

**Intelligent Customer Help Desk with Smart Document
Understanding**

PROJECT REPORT

TITLE : Intelligent Customer Help Desk with Smart
Document Understanding

CATEGORY : ARTIFICIAL INTELLIGENCE DEVELOPER

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1. Introduction:

1.1 Project Overview:

Artificial Intelligence(AI) is a science of making intelligent machine that are able to learn rules for using information in order to reach approximate conclusions. In this project we are going to create a chat bot which is intelligent conversational system and able to process human language. They themselves provide a platform for promotions of the products and services in online. For example, sir i is an intelligent agent used by Apple, reacting to the user spoken language. In the recent years, we are starting to see a variety of chat bot applications across industries and business processes using further advanced artificial intelligence technologies, as well as a growing number of technology platforms to facilitate them.

1.2 Project Requirements:

The minimum project requirements for chatbots are follows as:

- OS: Mac so high sierra, Windows 8.1, Windows 10
- Processor: 1.8 GHz Intel Core i5 or greater
- Memory: 8GB RAM
- Graphics: Intel HD GGraphics 6000 1536 MB
- DirectX: Version 11
- Network: Broadband Internet connection
- Storage: 2GB available space

1.3 Functional Requirements:

In Functional Requirements ,there are similar cases that a bots can respond to its input function,

- If the chat bot does not understand the input, it should ask for more simplified input
- If the chat bot understands the input,it should respond with correct information
- If the chat bot needs more information to find an answer, it should ask for more information
- The chat bot should use a text recognition API to understand the input for all the cases
- The chat bot can send a data as a text message
- The bot should able to query the data from the API
- The chat bot should create private cloud or virtual machine instances from user input

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1.4 Technical Requirements:

The Technical requirements of the projects comprises as

- Github account
- Github Tool
- Integrated Development Environment(IDE)
- IDLE
- Document writer
- Jupyter notebook

1.5 Software Requirements:

The software requirements for the chat bot applications are:

- Python
- Artificial Intelligence
- IBM Watson Services
- IBM Cloud Platform

1.6 Project Scope:

The aim of the project is to develop the chat bot which utilizes the common sense database when interacting with the user. we will develop the chat bot that can incorporate customer simple question such as hours ,store location ,directions and making an appointment.

2. Literature Survey:

2.1 Proposed Problem:

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 preddetermined question set, the option is typically to tell the customer the question isn't valid or offer to speak to a real person.

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2.2 Proposed Solution:

- Create IBM Cloud Services
- Configure Watson Assistant
- Configure Watson Discovery
- Create IBM Cloud Functions action
- Create a Node-red Flow to connect all the services together
- Create Flow and configure the node
- Deploy and run the node app

Create IBM Cloud Services:

Create the following Services

- Watson Discovery
- Watson Assistant
- Watson Cloud Functions
- Node-red

Configure Watson Assistant:

Launch the Watson Assistant tool and create a new dialog skill. Select the Use sample skill option as your starting point. This dialog skill contains all of the nodes needed to have a typical call center conversation with a user.

Add new intent

The default customer care dialog does not have a way to deal with any questions involving outside resources, so we will need to add this. Create a new intent that can detect when the user is asking about operating the Product. From the Customer Care Sample Skill panel, select the Intents tab.

Click the Create intent button. Name the intent #Product_Information, and at a minimum, enter the following example questions to be associated with it.

Create new dialog node

Now we need to add a node to handle our intent. Click on the Dialog tab, then click on

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the drop-down menu for the Small Talk node, and select the Add node below option.

Name the node "Ask about product" and assign it our new intent. This means that if Watson Assistant recognizes a user input such as "how do I set the time?", it will direct the conversation to this node.

Enable webhook from Assistant

Set up access to our Webhook for the IBM Cloud Functions action you created in

Enter the public URL endpoint for your action. Return to the Dialog tab, and click on the Ask about product node. From the details panel for the node, click on Customize, and enable Webhooks for this node: Click Apply.

The dialog node should have a Return variable set automatically to \$webhook_result_1. This is the variable name you can use to access the result from the Discovery service query.

Test in Assistant Tooling

From the Dialog panel, click the Try it button located at the top right side of the panel. Enter some user input: Note that the input "how do I turn on the heater?" has triggered our Ask about product dialog node, which is indicated by the #Product_Information response. And because we specified that \$webhook_result_1.passages be the response, that value is displayed also. You can also verify that the call was successfully completed by clicking on the Manage Context button at the top right. The response from the Discovery query will be stored in the \$webhook_result_1 variable.

