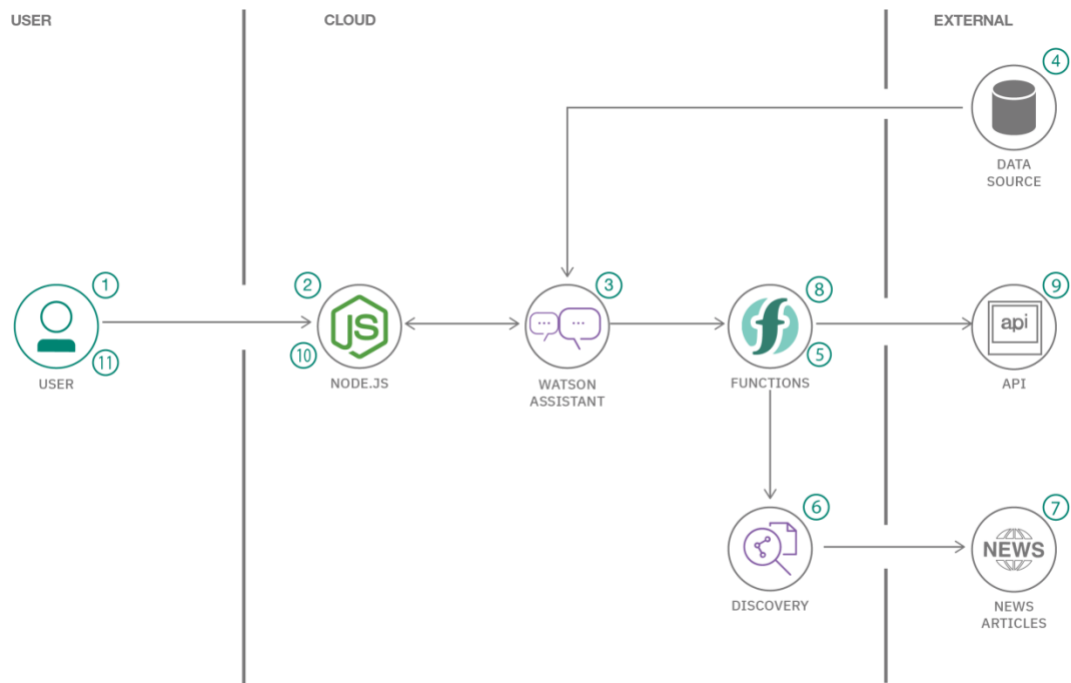
This project deals with those queries which are out of the set of predefined queries. One of the major part of these kind of queries are about a device specification and handling assistance of the device.

Usually, facts about operating a device is available in the user manual. With the help of Watson Discovery (an IBM cloud service), we are able to smartly analyze the user manual to obtain the important parts of the manual and divide it subtitle wise.

Therefore, any query regarding the operations of the device gets a reply from the Helpdesk after it has accessed the user manual using Smart Document Understanding.

3. THEORITICAL ANALYSIS

3.1. Block Diagram



3.2. Hardware/Software Requirements

We have to build an IBM Cloud account. By creating IBM Cloud account we are eligible to create various IBM Services. For this project, we are required to build Watson Discovery Service, IBM Cloud function action, Watson Assistant Service and Node-Red App. Also, a document of the user manual of ecobee3 is needed, which is fed to Watson Discovery Service.

4. PROCEDURAL ANALYSIS

1. Create an IBM Cloud account.

To create IBM Cloud account, go to <https://www.ibm.com/cloud> Click on Create an account.
If an account exists then log in with the IBMid and password.
After logging in, check Dashboard for present Services.

2. Create Watson Discovery.

Open the catalog option in IBM Cloud account and select Services. Under the Artificial Intelligence(AI) section, Discovery Service can be found.
Select a region and plan and configure the service. Then click on Create.
Discovery Service will be created successfully.
Copy the "url" and "api key" value, these will be required in cloud function action.
Then click on Launch Watson Discovery to launch the Discovery Service.

3. Create Watson Assistant.

Open the catalog option in IBM Cloud account and select Services. Under the Artificial Intelligence(AI) section, Watson Assistant Service can be found.
Select a region and plan and configure the service. Then click on Create.
Assistant Service will be created successfully.
Copy the "url" and "api key" values, these will be required in Node-Red flow.
Then click on Launch Watson Assistant to launch the Assistant Service.

3. Configure Watson Discovery

Click on Upload your own data to upload a new dataset (any unstructured file).

Go to Configure data after opening the dataset.

In Identify labels, label the data on the basis of fields like "title", "subtitle", "text", "footer" and so on.

Then the document is split in the Manage Fields on the basis of "subtitle" in this case, by selecting split document on each occurrence of "subtitle".

Then click Apply changes to collection and upload the original document to save the changes.

The Overview page of the document after field identification and splitting.

Now we see that the original document is split into 129 documents. Also, Sentiment Analysis is seen. Build your own query helps to test the accuracy.

Copy the api values of "collection ID" and "environment ID", these will be required in the cloud function action (parameter).

