

Chatbot

Semester- VII

A PROJECT REPORT

Submitted by

Kishan Aghera, 170170107003

Jinesh Majithia, 170170107039

Hirva Mathiya, 170170107040

Yashvi Modi, 170170107044

In partial fulfillment of the award of the degree of

BACHELOR OF ENGINEERING



in

COMPUTER ENGINEERING

VISHWAKARMA GOVERNMENT ENGINEERING COLLEGE CHANDKHEDA

Internal Guide:

Prof. Uttam G. Chauhan

Assistant Professor

VGEC, Chandkheda

Gujarat Technological University

Academic Year 2020-21

**VISHWAKARMA GOVERNMENT ENGINEERING COLLEGE,
CHANDKHEDA**

COMPUTER DEPARTMENT

CERTIFICATE



Date: 18-10-2020

This is to certify that the Project I Report entitled

Chatbot

Submitted by

Sr. No.	Name	Enrollment No.
1	Kishan Aghera	170170107003
2	Jinesh Majithia	170170107039
3	Hirva Mathiya	170170107040
4	Yashvi Modi	170170107044

towards the partial fulfillment in Project I (Computer Engineering) of Gujarat Technological University is the record of work carried out by him under our supervision and guidance in the Academic Year 2020-21.

Internal Guide

Head of Department

Prof. Uttam G. Chauhan

Prof M. T. Savaliya

Assistant Professor

Associate Professor

VGEC Chandkheda

VGEC Chandkheda

Acknowledgment

Firstly, we would like to thank our project guide Prof. Uttam Chauhan at the computer department, VGEC, who helped us with the project work. We would also like to give our gratitude to our project reviewers Prof. Nakul Dave and Prof. Avani Dave for their insights on our project work. We have like to thank them for providing the utmost guidance through the time of development of the project.

We have grown both personally and academically from the experience.

Kishan Aghera

Jinesh Majithia

Hirva Mathiya

Yashvi Modi

(B.E. Computer Engineering)

Abstract

- We aim to develop a chatbot which can be used to answer queries of students and well as faculties related to a particular engineering college.
- Our goal is to solve the problem of time-consuming browsing of college websites as well as physical contact required to get the queries answered.
- A chatbot is a computer program that can converse with the user in natural language and solve their queries.

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List of Abbreviations

IDP	Industry Defined Project
IDP	User Defined Project
NLP	Natural Language Processing
NLTK	Natural Language Tool Kit
AI	Artificial Intelligence
AIML	Artificial Intelligence Markup Language
UML	Unified Modeling Language

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1. Introduction

1.1 Why IDP/UDP?

We have selected a UDP Project because we were not able to get in contact with any industrial identity which had a similar problem statement as we developed. We together as a team came up with the given problem statement and aim to develop the project to resolve the problem.

1.2 Pre-Design

1.1.1 Learning Needs Matrix

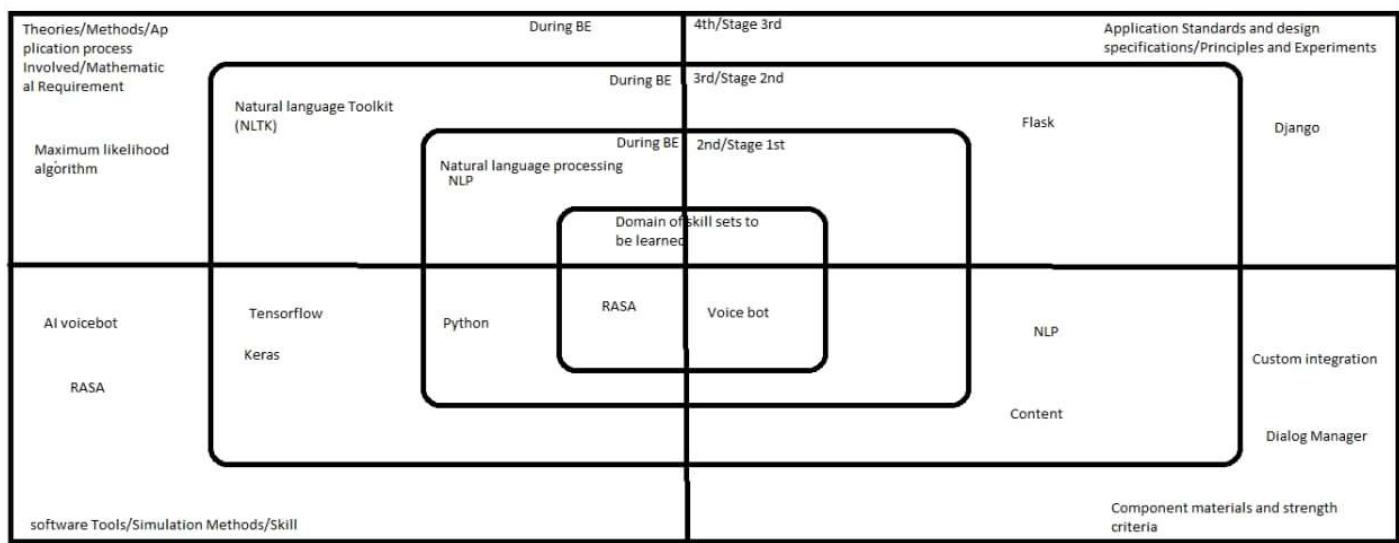


Fig. 1.1.1: Learning needs Matrix

1.1.2 The conclusion from Reverse Engineering

We used rasa framework for reverse engineering. We gained knowledge about the working of a chatbot, its processing algorithm, and result generation.

1.2 Project Summary

We aim to develop a chatbot which can be used to answer queries of students and well as faculties related to a particular engineering college. Our goal is to solve the problem of time-consuming browsing of college websites as well as physical contact required to get the queries answered. A chatbot is a computer program that can converse with the user in natural language and solve their queries.

1.4 Objectives of the project

To develop an efficient and effective chatbot to solve queries of students and faculties related to a particular academic institution.

1.5 Problem Specifications

Time consuming browsing of websites for information.

1.6 Technology Used

- Python
- RASA framework
- Natural Language Processing
- Machine Learning
- Artificial Intelligence
- Database

1.7 Hardware-Software Used

- PyCharm Community Edition
- Command Prompt Windows
- A system with 8GB RAM, 2GB NVIDIA Graphics, 1TB Hard-disk, Windows 10 Operating System.

2. System Analysis

2.1 Study of the Current System

In the olden days' students had to visit the college to enquire about details and other information about the college, which is a time-consuming process as well as a lengthy procedure for both parents as well as students. Nowadays there are many changes occurred in the Education system with help of advanced technological improvements. Everything is happening over the internet without any difficulty.

In those days for submitting a small application also, we have to visit that place, but as the days are passing away it's completely changing. Collecting the applications manually will be a hectic procedure and it also needs manpower. For reducing that manpower and such difficulties many devices or systems emerged day by day.

2.2 Problem and weakness of the Current System

Due to the lack of information, many students faced problems in paying fees and thus deadlines get passes and they have to pay penalty fees. The same problem occurred in the filling of the scholarship form.

This system fails to provide quick guidance. We have to go to the college for collecting the information regarding any problems.

2.3 Requirement Analysis

- Tools used:
 - A system with 8GB RAM, 2GB NVIDIA Graphics, 1TB Hard-disk, Windows 10 Operating System.
 - PyCharm Community Edition
- Techniques used:
 - Natural Language Processing
 - Parsing and Substitution

2.4 Brief Literature Review and Prior Art Search (PAS)

- **Components of Chatbot Application:**
 - The main components of the Chatbot are:
 - UI: The user interface is simple with not many colors. It is kept as simple as possible to make it look like a college chatbot. It consists of a text box at the bottom where the user may write the queries. A "send"

button is placed to send the query to the bot. The UI is to be created using HTML, CSS, and JavaScript.
[1]

- Back-end: There are three phases:

- Parsing and Substitution: Whenever a user types a query, it is passed on to a class that parses the input and then substitutes words and phrases with other words and phrases so that a grammatically correct statement can be generated. It is carried out using XML and Python. [1]
- Natural Language Processing: NLP is required so that the data which is parsed can be “understood” by the application. E.g. a user’s humor, feelings, names, and places mentioned in the input. NLP is not implemented in the project but can be implemented if needed in the future. [1]
- Database: There are various database files in the database folder with *.aiml* extension. These are the files that contain the various patterns of the conversations. [1]

- **NLP:**

- It is a part of artificial intelligence that deals with human languages. It has the following structure:
 - Application
 - NLP Layer
 - Knowledge Base
 - Data Storage
- NLP is divided into two very important components:
 - Natural Language Understanding: It is mostly used to map inputs to useful representations. It is also helpful in analyzing different aspects of the language.
 - Natural Language Generation: It is generally used text planning, sentence planning, and text realization. NLP is implemented using a library in Python named NLTK.
- There are some steps followed in NLP:
 - Tokenization: It is the process to break a complex sentence into words. Also, the importance of each word is understood concerning the sentence. It also helps to produce a structural description of an input sentence.
 - Stemming: It is the process in which words are normalized into its base form or root form.
 - Lemmatization: It is the process in which grouping of different inflected forms of a word is done. It also roots several words into one common root but the output of Lemmatization is a proper word.
 - Stop Words: These are some of the words which are helpful to make a sentence meaningful but do not help in NLP.
 - Parts of Speech: It is an inbuilt library containing various parts of speech.

