**PROJECT REPORT**

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**Title: Intelligent Customer Help Desk with Smart Document Understanding – SB33721**

**Category: Artificial Intelligence Internship at *SmartInternz***

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**INTRODUCTION**

* 1. **Overview**

A chatbot is made to answer some really simple questions. It can answer basic questions like, “When is the store open”, “Where are you located in Koramangala” and some more simple questions.

We will enhance the chatbot to handle the queries in a better way. If the user has a very particular question, our chatbot will look for the answer in the manual provided to the Watson Discovery by us. This way we handle the queries very efficiently.

We will build a chatbot using certain functionalities of the IBM Cloud.

* **Project Requirements**

IBM Cloud, IBM Watson, Node-Red, NodeJS

* **Functional Requirements**

IBM Cloud

* **Technical Requirements**

Artificial Intelligence, Watson Discovery, Node-Red

* **Software Requirements**

Watson Assistant, Watson Discovery, Node-Red

* **Project Deliverables**

Intelligent Chatbot with Smart Document Understanding

* **Project Team**

Neel Raval

* **Project Schedule**

19 Days + 10 Days

* 1. **Purpose**

As said previously, a simple chatbot can understand and reply back to simple queries. In a case where the chatbot is unable to answer the query, it says the question is invalid or in some cases offers the user an agent to speak to.

Now, we will integrate another step into our chatbot. If the user asks a technical question, the chatbot will pass the question to our Watson Discovery, which will look for matching cases and give the reply accordingly. So, now we have moved the talking to a agent step a little further away.

We are going to use Smart Document Understanding, which is a feature of the Watson Discovery, we train the assistant accordingly, to understand, what text is important and what is not.

Hence, we improve our results.

* + 1. **Scope of Work**
* Create a Customer Care Dialog Skill in Watson Assistant.
* Use Smart Document Understanding to build an enhanced Watson Discovery Collection.
* Create an IBM Cloud Function’s Web Action that allows Watson Assistant to post queries to Watson Discovery.
* Build a web application with integration to all these services and deploy the same on IBM Cloud Platform.

**2. LITERATURE SURVEY**

**2.1 Existing Problem**

A chatbots basic duty is to take the input query and find an appropriate and matching answer to it, when it is unable to do so, it asks the user to rephrase the query or it asks the user whether he wants to be connected to an agent. But we have build chatbots to minimize human interaction, so hence, we have to come up with a more effective solution to do so.

**2.2 Proposed Solution**

We integrate our chatbot with a Virtual Agent, for better understanding of the queries. We have to be able to train our Virtual Agent with a lot of records related to the queries we are going to provide it with. We use Watson Discovery, where we manually input the dataset and train the bot to recognize various fields. We use the Watson Assistant to build a Dialog Skill. We then use Node-Red which will serve as our web interface.

**3. THEORITICAL ANALYSIS**

**3.1 Block / Flow Diagram**

**A close up of text on a white background

Description automatically generated**

This is the basic flow of our project.

1. We train the document using SDU from Watson Discovery.
2. The user interacts with our chatbot, using the UI we created using Node-Red.
3. The created Dialog Skill coordinates the chat with the user.
4. If we get a question related to the product, we pass the query to the created cloud functions.
5. The cloud functions invoke our Dataset and hence the result is passed.

**3.2 Hardware / Software designing:**

1. IBM Cloud Services

2. Configuring our Discovery Dataset

3. Actions on the IBM Cloud Functions

4. Watson Assistant dialog skill

5. Making the flows and configuring our dash-board flow.

6. Deployment.

**4. EXPERIMENTAL INVESTIGATIONS**

**1.** IBM Cloud Services

*Create the following Services:*

* Watson Discovery
* Watson Assistant
* Node Red

A screenshot of a computer

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Upon creating the required resources you will be able to view all your resources here. Creation of all of these resources is fairly easy.

**2.** Configuring our Discovery Dataset

* Import the Document
* Create a new Data Collection

A screenshot of a cell phone

Description automatically generated

* The data collections should be given a unique name.
* Select the dataset you want to train your Watson Discovery with.
* I have uploaded Ecobee User Guide.
* Before we train our document we shall check out what our query result is.