Configure Watson Discovery:

Import the document

Launch the Watson Discovery tool and create a new data collection by selecting the Upload your own data option. Give the data collection a unique name. When prompted, select and upload the ecobee3_UserGuide.pdf file located in the data directory of your local repo.

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Annotate with SDU

Now let's apply SDU to our document to see if we can generate some better query responses. From the Discovery collection panel, click the Configure data button (located in the top right corner) to start the SDU process. The goal is to annotate all of the pages in the document so Discovery can learn what text is important, and what text can be ignored.

Create IBM Cloud Function Actions:

Now let's create the web action that will make queries against our Discovery collection. Start the IBM Cloud Functions service by selecting Create Resource from the IBM Cloud dashboard. Enter functions as the filter, then select the Functions card:

From the Functions main panel, click on the Actions tab. Then click on Create. From the Create panel, select the Create Action option.

On the Create Action panel, provide a unique Action Name, keep the default package and select the Node.js 10 runtime.

Click the Create button to create the action.

Once your action is created, click on the Code tab:

In the code editor window, cut and paste in the code from the disco-action.js file found in the action's directory of your local repository. The code is pretty straight-forward - it simply connects to the Discovery service, makes a query against the collection, then returns the response.

If you press the Invoke button, it will fail due to credentials not being defined yet. We'll do this next. Select the Parameters tab:

Add the following keys:

- url
- environment_id
- collection_id
- iam_apikey

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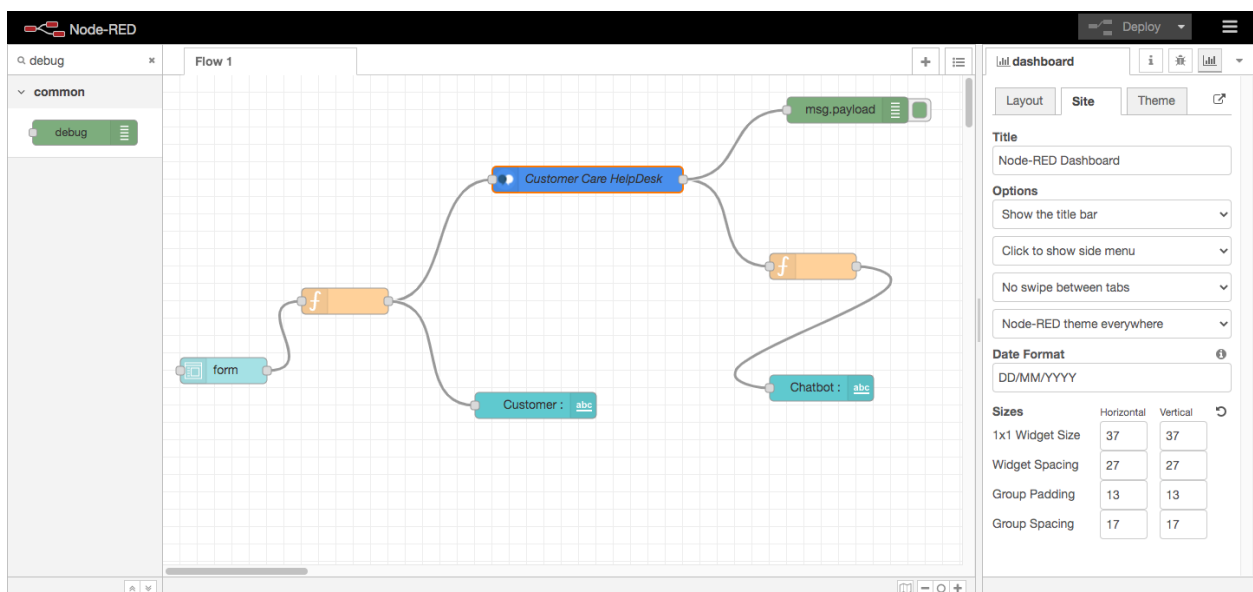
For values, please use the values associated with the Discovery service you created in the previous step. Now that the credentials are set, return to the Code panel and press the Invoke button again. Now you should see actual results returned from the Discoveryservice. Next, go to the Endpoints panel.

Click the checkbox for Enable as Web Action. This will generate a public endpoint URL. Take note of the URL value, as this will be needed by Watson Assistant in a future step. To verify you have entered the correct Discovery parameters, execute the provided curl command. If it fails, re-check your parameter values.