2.5 Design: Analysis, Design Methodology, and Implementation Strategy

- AEIOU Summary Canvas:

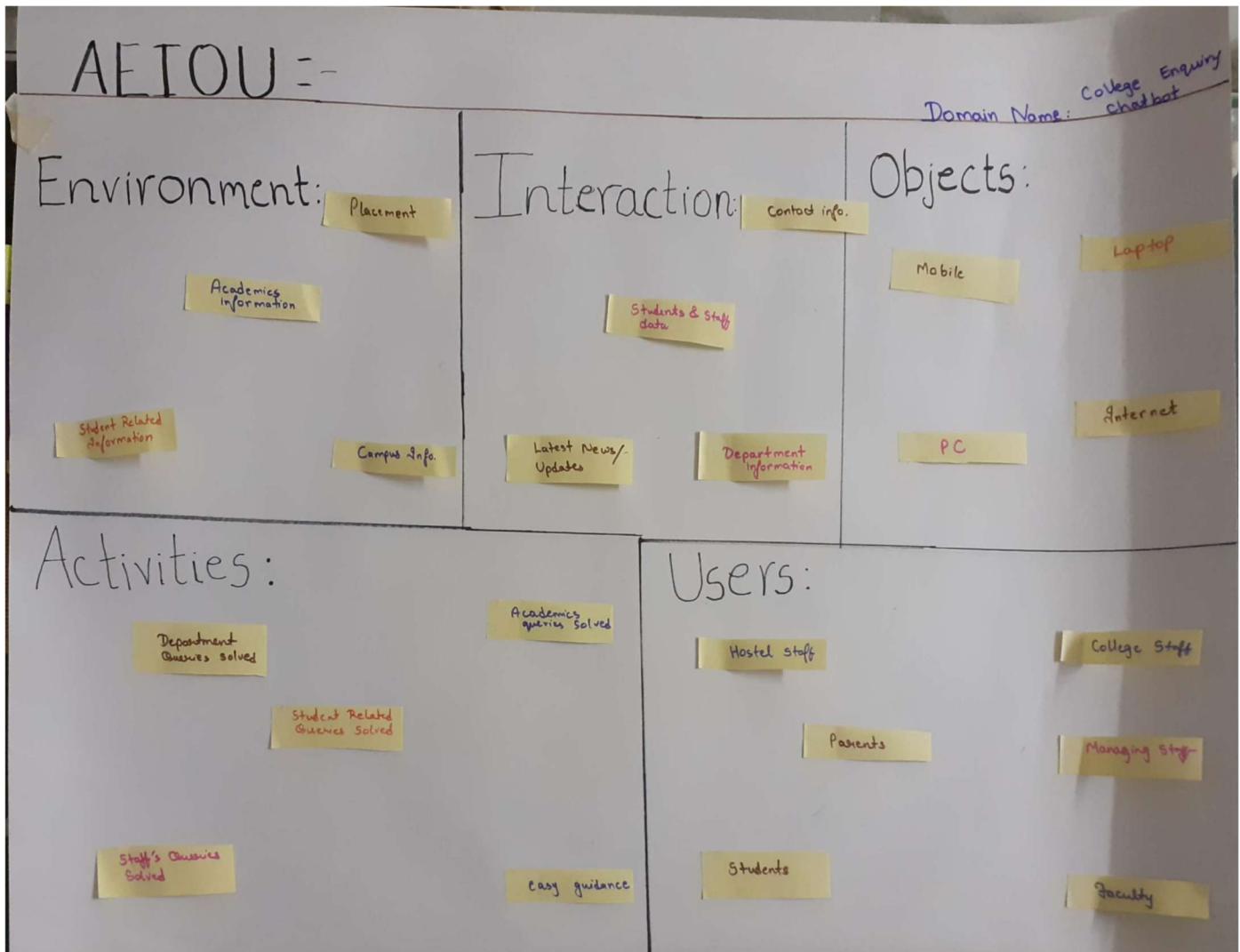


Fig. 2.5.1: AEIOU Summary Canvas

- Students, faculty, and parents can use this chatbot to get quick response and guidance regarding placements, academic details, latest updates, and also the department's information.
- The objects required for the use of chatbot are mobile/PC/laptop, internet.

- Ideation Canvas:

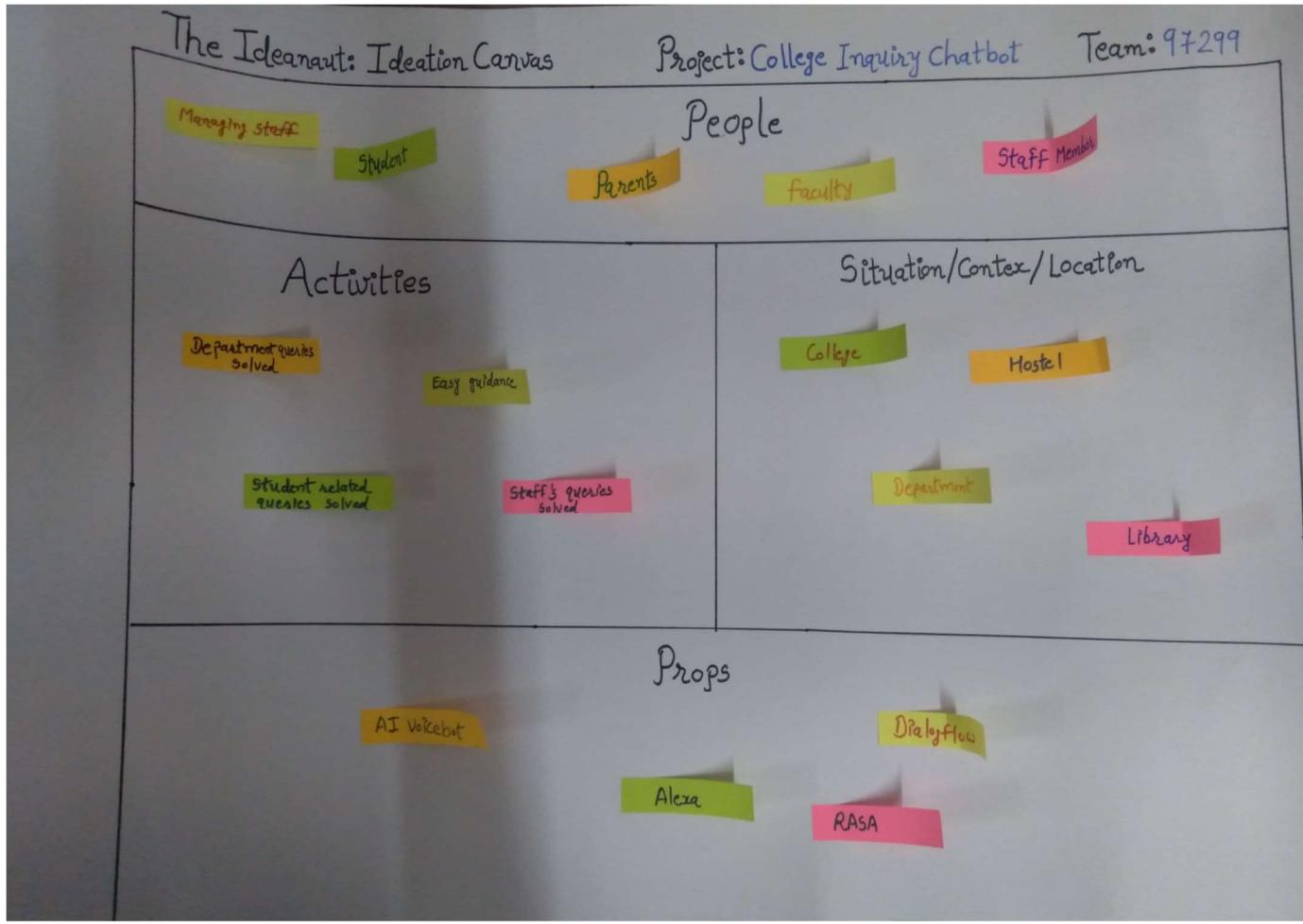


Fig. 2.5.2: Ideation Canvas

- People: Managing staff, students, faculty, staff members, parents.
- The chatbot can guide college members, hostel members, departments, and library members.
- The other tools which can be used for making chatbot are rasa, Alexa, dialog flow, AI voice bot.