A screenshot of a computer screen

Description automatically generated

* When we run the query we see we don’t get any good results.
* Now let’s train the data, on the main page click on the configure data.

A screenshot of a cell phone

Description automatically generated

* Train your document according to the fields given on the right side.
* Submit all the pages and once done with all the pages, click on the Apply Changes to collection, and re-upload the dataset.
* Then let us go and Manage the fields.

A screenshot of a computer

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* We will tell discovery to switch off the fields that are unnecessary.
* Then we will split the document according to the subtitles we have given in the Discovery
* Once we submit our changes, we need to reupload the document.

A screenshot of a computer screen

Description automatically generated

* As you can see, that 1 document, has been split into 118 documents. Certain enrichments have also been added to make the recognition of the document easy.

**3.** Actions on the IBM Cloud Functions

* We’ll create the Action to make queries against Discovery.

A screenshot of a computer screen

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* As you can see, I have highlighted the function button, click on it and you’ll land on the next page.

A screenshot of a computer

Description automatically generated

* This is main page of the cloud functions. IBM allows 10,000 API calls a month.

A screenshot of a computer

Description automatically generated

* Create an Action.

A screenshot of a cell phone

Description automatically generated

* Fill the fields accordingly and create your Cloud Actions.

A screenshot of a computer screen

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* This is the code for the Cloud Action.

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* Fill in these details from the Discovery API details.
* You need to fill in the details so that when we invoke it, it gives us an appropriate response.

A screenshot of a computer screen

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A screenshot of a computer

Description automatically generated

* Enable as Web Action, you’ll get a public endpoint URL.

**4.** Watson Assistant Dialog Skill

* Create a Dialog Skill using Watson.

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Description automatically generated

* Create an intent, fill in the intent name, the description and few examples related to it.
* We have to add as many intents as possible so that all of the queries fall into the intent.

A screenshot of a computer screen

Description automatically generated

* Add a dialog node, name the node appropriately, give an intent, for recognition.

A screenshot of a social media post

Description automatically generated

* Enable webhooks, and put the URL from the Action.
* For all the nodes as per required, enable webhooks.

A screenshot of a computer screen

Description automatically generated

* Edit the webhooks and change the input-output accordingly.

A screenshot of a computer

Description automatically generated

* This is the try it out window, as you can see, it replies appropriately and also tells us from which intent, it has taken the input.

1. Making the flows and configuring our dash-board flow.

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* Integrate Watson Assistant with Node-Red
* In the assistant node, fill in the required details.
* From the input section, drag the template node.
* From the output section, drag the output flow.
* Now, we’ll need to install the dashboard, for the web application UI.

A screenshot of a computer

Description automatically generated

* Click on the hamburger menu, click on Manage Pallet, in install, search for node-red dashboard, and install it.
* Drag the form node onto the dashboard
* Configure the form

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* Fill the details accordingly.
* Put in a function node.

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Description automatically generated

* Connect the form output to the input of the function, and the output to the input of the assistant bot.
* Drag the text and template node onto the dashboard.
* Then Deploy the dashboard.

**5. FLOWCHART**

**A screenshot of a computer

Description automatically generated**

* This is the flowchart of the Node-Red

1. **RESULTS**

* When we click on the deploy, it get’s deployed on this URL, “<https://node-red-cnewu.eu-gb.mybluemix.net/ui/#!/0?socketid=SCyueWgzC7zPlnNAAAAB>”.

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1. **ADVANTAGES & DISADVANTAGES**

Advantages

* We can deploy this chatbot to decrease human interaction.
* Shares the workload.
* Cost Efficient.

Disadvantages

* Chatbots can’t always give the right solution
* Chatbots cannot feel the problem of the customer.

1. **APPLICATIONS**

It can be deployed on various platforms by integrating it with the platform you are using.

1. **CONCLUSION**

Congratulation, we have successfully created a chatbot with Smart Document Understanding, using the various functionalities provided by IBM Cloud.

1. **FUTURE SCOPE**

We can include speech synthesis, and make it hands free.