4. Create IBM Cloud function action.

The web action that will make queries against the Discovery collection (data) is built. Go to IBM Cloud Dashboard and click on Create Resources then select functions.

Click on Actions on the left panel. Then select Create and provide a unique action name.

Click on Code tab. A certain code is written which, connects function to the Discovery Service, makes the query against the collection and returns the result.

The code is provided under the name of qwerty.js in Source Codes (Appendix).

Click on Parameters tab.

The values of following parameters, "url", "environment_id", "collection_id" and "iam_apikey" can be accessed from the Discovery Service. This helps the action to connect to the Discovery Service. Click on Endpoints tab.

Click on Enable as Web Action. This generates an URL of cloud function action.

Copy this URL, this will be required in Watson Assistant as webhooks.

4. Configure Watson Assistant.

Launch Watson Assistant. Then go to Skills tab and select Create Skills.

Two types of skills can be made, Dialog and Search (only for Plus plan). Select Dialog Skill.

Select Create skill and provide a name and description of the skill. Skills can also be imported using Import skills and default predefined skill can be used using Use sample skill.

Intents is a goal or purpose of user's questions. Entities is a specific detail of questions and statements. Dialogue puts intent and entity together to provide interaction.

We create respective Intents and Entity. Also, a dialogue flow is created.

The dialogue box "heaters_guide " is for customer interaction using the user manual.

In Skills tab, click on View API details of the skill. Copy the "Skill ID", this will be required in Node-RED flow. Open the Assistants tab and click on Create Assistant.

Give a name to the assistant. Add the created skill to the assistant.

So, the assistant acquires the skill created and is able to answer the queries.

To turn on Webhooks, click on Options.

Paste the url of cloud function action into the Webhooks' url section. It is a must to end the url in webhook with ".json". Therefore, now the assistant is linked to the cloud function using Webhooks. Whereas the cloud function action is connected to the Watson Discovery Service. Thus, the assistant is indirectly connected to Discovery Service using Cloud function.

Customize the "heaters_guide" dialogue and turn on the Webhooks option.

The query of the user is passed through the key "input" to Discovery Service. The response from Discovery service is captured in variable "\$webhook_result_1".

5. Build Node-RED flow to integrate all services together.

Go to Create Resource and search for Node-RED App.

Open the Node-RED App. Provide a unique name for the app or accept the default name.

Provide IBM Cloud API key or generate a new one.

Also provide memory per instance (in this case 64Mb).

Select region to create the DevOps toolchain and select Create.

Initially, the Status in Delivery Pipelines will show "in progress". The Deploy stage will take time to get completed. Once the Deploy stage is passed, the status will turn to "success".

The details of the application page after deploy stage is passed. The newly created Node-RED App will be listed under the App Section in Resource list.

Also a corresponding entry under the Cloud Foundry App section can be seen.

Click to open the App URL. The Node-RED editor will open.

6. Build a web dashboard using Node-Red flow.

Go to Settings and then Install Tab and search for Node-red-dashboard.

Install the Node-red-dashboard.

By installing node-red-dashboard, "form" node becomes available.

The "assistant" node is used to link the flow with the assistant (Customer Help Desk).

The Workspace ID, Service endpoint and API key are the Skill ID, URL and API key respectively of the Watson Assistant.

Taking various other nodes from palette, the desired web dashboard is built.

"form" node helps to build the query section for the user. We use two "text" node , one to display the question being asked by the user and another to display the answers.

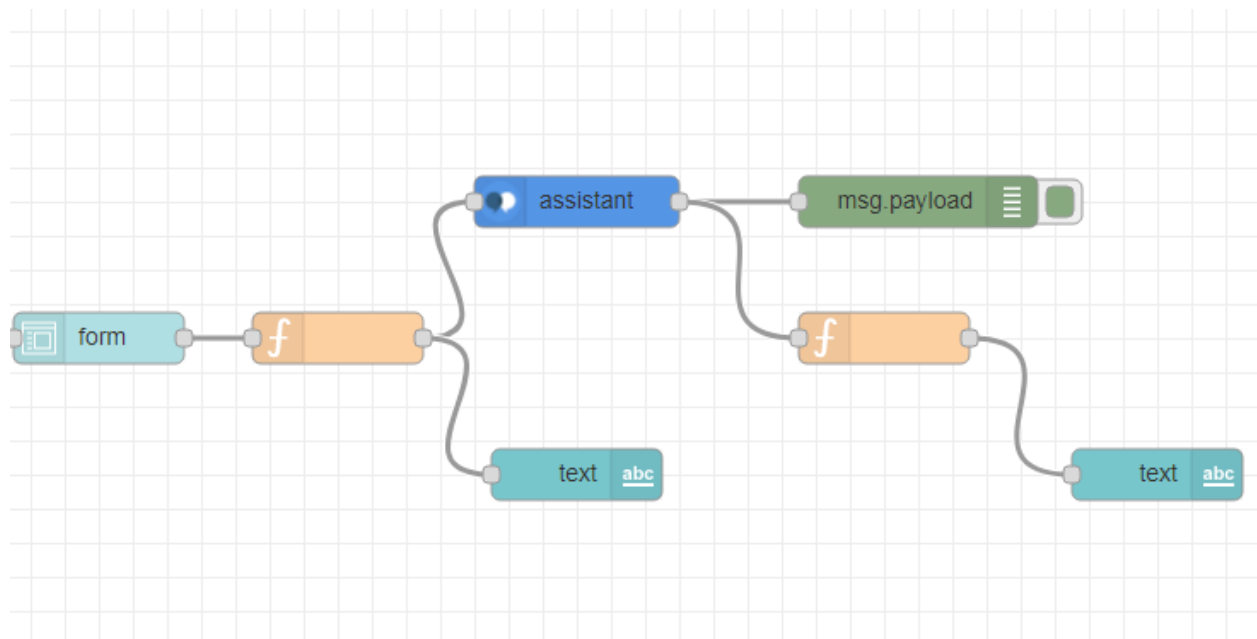
"assistant" node links the flow with the Watson Assistant (Customer Help Desk) to feed questions and obtain answer from it.