- Empathy Canvas:

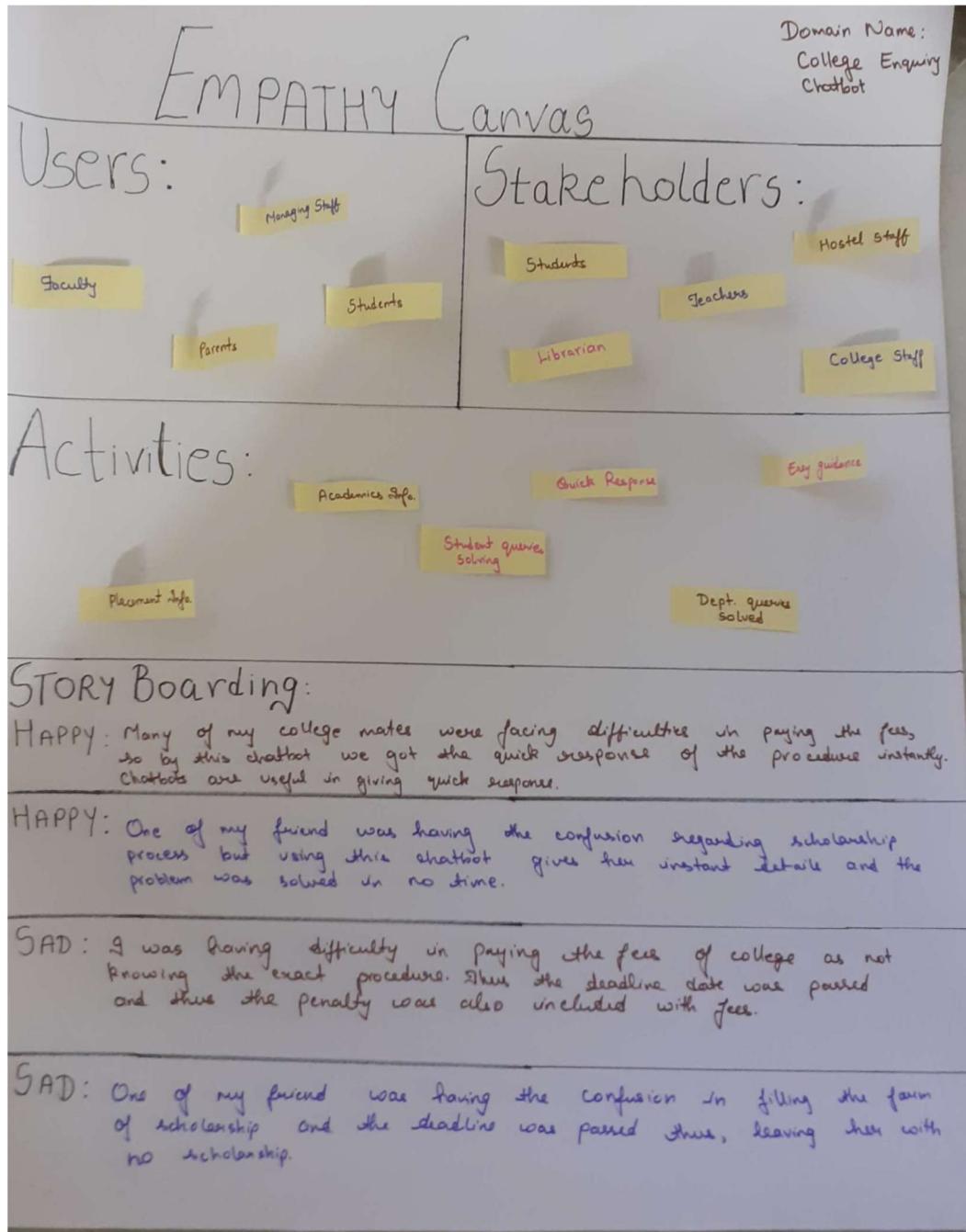


Fig. 2.5.3: Empathy Canvas

- Users are: faculty, managing staff, parents, students
- Students can get information about paying fees and scholarship information in no time. So the problems faced by the students of paying penalty fees can be solved by using this chatbot as it gives a quick response.

- Product Development Canvas:

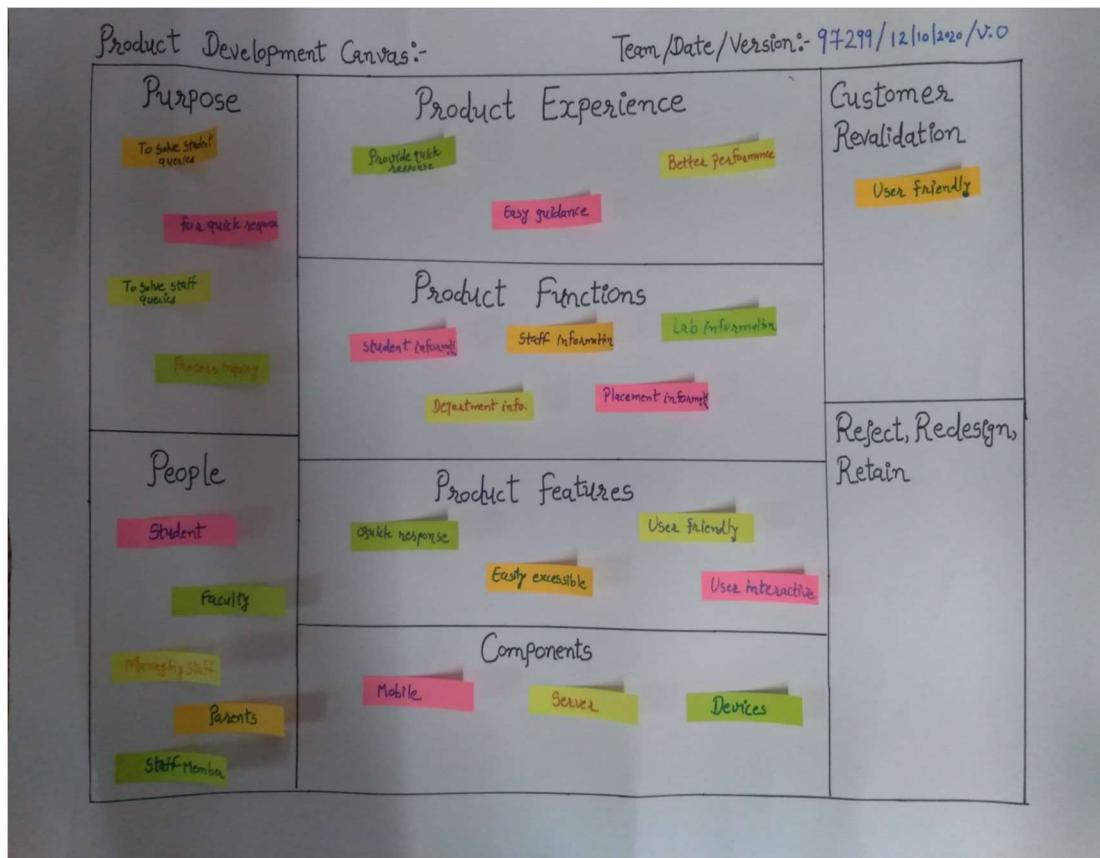


Fig. 2.5.4: Product Development Canvas

- The components required are mobile, laptop, and internet.
- The product gives us a quick response, also easily accessible to all the users.
- Customer Revalidation: User-friendly product.
- The purpose is to give correct information, quick and easy response.

3. Project Management

3.1 Project Planning and Scheduling

3.1.1 Project Development Approach

Step-1: Gather information about how a chatbot works.

Step-2: Divide the working and architecture of the chatbot into different components.

Step-3: Design a graphical framework to get an idea about the position of components in the process.

Step-4: The three main components of a chatbot are NLP, Processing, and Database.

Step-5: Create a prototype through a framework to understand the working of the chatbot.

Step-6: Gather information about NLP and improve its efficiency for the chatbot.

Step-7: Gather information about Databases to have less overhead in the process.

Step-8: Create an efficient program to process the NLP output and search the Database.

Step-9: Combine all the components.

Step-10: Train the chatbot to improve its efficiency.

Step-11: Deploy the chatbot.

Note: Step 1-4 are to be completed in Semester 7, Step 5-7 are to be partially completed in Semester 7 and to be fully completed in Semester 8, Step 8-10 are to be completed in Semester 8.

3.1.2 Project Plan

The Project Plan is the same as the steps mentioned above.