Create Node-red Flow and Configure the Node:

At first go to manage palette and install dashboard. Now, Create the flow with the help of following node:

- Inject
- Assistant
- Debug
- Function
- UI-Form
- UI-Text



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Deploy and Run the Node App:

Deploy the Node Red flow By this link

<https://node-red-mjpf.eu-gb.mybluemix.net/ui>

Customer Care HelpDesk

Chatbot

Enter your Input +
Hello

SUBMITCANCEL

Customer : Hello

Chatbot :
Good afternoon. How can I help?

3. Experimental Investigations :

Watson Discovery:

OverviewErrors and warnings (0)Search settings

130documents0 documents failedView detailsCreated on6/1/2020 11:35:11 pm EDTLast updated6/1/2020 11:35:11 pm EDTUpload documents

Identified 5 fields from your data

- footer
- subtitle
- table_of_contents
- text
- title

Need to identify more fields? [Add fields](#)

Added 4 enrichments to your data

Entity Extraction0.3°C (4) | 0.5°F (4) | 10 °F (4) | 20 min (3) | 4-digit (3)

Concept TaggingHeat (1.4) | Internet (1.2) | HVAC (1.1) | Temperature (1.1) | Netscape (1.0)

5 enrichments available. [Add enrichments](#)

Sentiment Analysis54% positive34% neutral13% negative

Category Classificationtechnology and com...operating systems

Now you're ready to query!

Entities of type **Quantity** which have positive sentimentRun

Top people related to **/technology and computing/operating systems**Run

Most common entity types and their top entitiesRun

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Cloud Functions:

The screenshot displays the IBM Cloud Functions console for a function named 'discovery function'. The left sidebar shows navigation options: Code, Parameters, Runtime, Endpoints, Connected Triggers, Enclosing Sequences, and Logs. The main area is divided into two panes. The left pane shows the code for the function, which is a Node.js script using the 'assert' and 'watson-developer-cloud/discovery/v1' modules. The right pane shows the activation results, including the activation ID, matching results, passages, and enriched text.

Code Node.js 10 **Invoke with parameters** **Invoke**

```
1- /**
2-  *
3-  * @param {object} params
4-  * @param {string} params.iam_apikey
5-  * @param {string} params.url
6-  * @param {string} params.username
7-  * @param {string} params.password
8-  * @param {string} params.environment_id
9-  * @param {string} params.collection_id
10-  * @param {string} params.configuration_id
11-  * @param {string} params.input
12-  *
13-  * @return {object}
14-  */
15-
16-
17- const assert = require('assert');
18- const DiscoveryV1 = require('watson-developer-cloud/discovery/v1');
19-
20- /**
21-  *
22-  * main() will be run when you invoke this action
23-  *
24-  * @param Cloud Functions actions accept a single parameter, which must be
25-  *
26-  * @return The output of this action, which must be a JSON object.
27-  */
28- */
```

Activations **Collapse** **Clear**

discovery function 579 ms 02/06/2020, 19:41:21

Activation ID:
c61dcd864d6f4a0e9dcd864d6fca0e73

Results:

```
{
  "matching_results": 130,
  "passages": [],
  "results": [
    {
      "enriched_text": {
        "categories": [
          {
            "label": "/business and industrial/energy",
            "score": 0.69535
          },
          {
            "label": "/business and industrial/green",
            "score": 0.643533
          },
          {
            "label": "/business and industrial/business",
            "score": 0.633224
          }
        ],
        "concepts": [
          {
            "dbpedia_resource": "http://dbpedia.org/resource/Fahrenheit",
            "relevance": 0.409247
          }
        ]
      }
    }
  ]
}
```

Watson Assistant:

The screenshot displays the IBM Watson Assistant console for a dialog named 'Customer Care HelpDesk'. The left sidebar shows navigation options: Intents, Entities, Dialog, Options, Analytics, Versions, and Content Catalog. The main area shows the dialog flow with nodes for 'Opening', 'What are your hours?', 'Where are you located?', 'I want to make an appointment', and '#General_Greetings'. The right pane shows a chat interface with a welcome message and a text input field.

IBM Watson Assistant Lite **Upgrade**

Customer Care HelpDesk **Save new version**

Try it out **Clear** **Manage Context**

Welcome to the customer care chat bot.
How can I help you?