There are two "function" nodes, one named as "input parsing" for feeding the question text to the assistant and the other named as "parsing" which converts output of assistant from json to text format.

"debug" node is used to help the designer debug the outputs.

The two "function" nodes have to be coded in order to extract text from json. The code is given in Source Code (Appendix)

5. FLOWCHART



6. RESULTS

Response of Customer Help Desk to few demo queries are as follows-

Customer Service Help Desk

chatbot

Enter Your Queries *

hi

SUBMIT

CANCEL

display

text

hi

answer

text

Hello. How can I help you?

Customer Service Help Desk

chatbot

Enter Your Queries *

how to turn on the heater

SUBMIT

CANCEL

display

text

how to turn on the heater

answer

text

If you have a furnace or boiler installed: 1. Select the heating menu. Configure the heater type: Furnace: Optimizes ecobee3 for systems using forced air Boiler: Optimizes your ecobee3 for systems using radiators or in-floor heat. 3. Touch Next. You will be returned to the Equipment configuration menu. This menu lets you test the wiring and connections of the devices connected to the thermostat by turning them on or off. The equipment will turn off when you exit the menu. Warning: Compressor protection and minimum run-time features are not enforced while in this mode. The HVAC System settings depend on the type of system you have. Depending on your system, one or more the following options are shown: Cool: Turn on the air conditioner when the current temperature rises above the set temperature. Heat: Turn on the heat when the current temperature drops below the set temperature. Auto: Activate the heating or cooling system as required to keep your home within the configured range of set temperatures. Aux: Only use the auxiliary or backup heat source to maintain the heat set point temperature. This option only appears if auxiliary heat is configured in the Equipment menu. Off: Turn the system off. When the system is off, only the current temperature will be displayed on the Home screen. On Thermostat and Mobile: Select Main Menu > System > HVAC System On Web: Select System tile > HVAC

7. ADVANTAGES AND DISADVANTAGES

Advantages:

1. Fast Response
2. Multiple queries can be addressed
3. Reduction in manual labour
4. 24*7 availability.

Disadvantages:

1. Accuracy is compromised at times
2. Limited reply.

8. APPLICATION

This chatbot, Customer Helpdesk, is mainly applicable for any device operation query.

Instead of searching for details about the operations of a device from its user manual or

waiting for reply from customer care representatives, the chatbot helps to find answers

by just raising a query about any specific topic of the device.

9. CONCLUSION

The intelligence of Customer Helpdesk is increased using Smart Document

Understanding. To incorporate the various operations in the Chatbot, functions like

Watson Assistant, Watson Discovery, Cloud function action and Node-RED Application have been used.

Each of the services helps to build different sections of the chatbot. Integration of different sections is possible by the use of Node-RED. Also, it provides an UI for the customer interaction.

The results obtained show that the Customer Helpdesk is able to communicate with the

user like a normal chatbot. In addition to this, Customer Helpdesk is able to give details about the device operations and configurations.

10. FUTURE SCOPE

Device operation related answers are obtained but there is limited field of reply. Higher number of documents (data) feeding can lead to more accuracy. A personalized or more user friendly Chatbot is seen as the future scope to this system

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2. <https://www.youtube.com/watch?v=-yniuX-Poyw&feature=youtu.be>
3. <https://developer.ibm.com/tutorials/how-to-create-a-node-red-starter-application/>
4. <https://drive.google.com/file/d/1pKM2It793hv9RIBAWl4-VGihMXCTF4vI/view>
5. <http://www.iotgyan.com/learning-resource/integration-of-watson-assistant-to-node-red>
6. <https://drive.google.com/file/d/15s07ymOgBMInOf7mabqla5mLiAtlVJ31/view>
7. <https://www.youtube.com/watch?v=Jpr3wVH3FVA&feature=youtu.be>
8. <https://cloud.ibm.com/>

APPENDIX

SOURCE CODES

please refer to the following link

<https://github.com/Avishek023/Intelligent-Customer-Help-Desk-with-Smart-Document-Understanding--SB5150>