4. System Modeling

4.1 Dataflow Diagrams

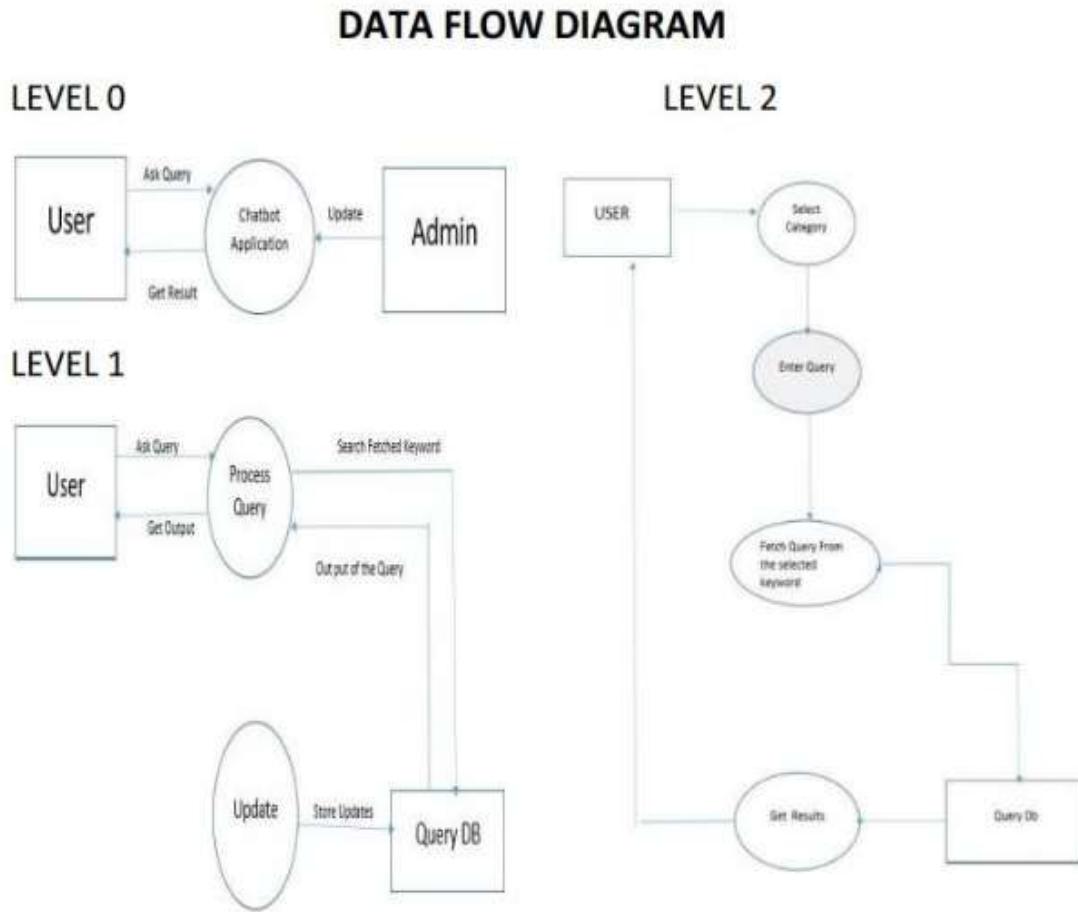


Fig. 4.1: Dataflow Diagrams [1]

4.2 Use Case Diagram

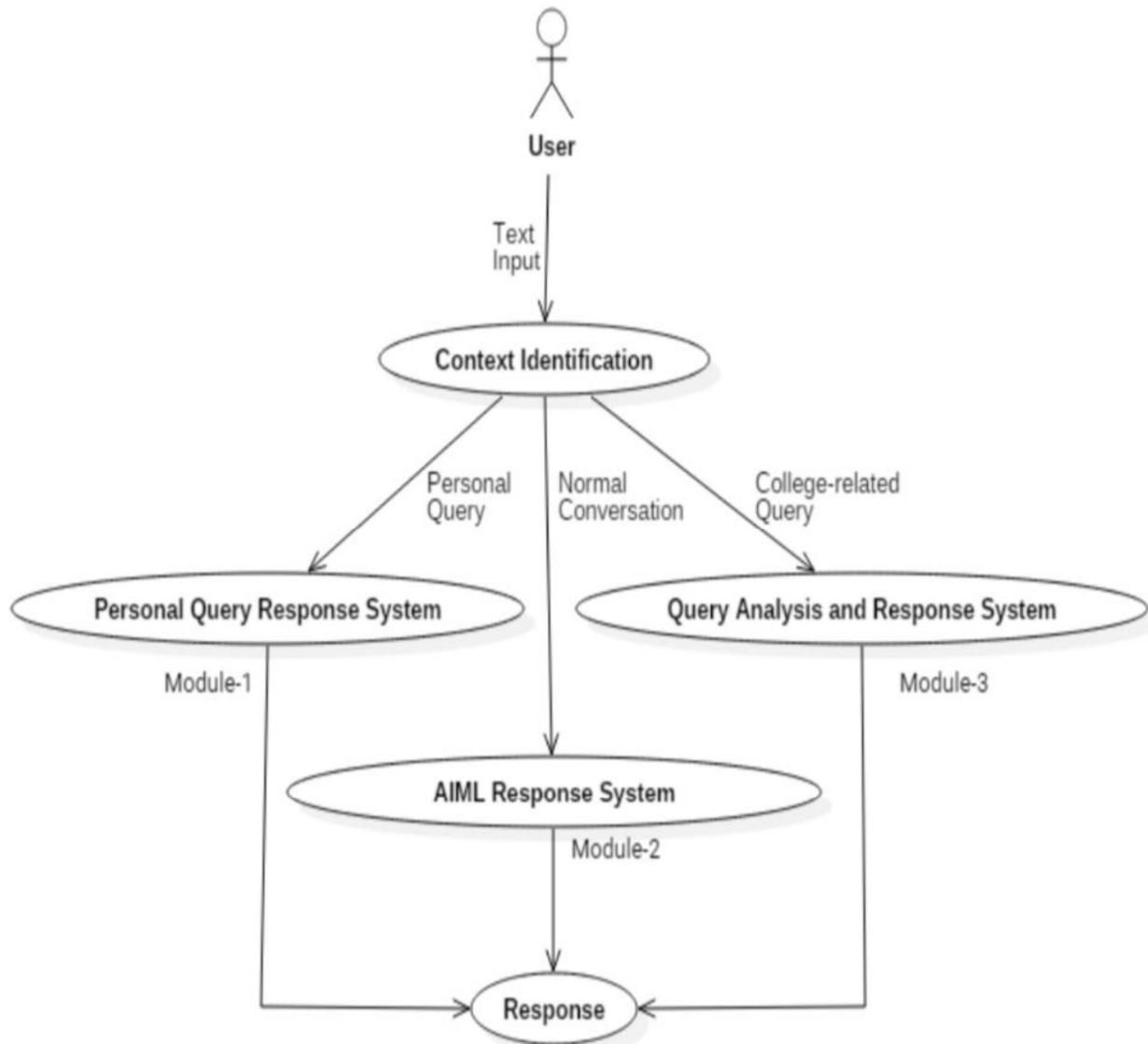


Fig. 4.2: Use Case Diagram^[1]

User's text input will be the input to the chatbot then NLP will be performed on the text and based on the semantic, the query will be divided into three subdivisions.

- Personal Query Response System,
- AIML Response System, and
- Query Analysis and Response System.

Based on the subdivisions, answers will be separately stored so it becomes easy to search the database, then the final response will be generated by the chatbot based on its understanding of the query.

4.3 Activity Diagrams

- Personal Query Response Activity:

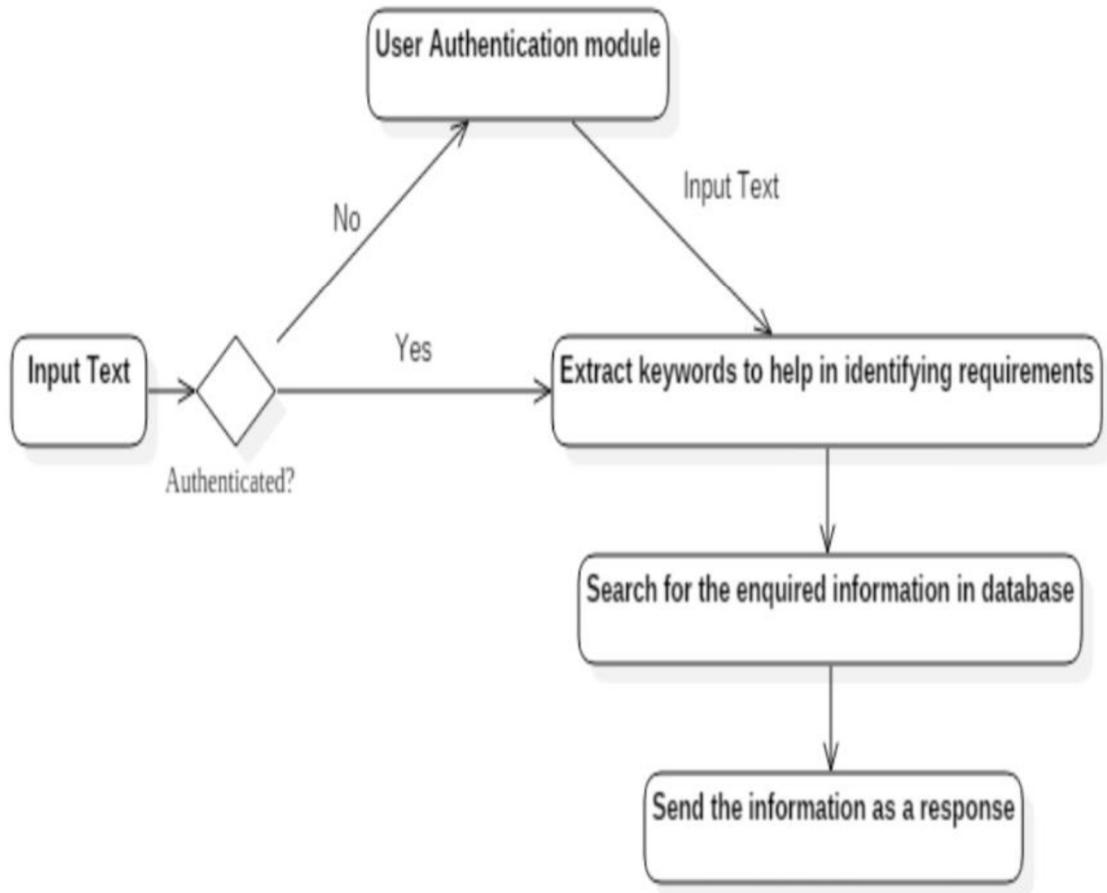


Fig. 4.3.1: Personal Query Response Activity [1]

- Normal Conversation Response Activity:

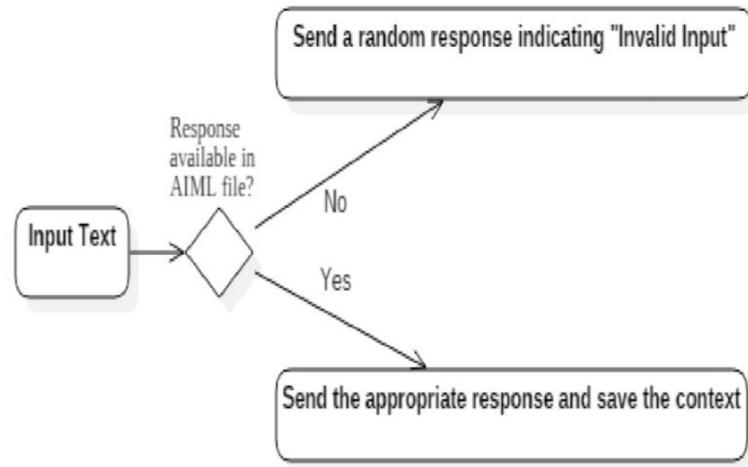


Fig. 4.3.2: Normal Conversation Response Activity [1]

- College-Related Response Activity:

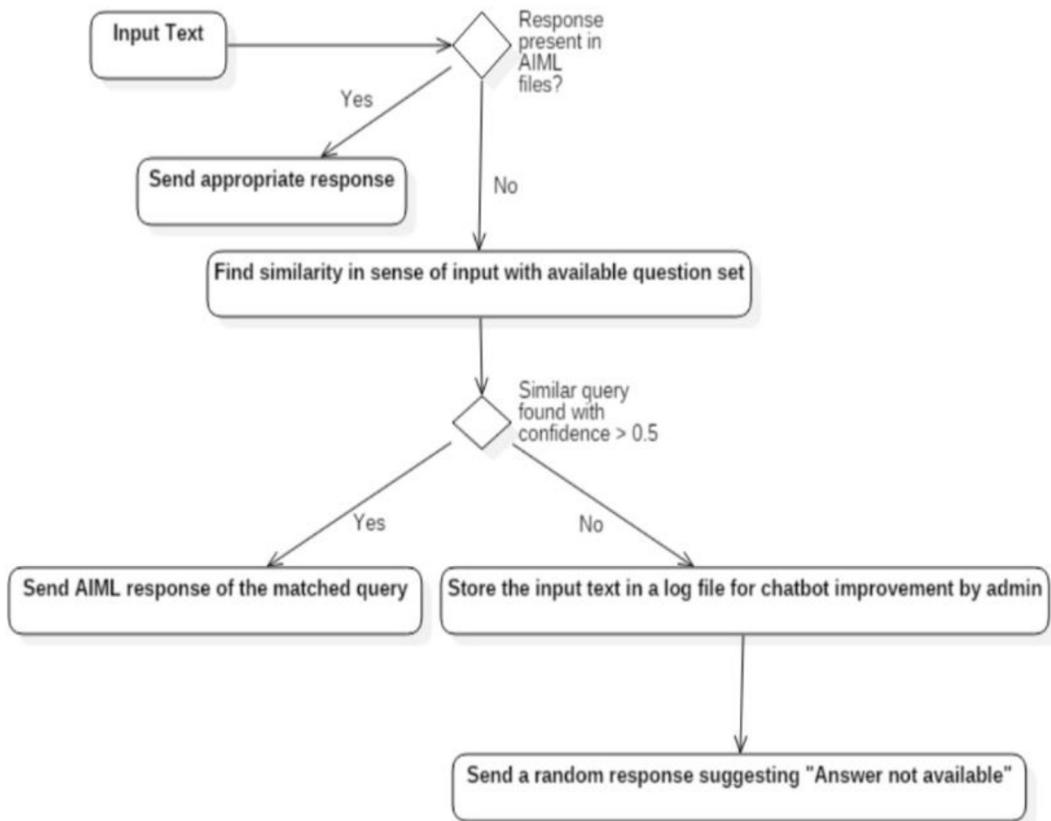


Fig. 4.3.3: College-Related Response Activity [1]

4.4 Sequence Diagram

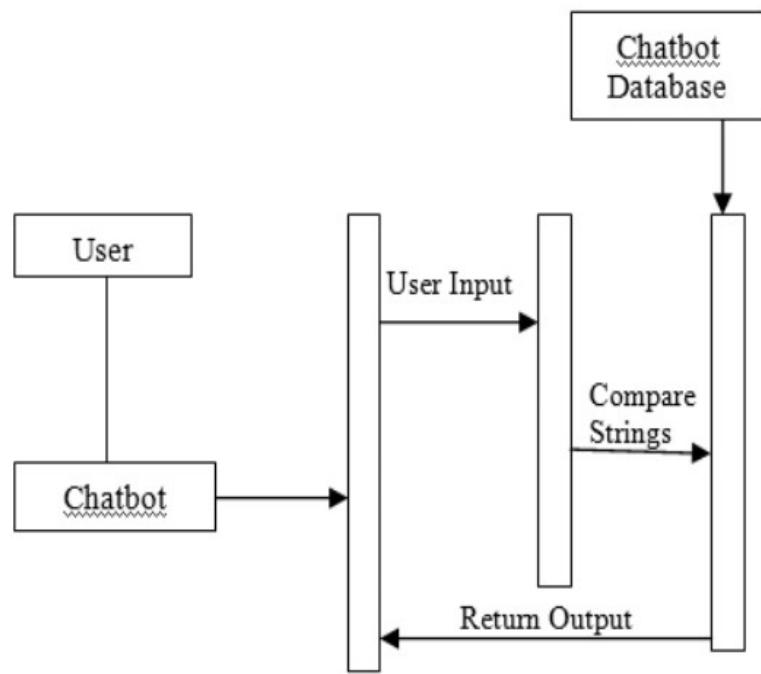


Fig. 4.4: Sequence Diagram [2]

4.5 State Transition Diagram

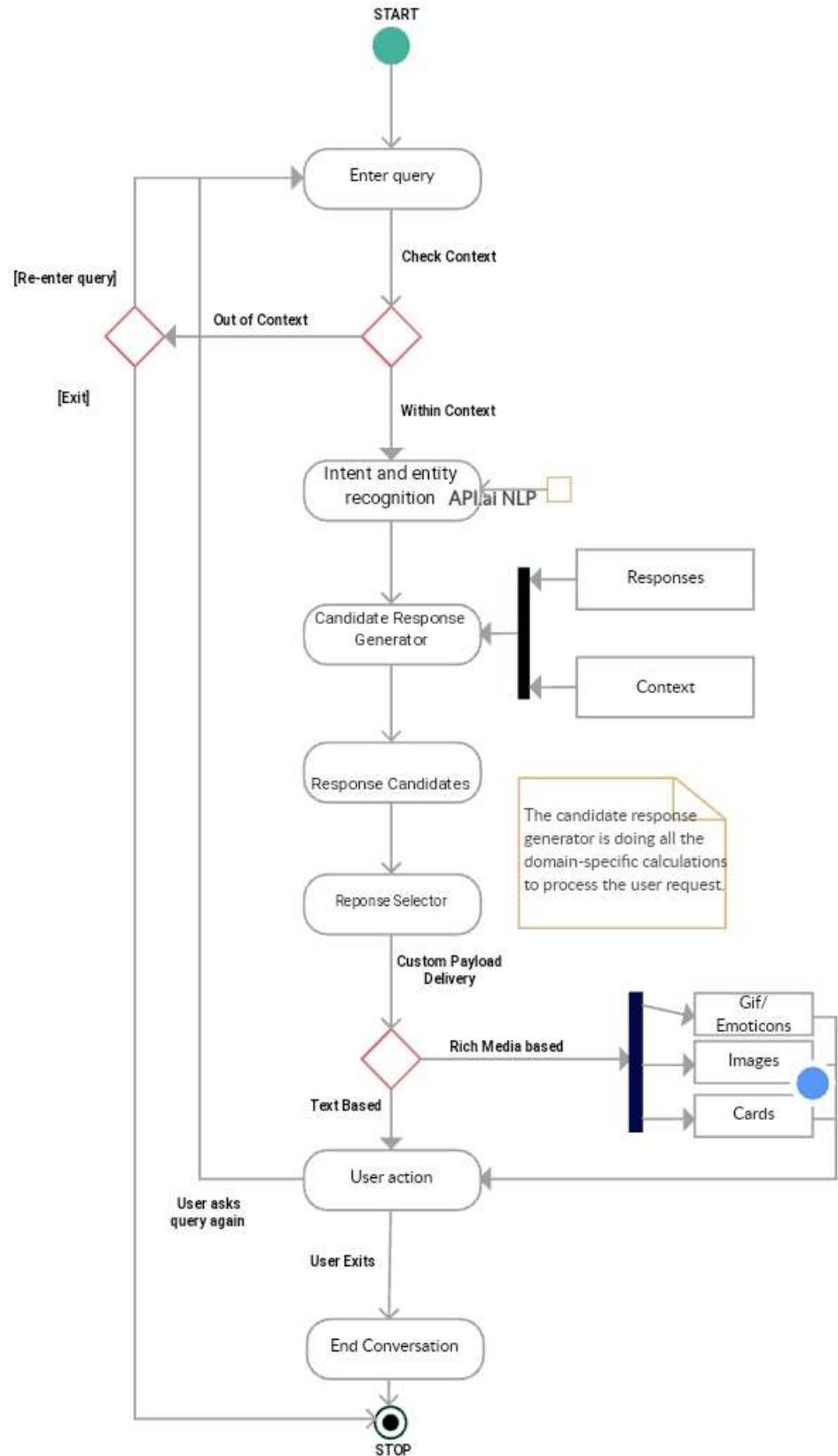


Fig. 4.5: State Transition Diagram [3]