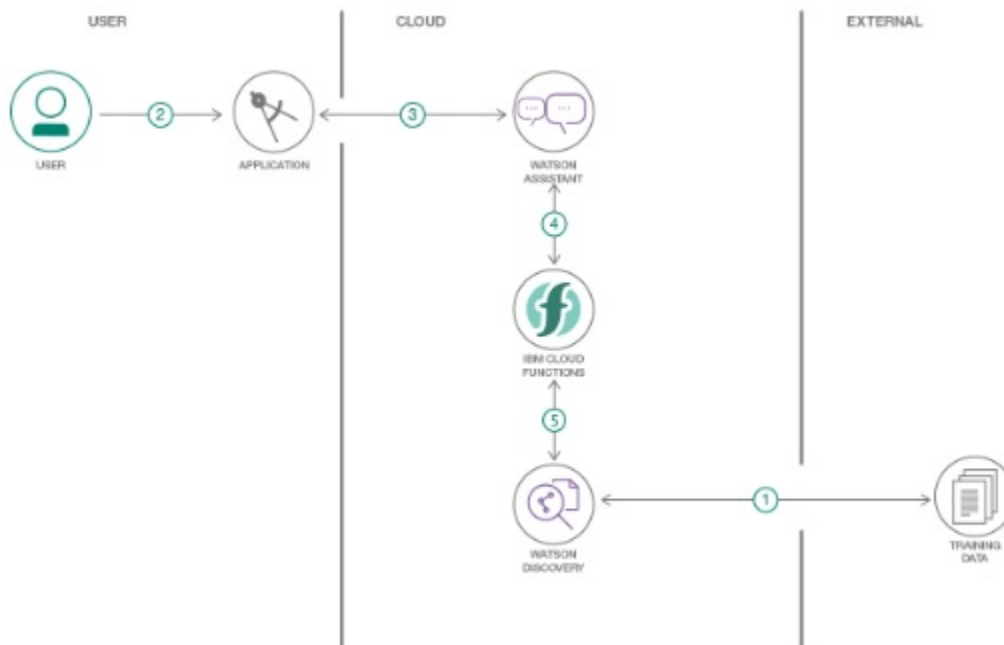
Use the up key for most recent

Enter something to test your assistant

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4. Project Schedule:



This is the flow how we are going to do the tasks for the proposed problems.

- The document is annotated using Watson DiscoverySDU
- The user interacts with the backend server via the app UI. The frontend app UI is a chatbot that engages the user in a conversation.
- Dialog between the user and backend server is coordinated using a Watson Assistant dialogskill.
- If the user asks a product operation question, a search query is passed to a predefined IBM Cloud Functionsaction.
- The Cloud Functions action will query the Watson Discovery service and return the results.

4.1 Project Deliverables:

Every project should have a clear end with a correct handover of the product, user information and responsibilities

- Chat bot target customer engagement
- Depends customer loyalty as its responds

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- Chat bot supports hundreds of conversation in parallel
- It also offers personalization
- It responds and enhances the chances of business development opportunities
- Chat bot should be available for 24/7

4.2 Project Team:

Every chat bot team consists of three roles

1. **Owner:** The product owner handles the day to day progress and interaction within the bot team and other stakeholders.
2. **Flow Designer:** This one the design the chat bot and conversation with the flow of AI platform.
3. **Development:** If you do not want to integrate any external services you might even create a bot with a developer.

5. IBM Watson

5.1 IBM Watson Usecases:

Main Usecases for a chatbots are

- Virtual Assisant
- Customer service
- E-commerce
- Help desk support
- Call center support
- Entertainment

5.2 Watson Assistant:

- Natural Language Processing
- Enterprise Aritificial Intelligence
- Delivers Personalized and proactive customer service
- No Coding Required

5.3 Chatbots Design:

1. **Type of chatbot:** Customer Service
2. **Main user of chatbot:** Racetrack patrons
3. **Engage with more company:** Make it less for overwhelming for new guests.

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Answering a typical questions can make life easier

4. **Types of informations:** Answer to FAQ's and betting definitions like hours, locations
5. **Functionality:** Information for now with potential to add placing bets in a future release

5.4 Goals for chatbots:

Intents purpose of the user's can answer simple questions

- Greeting
- Store locations
- Hours
- Directions
- Making appointment
- Definition
- Thanks

6. Results Of Customer Care Help Desk :

The chatbot was successfully made using Watson assistant and using SDU. All the services were integrated using Node Red Application.

Customer Care HelpDesk

Chatbot

Enter your Input -
How do I access Settings?

SUBMIT

CANCEL

Customer : How do I access Settings?