1. **BIBILIOGRAPHY**

Source Code:

Cloud Functions:

/\*\*

  \*

  \* @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');

 /\*\*

   \*

   \* main() will be run when you invoke this action

   \*

   \* @param Cloud Functions actions accept a single parameter, which must be a JSON object.

   \*

   \* @return The output of this action, which must be a JSON object.

   \*

   \*/

 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);

     });

   });

 }

Node-Red Flow

[{"id":"91bfe3c2.82a68","type":"tab","label":"Customer Help Desk","disabled":false,"info":""},{"id":"cc38974d.042738","type":"debug","z":"91bfe3c2.82a68","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete":"false","x":1130,"y":120,"wires":[]},{"id":"d09bb681.085fd8","type":"function","z":"91bfe3c2.82a68","name":"","func":"msg.payload = \" \"+msg.payload.input\nreturn msg;","outputs":1,"noerr":0,"x":230,"y":340,"wires":[["ca0286d2.182658"]]},{"id":"86722136.1bab1","type":"function","z":"91bfe3c2.82a68","name":"","func":"msg.payload.text=\"\";\nif(msg.payload.context.webhook\_result\_1)\n{\n    for(var i in msg.payload.context.webhook\_result\_1.results)\n    {\n        msg.payload.text = msg.payload.text+\"\\n\"+msg.payload.context.webhook\_result\_1.results[i].text;\n    }\n    msg.payload = msg.payload.text;\n}\nelse\nmsg.payload = msg.payload.output.text[0];\nreturn msg;","outputs":1,"noerr":0,"x":870,"y":480,"wires":[["bf72349d.bd0368"]]},{"id":"3bcef049.c80bd","type":"ui\_form","z":"91bfe3c2.82a68","name":"","label":"","group":"4dbda236.78d2ac","order":2,"width":0,"height":0,"options":[{"label":"What's the issue?","value":"input","type":"text","required":true,"rows":null}],"formValue":{"input":""},"payload":"","submit":"Submit","cancel":"Cancel","topic":"","x":110,"y":660,"wires":[["d09bb681.085fd8"]],"info":"<input type=\"text\" placeholder=\"What's your query?\" />"},{"id":"ca0286d2.182658","type":"watson-conversation-v1","z":"91bfe3c2.82a68","name":"","workspaceid":"6e972715-324f-45a7-979e-d609831a3679","multiuser":false,"context":false,"empty-payload":false,"service-endpoint":"https://api.eu-gb.assistant.watson.cloud.ibm.com/instances/fe1e54ee-a2dc-4084-9a58-717f3aeb35ca","timeout":"","optout-learning":false,"x":580,"y":120,"wires":[["cc38974d.042738","86722136.1bab1"]]},{"id":"bf72349d.bd0368","type":"ui\_template","z":"91bfe3c2.82a68","group":"369f99d6.04ccc6","name":"ChatBot","order":0,"width":"20","height":"6","format":"<div ng-bind-html=\"msg.payload\">\n</div>","storeOutMessages":true,"fwdInMessages":true,"resendOnRefresh":true,"templateScope":"local","x":1200,"y":640,"wires":[[]]},{"id":"4dbda236.78d2ac","type":"ui\_group","z":"","name":"I am here to help you","tab":"5ccf1450.7d554c","order":1,"disp":true,"width":"20","collapse":false,"info":"<input type=\"text\" placeholder=\"Enter your problem here\" />"},{"id":"369f99d6.04ccc6","type":"ui\_group","z":"","name":"Here's what I think about it","tab":"5ccf1450.7d554c","order":2,"disp":true,"width":"20","collapse":false},{"id":"5ccf1450.7d554c","type":"ui\_tab","z":"","name":"Virtual Assistant","icon":"dashboard","disabled":false,"hidden":false}]

Reference:

**1. https://www.ibm.com/cloud/architecture/tutorials/cognitive\_discovery 2. https://cloud.ibm.com/docs/assistant?topic=assistant-getting-started 3.https://developer.ibm.com/recipes/tutorials/how-to-create-a-watson-chat bot-on-nodered/ 4.http://www.iotgyan.com/learning-resource/integration-of-watson-assista nt-to-node-red 5. https://github.com/IBM/watson-discovery-sdu-with-assistant**