4.6 System Architecture

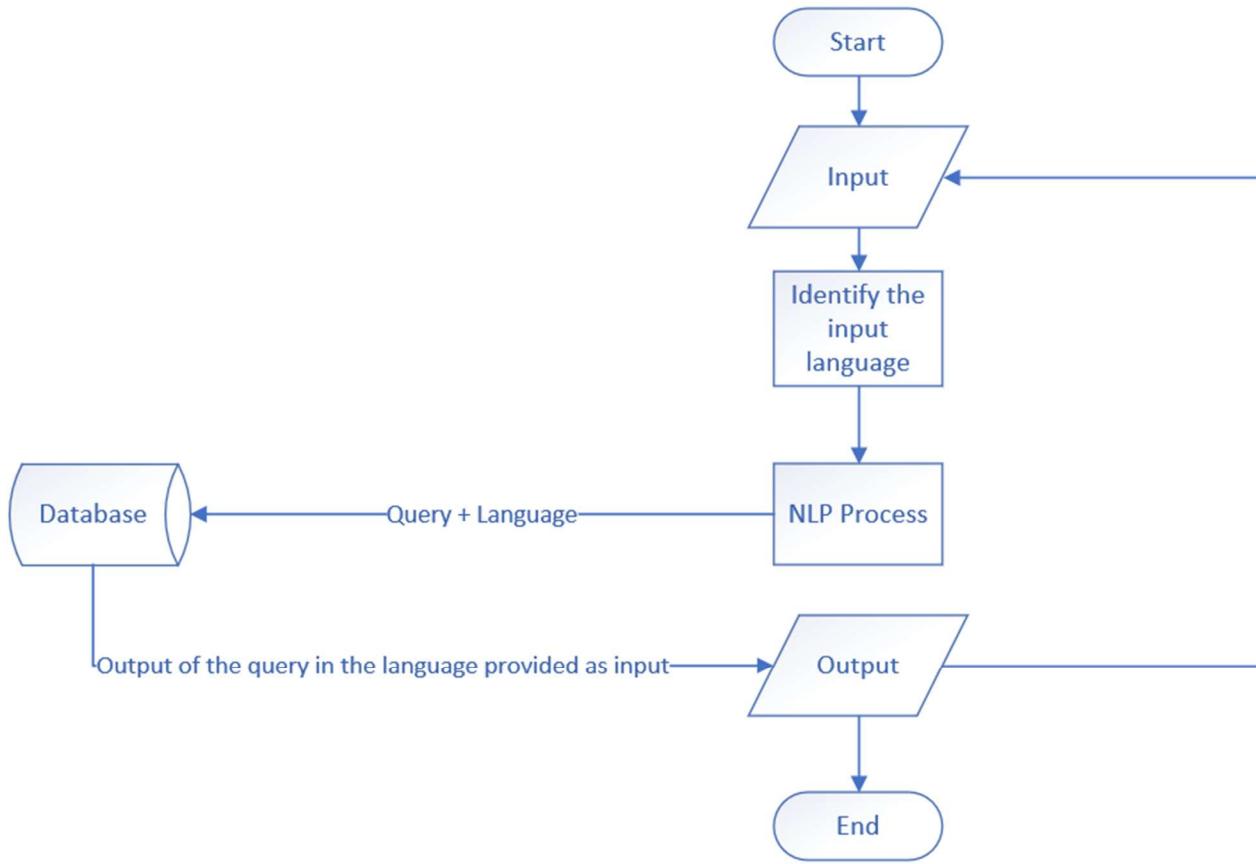


Fig. 4.6: System Architecture

5. Engineering of Economics Design

5.1 Market Demand

Automation has always been in demand in the market. We aim to develop a product that can solve common user queries so the waiting time for unique queries decreases. Also, due to COVID-19, the demand for such products has increased as people now prefer less physical contact.

5.2 Your Business Strategy

Our strategy is to currently develop a product that is focused on solving the queries of a particular institution. Then, we aim to expand our product with any customization required for different clients.

5.3 Your Service

Our service is to deploy the chatbot where the client requires it and then maintain the product, i.e. updating the database and maintenance check.

5.4 Who is your Client?

Our client is an institution or company that requires its employees or clients to access their sites frequently for information.

6. Conclusion and Future Scope

- Our product will help the clients as well as employees of any institution or company to get their queries answered more efficiently than ever.
- Currently, we are preparing the product for an educational institution and we aim to expand our product's limit to every field possible.
- We also aim to improve the efficiency of our product through the timeline simultaneously.

7. References

1. College Enquiry Chat Bot by Karanvir Singh Pathania of Jaypee University of Information and Technology Waknaghat, Solan – 173234, Himachal Pradesh.
(<http://122.252.232.85:8080/jspui/bitstream/123456789/22765/1/College%20Enquiry%20Chat%20Bot.pdf>)
2. Dahiya, Menal. (2017). A Tool of Conversation: Chatbot. INTERNATIONAL JOURNAL OF COMPUTER SCIENCES AND ENGINEERING. 5. 158-161.
(https://www.researchgate.net/publication/321864990_A_Tool_of_Conversation_Chatbot/link/5a360b02aca27247eddea031/download)
3. A chatbot (Activity Diagram (UML)) by Mohammed Abrar Ahmed
(<https://creately.com/diagram/example/j1q6u9ue2/Chatbot>)

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College : VISHWAKARMA GOVERNMENT ENGINEERING COLLEGE, CHANDKHEDA
StudentName : Majithia Jinesh Prashantkumar
EnrollmentNo : 170170107039
MobileNo : 8866333405
Email : jineshmajithia99@gmail.com
Department : Computer Engineering
Discipline : BE
Semester : Semester 7

PPR Details

Periodic Progress Report : First PPR

Project : Chatbot

Status : Submitted

1. What Progress you have made in the Project ?

We have identified the problem statement and have done a discussion with the guide regarding the feasibility. We have read relevant research/review papers and have identified the architecture used for the problem statement.

2. What challenge you have faced ?

Creating a chatbot that can efficiently and effectively answer the queries of the user is difficult because each person can have different syntax for a question with the same semantics.

3. What support you need ?

We need support to deploy our project using Cloud to analyze user queries so that we can increase the efficiency of the user query response.

4. Which literature you have referred ?

We have referred several research papers namely "Chatbot for University Related FAQs" by Bhavika R. Ranoliya, Nidhi Raghuwanshi, and Sanjay Singh, "A Deep Reinforcement Learning Chatbot" by Iulian V. Serban, Chinnadhurai Sankar, Mathieu Germain, Saizheng Zhang, Zhouhan Lin, Sandeep Subramanian, Taesup Kim, Michael Pieper, Sarath Chandar, Nan Rosemary Ke, Sai Rajeshwar, Alexandre de Brebisson, Jose M. R. Sotelo, Dendi Suhubdy, Vincent Michalski, Alexandre Nguyen, Joelle Pineau, and Yoshua Bengio, "Survey on Chatbot Design Techniques in Speech Conversation Systems" by Sameera A. Abdul-Kader and Dr. John Woods.

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

College : VISHWAKARMA GOVERNMENT ENGINEERING COLLEGE, CHANDKHEDA
StudentName : Majithia Jinesh Prashantkumar
EnrollmentNo : 170170107039 Department : Computer Engineering
MobileNo : 8866333405 Discipline : BE
Email : jineshmajithia99@gmail.com Semester : Semester 7

PPR Details

Periodic Progress Report : Second PPR

Project : Chatbot

Status : Submitted

1. What Progress you have made in the Project ?

Based on our problem statement, we have done a discussion with our guide. We have read relevant research/review papers and identified the architecture in which one is suitable for our problem statement.

2. What challenge you have faced ?

Creating a chatbot that can efficiently and effectively answer the queries of the user is difficult because each user can have different query syntax for the same question.

3. What support you need ?

Creating a chatbot that can efficiently and effectively answer the queries of the user is difficult because each user can have different query syntax for the same question.

4. Which literature you have referred ?

. We have referred several research papers namely “Extracting Chatbot Knowledge from Online Discussion Forums” by Jizhou Huang¹, Ming Zhou², Dan Yang¹ “Sequence to Sequence Learning with Neural Networks” by Ilya Sutskever, Oriol Vinyals, Quoc V. Le “A Survey on Chatbot Implementation in Customer Service Industry through Deep Neural Networks” by Mohammad Nuruzzaman, Omar Khadeer Hussain

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

College : VISHWAKARMA GOVERNMENT ENGINEERING COLLEGE, CHANDKHEDA
StudentName : Majithia Jinesh Prashantkumar
EnrollmentNo : 170170107039
MobileNo : 8866333405
Email : jineshmajithia99@gmail.com
Department : Computer Engineering
Discipline : BE
Semester : Semester 7

PPR Details

Periodic Progress Report : Third PPR

Project : Chatbot

Status : Submitted

1. What Progress you have made in the Project ?

After reading different research/review papers we started our project by doing practical in NLP using some inbuilt libraries like NLTK. We analyze the user query and split the words by operating like stop keywords and then performed stemming and lemmatization.