Chatbot :
"If enabled, the security code will be required to access and change these settings. On Thermostat: To add a security code or change existing settings: 1. Select Main Menu > Settings > Access control 2. If the security code is currently disabled (default setting), touch Enable Security Code, enter a new code and touch Save."

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7. Advantages and Disadvantages:

7.1 Advantages:

Reduced costs:

Chatbots eliminate the need for labor during online interaction with customers. This is obviously a great advantage for companies that receive multiple queries at once. In addition to saving costs with them, companies can align the chatbot with their objectives, and use them as a means to enhance customer conversion.

24/7 Availability:

Unlike humans, once we install a chatbot, it can handle queries at any time of day. Thus, the customer does not have to wait for a commercial of the company to help him. This also allows companies to monitor customer « traffic » during non-working hours and contact them later.

Learning and updating:

AI-based chatbots are able to learn from interactions and update independently. This is one of the main advantages. When you hire a new employee, you have to train them continuously. However, chatbots « form » themselves (with certain limitations, of course).

Management of multiple clients:

Humans can serve a limited number of customers at the same time. This restriction does not exist for chatbots, and they can manage all the necessary queries simultaneously. This is one of the main advantages of using chatbot, as no customer is left unattended and you are solving different problems at the same time. There are chatbots companies already working on developing voice chatbot services.

7.2 Disadvantages:

Complex interface:

It is often considered that chatbots are complicated and need a lot of time to understand what you want in customer. Sometimes, it can also annoy the client about their slowness, or their difficulty in filtering responses. They don't get you right: Fixed chatbots can get stuck easily. If a query doesn't relate to something you've previously « taught » it, you won't understand it. This can lead to a frustrated customer and the loss

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of the sale. Other times they do understand you, but they need double (or triple) as many messages as one person, which spoils the user experience.

Bad memory:

The chatbots are not able to memorize a conversation already had, which forces the user to write the same thing over and over again. This can be cumbersome for the client and annoying for the effort required. Therefore, it is important to be careful when designing chatbots and make sure that the program is able to understand users' queries and respond accordingly.

8. Applications:

Help User:

This chatbot will be useful for the user to ask the assistant the queries related to the Product and will give them clear guidance about the Product. If the Assistant doesn't know about a certain query, it will redirect to the correct person for it.

Content delivery:

Media Publishers have realized that chatbots are a powerful way to engage with their audiences and monitor engagement to gain valuable insights on reader interests. Chat with the CNN and Wall Street Journal Chatbots on Facebook Messenger and receive the latest news directly in Messenger, without having to visit their websites.

Companionship:

The primary function of the chatbot is to be a virtual companion – To speak with senior people on general topics like the weather, nature, hobbies, movies, music, news, etc. The chatbot asks questions, reacts to the answers, is able to speak on various topics, and share interesting news and facts from Google.

9. Future Scope:

Future Scope of this chatbot can be by adding the following to make it more advance:

Smarter Virtual Assistants:

Much of what virtual assistants do now are basic skills, such as retrieving data and basic computation. As natural language processing (NLP) continues to mature, virtual assistants will improve their comprehension and response capabilities, allowing

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for their use to become more widespread and complex. Also, as machine learning progresses, we may see virtual assistants become smarter and begin to learn and predict customer needs.

Integration with IoT Devices:

Car speakers, smart home devices, and wearables are just a few examples where the virtual assistant is departing from its original hardware and making its way to in-context devices. These integrations ensure that virtual assistants can always be near their human and ready to support any need. It is expected that these integrations will continue at an accelerated pace throughout 2018.

Voice-control:

Voice recognition can be added with the virtual assistant. Then the customer can control application by using his voice. Soon, we could be joining meetings with a voice command, instead of dialing in the long meeting ID and password.

10. Conclusions:

This chatbot will be useful for the user to ask the assistant the queries related to the Product and will give them clear guidance about the product. If the Assistant doesn't know about a certain query, it will redirect to the correct person for it. Chatbots are quickly making transformational changes and allowing businesses to thrive through customer interactions. The feedback and survey through chatbots strengthen the position of businesses as they analyze the reason behind different levels of customer approval. Use of conversational AI chatbots only means better engagement and relentless need for customer satisfaction in the near future.

11. References:

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<https://cloud.ibm.com/docs/assistant?topic=assistant-getting-started>

<https://developer.ibm.com/recipes/tutorials/how-to-create-a-watson-chatbot-on-nodered/>

<https://github.com/IBM/watson-discovery-sdu-with-assistant>

<https://www.youtube.com/watch?v=Jpr3wVH3FVA>

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