2. What challenge you have faced ?

Creating a chatbot that can efficiently and effectively answer the queries of the user is difficult because each person can have different syntax for a question with the same semantics.

3. What support you need ?

We need support to deploy our project using Cloud to analyze user queries so that we can increase the efficiency of the user query response.

4. Which literature you have referred ?

We have referred several research papers namely “A Survey Paper on Chatbots” by Aafiya Shaikh¹, Dipti More², Ruchika Puttoo³, Sayli Shrivastav⁴, Swati Shinde⁴ “Evolution of Chatbots for Smart Assistance” by Vishal Aggarwal, Anjali Jain, Harsh Khatter, Kanika Gupta

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

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College : VISHWAKARMA GOVERNMENT ENGINEERING COLLEGE, CHANDKHEDA
StudentName : Majithia Jinesh Prashantkumar
EnrollmentNo : 170170107039
MobileNo : 8866333405
Email : jineshmajithia99@gmail.com
Department : Computer Engineering
Discipline : BE
Semester : Semester 7

PPR Details

Periodic Progress Report : Forth PPR

Project : Chatbot

Status : Submitted

1. What Progress you have made in the Project ?

After removing unnecessary words from the user query using the stop words method we performed different techniques on a query like a bag of words, TF-IDF, and analyzed its output so that we can increase the efficiency of our user query responses.

2. What challenge you have faced ?

In this project, the main challenge is how we can increase the efficiency of our chatbot so it can respond to different user queries very effectively and accurately.

3. What support you need ?

We need financial support to use AWS credits to host our application.

4. Which literature you have referred ?

We have referred several research papers namely "Seq2Seq AI Chatbot with Attention Mechanism" by Abonia Sojasingarayar "Survey on Chatbot Design Techniques in Speech Conversation Systems" by Sameera A. Abdul-Kader and Dr. John Woods.

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None



**GUJARAT TECHNOLOGICAL UNIVERSITY
(GTU)
INNOVATION COUNCIL (GIC)
Patent Search & Analysis Report
(PSAR)**



Date of Submission : 15/10/2020

Dear Majithia Jinesh Prashantkumar,

Studied Patent Number for generation of PSAR : 20BE7_170170107039_1

PART 1: PATENT SEARCH DATABASE USED

1. Patent Search Database used : Indian Patent Office database
Web link of database : <http://ipindiaservices.gov.in/publicsearch/>
2. Keywords Used for Search : AI,Chatbots,Real-Time
3. Search String Used : AI Chatbots
4. Number of Results/Hits getting : 100

PART 2: BASIC DATA OF PATENTED INVENTION /BIBLIOGRAPHIC DATA

5. Category/ Field of Invention :
6. Invention is Related to/Class of Invention : Computer Science
- 6 (a) : IPC class of the studied patent : G06N 3/00 G06K 9/00
7. Title of Invention : REAL-TIME LEARNING IN AI CHATBOTS
8. Patent No. : 50/2019
9. Application Number : 201821021668
- 9 (a) : Web link of the studied patent : <http://ipindiaservices.gov.in/PublicSearch/PublicationSearch/Patent>
10. Date of Filing/Application (DD/MM/YYYY) : 06/11/2018
11. Priority Date (DD/MM/YYYY) :
12. Publication/Journal Number :
13. Publication Date (DD/MM/YYYY) :
14. First Filled Country : Albania

15. Also Published as

Sr.No	Country Where Filed	Application No./Patent No.
1		

16. Inventor/s Details.

Sr.No	Name of Inventor	Address/City/Country of Inventor
1	Mr Anil P Menon	INDIA

17. Applicant/Assignee Details.

Sr.No	Name of Applicant/Assignee	Address/City/Country of Applicant
1	DBNIX SYSTEMS PVT LTD	INDIA

18. Applicant for Patent is : Company

PART 3: TECHNICAL PART OF PATENTED INVENTION**19. Limitation of Prior Technology / Art**

No limitation found as of now

20. Specific Problem Solved / Objective of Invention

Real time learning of the chatbot/virtual assistants during interaction with the correspondent.

21. Brief about Invention

The present invention objects to provide the chatbot/virtual assistant/virtual assistant system which is capable of learning during real-time interaction with the correspondent or other chatbot/virtual assistant systems. Another object of the present invention is to provide the chatbot/virtual assistant/virtual assistant system that is capable of storing perceived and learned information in the form of a neural signature to form the memory.

22. Key learning Points

Neural Network, Real-Time Learning.

23. Summary of Invention

The present invention pertains to the chatbot/virtual assistants. More particularly, to the real-time learning of the chatbot/virtual assistants during interaction with the correspondent. The present invention comprises of the chatbot/virtual assistants which are enabled for real-time learning wherein the chatbot/virtual assistants are capable of memorizing the information perceived during the real interaction with the correspondent.

24. Number of Claims : 10

25. Patent Status : Published Application

26. How much this invention is related with your IDP/UDP?

71 to 90%

27. Do you have any idea to do anything around the said invention to improve it? (Give short note in not more than 500 words)

As the invention uses real-time learning which is currently trending, there is no more room for any improvement as of now.



**GUJARAT TECHNOLOGICAL UNIVERSITY
(GTU)
INNOVATION COUNCIL (GIC)
Patent Search & Analysis Report
(PSAR)**



Date of Submission : 15/10/2020

Dear Majithia Jinesh Prashantkumar,

Studied Patent Number for generation of PSAR : 20BE7_170170107039_2

PART 1: PATENT SEARCH DATABASE USED

1. Patent Search Database used : Indian Patent Office database
Web link of database : <http://ipindiaservices.gov.in/publicsearch/>
2. Keywords Used for Search : NLP,Deep Learning,Sentiment Anlaysis
3. Search String Used : NLP Deep Learning
4. Number of Results/Hits getting : 1377

PART 2: BASIC DATA OF PATENTED INVENTION /BIBLIOGRAPHIC DATA

5. Category/ Field of Invention :
6. Invention is Related to/Class of Invention : Computer Science
6 (a) : IPC class of the studied patent : G06Q50/00
7. Title of Invention : SENTIMENT ANALYSIS: NLP-BASED SENTIMENT ANALYSIS USING DEEP LEARNING PROGRAMMING.
8. Patent No. : 33/2020
9. Application Number : 33/2020
9 (a) : Web link of the studied patent : <http://ipindiaservices.gov.in/PublicSearch/PublicationSearch/Patent>
10. Date of Filing/Application (DD/MM/YYYY) : 07/22/2020
11. Priority Date (DD/MM/YYYY) :
12. Publication/Journal Number :
13. Publication Date (DD/MM/YYYY) :
14. First Filled Country : Albania : 100

15. Also Published as

Sr.No	Country Where Filed	Application No./Patent No.
1		

16. Inventor/s Details.

Sr.No	Name of Inventor	Address/City/Country of Inventor
1	Dr A MOHAN BABU	INDIA

17. Applicant/Assignee Details.

Sr.No	Name of Applicant/Assignee	Address/City/Country of Applicant
1	AUDISANKARA COLLEGE OF ENGINEERING TECHNOLOGY	INDIA

18. Applicant for Patent is : College

PART 3: TECHNICAL PART OF PATENTED INVENTION**19. Limitation of Prior Technology / Art**

No limitation found as of now.

20. Specific Problem Solved / Objective of Invention

The invention, such tools are provided in the form of a “ready-made” Sentiment Widget, which is programmed to analyze sentiment for a particular topic, entity, or facet (e.g., characteristic of an entity).

21. Brief about Invention

The invention “Sentiment Analysis” is related to techniques and systems for providing sentiment analysis using deep learning programming and natural language processing to determine sentiment.

22. Key learning Points

NLP, Deep Learning.

23. Summary of Invention

“Sentiment Analysis” is a technique for providing sentiment analysis and for presenting the results. The invention, such tools are provided in the form of a “ready-made” Sentiment Widget, which is programmed to analyze sentiment for a particular topic, entity, or facet (e.g., characteristic of an entity). Example: provide a Sentiment Analysis System (“SAS”), which provides tools to enable authors, programmers, users, developers, and the like to incorporate sentiment analysis into their content, such as into their web pages, and other web blogs or textual content. And also the SAS provides a Sentiment Analysis Engine, a SAS API, and one or more user interface tools for requesting sentiment analysis. Other embodiments provide other mechanisms and examples of user interfaces that incorporate the techniques of the SAS and deliver information via NLP-based sentiment analysis to a consumer of such results.

24. Number of Claims : 10

25. Patent Status : Published Application

26. How much this invention is related with your IDP/UDP?

71 to 90%

27. Do you have any idea to do anything around the said invention to improve it? (Give short note in not more than 500 words)

As the invention uses NLP, there is no more room for any improvement. as of now.



**GUJARAT TECHNOLOGICAL UNIVERSITY
(GTU)
INNOVATION COUNCIL (GIC)
Patent Search & Analysis Report
(PSAR)**



Date of Submission : 15/10/2020

Dear Majithia Jinesh Prashantkumar,

Studied Patent Number for generation of PSAR : 20BE7_170170107039_3

PART 1: PATENT SEARCH DATABASE USED

1. Patent Search Database used : Indian Patent Office database
Web link of database : <http://ipindiaservices.gov.in/publicsearch/>
2. Keywords Used for Search : AI,Chatbot,Voicobot
3. Search String Used : AI Chatbot Voicobot
4. Number of Results/Hits getting : 109

PART 2: BASIC DATA OF PATENTED INVENTION /BIBLIOGRAPHIC DATA

5. Category/ Field of Invention :
6. Invention is Related to/Class of Invention : Computer Science
6 (a) : IPC class of the studied patent : H04L 12/00
7. Title of Invention : ARTIFICIAL CHATBOTS AND VOICEBOTS FOR SMART CITY CITIZENS SERVICES
8. Patent No. :
9. Application Number : 201821023423
9 (a) : Web link of the studied patent : <http://ipindiaservices.gov.in/PublicSearch/PublicationSearch/Patent>
10. Date of Filing/Application (DD/MM/YYYY) : 06/11/2018
11. Priority Date (DD/MM/YYYY) :
12. Publication/Journal Number :
13. Publication Date (DD/MM/YYYY) :
14. First Filled Country : Albania : 100

15. Also Published as

Sr.No	Country Where Filed	Application No./Patent No.
1		

16. Inventor/s Details.

Sr.No	Name of Inventor	Address/City/Country of Inventor
1	JIMMY PADIA	INDIA

17. Applicant/Assignee Details.

Sr.No	Name of Applicant/Assignee	Address/City/Country of Applicant
1	ZOROIM IPSYSTEMS PRIVATE LIMITED	212-214, Madhav Darshan, Waghawadi Road, Bhavnagar, GUJARAT, INDIA

18. Applicant for Patent is : Company

PART 3: TECHNICAL PART OF PATENTED INVENTION**19. Limitation of Prior Technology / Art**

No limitation found as of now.

20. Specific Problem Solved / Objective of Invention

The main objective of the presently invented method is to make available and aggregate the eGovernance services, ULB (Urban Local Body) services, CCRS (Comprehensive Complain Redressal system), and ICOP (Integrated City Operations Platform) services to Citizens over intuitive AI Chatbot and Voicebot.

The further object of the present invention is to make all the government services and ULB (Urban Local Body) services made available to each citizen of city, town, village through AI (Artificial Intelligence) Chatbot/Voicebot in English as well as a local vernacular language. The present invented Artificial Intelligence bot model is designed, architected and trained for G2C engagement. The further object of the present invention is to engage the citizens specially youth of the country on AI Chatbot. Thereby, revolutionize the G2C (Government to Citizen) engagement space.

21. Brief about Invention

The present invention relates to AI CHATBOT AND VOICEBOT FOR SMART CITY CITIZEN SERVICES. The present invention gives Citizen the power and convenience to access all the local Government services, ULB (Urban Local Body) Services such as complain registration, eGovernance (Birth certificate, death certificate, marriage certificate, payment of property tax, professional tax, water tax, etc.), Citizen complain management (CCRS – Comprehensive Complain Redressal System), ICOP (Integrated City Operations Platform) smart city services (smart parking, temperature, pollution reading, access of IoT devices, GIS, Health management, solid waste management, City Surveillance, etc) through AI Chatbot or Voicebot.

22. Key learning Points

Artificial Intelligence, Voicebot.

23. Summary of Invention

AI bot (Chatbot or Voicebot) services can be used to offer a multitude of services to its users. One such service is the ability to communicate with government agencies, local municipality, and access all government and ULB services (eGovernance, CCRS, and ICOP) through an intelligent chatbot. The intelligent personal assistant is offered to the citizen for communication, information, and to avail of all governance and smart city services either through a Chatbot or Voicebot. Today's government (Local/state/national) needs an effective medium to support and engage their citizens especially the next generation

citizens: millennial. Most of the government services are digitized but usability is still an issue – we don't see citizen usage or participation as expected in using these government websites or apps Interaction/Engagement between the government and citizens feels disconnected and still done using conventional methods such as hoardings or local media (newspaper/TV). A lot of smart city applications, eGovernance, and ULB systems are deployed but there is hardly any usage of these applications because they are deployed in silos (isolation from each other) or are available through multiple web apps or mobile apps.

Most of the Smart city systems are not accessible to citizens at all and have not penetrated in cities, towns, and villages. Each state has more than 150+ ULBs (Urban Local Bodies) – India might have collectively around 3500+ ULBs. The government has launched many online services such as eGovernance, Smart city applications for ULBs but most of them are not accessible to citizens and the usage of these digital systems by citizens is very minimal.

24. Number of Claims : 10

25. Patent Status : Published Application

26. How much this invention is related with your IDP/UDP?

71 to 90%

27. Do you have any idea to do anything around the said invention to improve it? (Give short note in not more than 500 words)

The current invented chatbot platform has an Analyze section to evaluate what are major pain areas of citizens thereby guiding the government to address these issues with high priority. The current invented chatbot platform has Sentiment Analysis of citizens – each chat is tagged as positive, negative, or neutral. While the invention has been described with respect to the given embodiment, it will be appreciated that many variations, modifications, and other applications of the invention may be made.



**GUJARAT TECHNOLOGICAL UNIVERSITY
(GTU)
INNOVATION COUNCIL (GIC)
Patent Search & Analysis Report
(PSAR)**



Date of Submission : 15/10/2020

Dear Majithia Jinesh Prashantkumar,

Studied Patent Number for generation of PSAR : 20BE7_170170107039_4

PART 1: PATENT SEARCH DATABASE USED

1. Patent Search Database used : Indian Patent Office database
Web link of database : <http://ipindiaservices.gov.in/publicsearch/>
2. Keywords Used for Search : Chatbot,Output,User State
3. Search String Used : Chatbot Output Userstate
4. Number of Results/Hits getting : 9004

PART 2: BASIC DATA OF PATENTED INVENTION /BIBLIOGRAPHIC DATA

5. Category/ Field of Invention :
6. Invention is Related to/Class of Invention : Comunicaton
6 (a) : IPC class of the studied patent : H04N 21/4227
7. Title of Invention : FORMING CHATBOT OUTPUT BASED ON USER STATE
8. Patent No. :
9. Application Number : 201847011305
9 (a) : Web link of the studied patent : <http://ipindiaservices.gov.in/PublicSearch/PublicationSearch/Patent>
10. Date of Filing/Application (DD/MM/YYYY) : 03/27/2018
11. Priority Date (DD/MM/YYYY) :
12. Publication/Journal Number : 14/2018
13. Publication Date (DD/MM/YYYY) : 04/06/2018
14. First Filled Country : Albania : 100

15. Also Published as

Sr.No	Country Where Filed	Application No./Patent No.
1		

16. Inventor/s Details.

Sr.No	Name of Inventor	Address/City/Country of Inventor
1	HORLING Bryan	USA
2	KOGAN David	USA
3	GARRETT Maryam	USA
4	KUNKLE Daniel	USA
5	QUAH Wan Fen Nicole	USA
6	HE Ruijie	USA
7	YUAN Wangqing	USA
8	CHEN Wei	USA
9	ITZ Michael	USA

17. Applicant/Assignee Details.

Sr.No	Name of Applicant/Assignee	Address/City/Country of Applicant
1	GOOGLE LLC	USA

18. Applicant for Patent is : Company

PART 3: TECHNICAL PART OF PATENTED INVENTION**19. Limitation of Prior Technology / Art**

No limitation found as of now

20. Specific Problem Solved / Objective of Invention

Chatbots also referred to as "interactive assistant modules," "virtual assistants," and/or "mobile assistants," may be designed to mimic human conversation. For example, a chatbot may greet a user with conversational statements such as "hello" and "how are you today?" Some chatbots may even be configured to identify a state associated with a user statement and respond accordingly. These responses are sometimes difficult for a user to fully understand and/or find meaningful. For example, the language and phrasing of the response may not resonate with the user in question and may as such lead to a more protracted and/ineffective interaction between the chatbot and the user. Chatbots may thus tend to come off as unnatural or awkward.

21. Brief about Invention

Chatbots also referred to as "interactive assistant modules," "virtual assistants," and/or "mobile assistants," may be designed to mimic human conversation. For example, a chatbot may greet a user with conversational statements such as "hello" and "how are you today?" Some chatbots may even be configured to identify a state associated with a user statement and respond accordingly. These responses are sometimes difficult for a user to fully understand and/or find meaningful. For example, the language and phrasing of the response may not resonate with the user in question and may as such lead to a more protracted and/ineffective interaction between the chatbot and the user. Chatbots may thus tend to come off as unnatural or awkward.

22. Key learning Points

NLP, Artificial Intelligence.

23. Summary of Invention

This specification is directed generally to various techniques for tailoring chatbot output to a user's state in order to achieve a more understandable, natural dialog for the user and thereby facilitate more effective communication with the user. For example, the techniques described herein may allow a chatbot to convey meaning to a particular user using language and phrasing which resonates with the user. This may make the overall duration of an interaction shorter than it would otherwise need to be, thereby saving computational load in the computing system hosting the chatbot. As used herein, a user's "state" may refer to a particular condition of the user (at that time or at a previous time) or of another being (e.g., the user's friend/family member/pet), such as an emotional and/or physical condition (e.g., a sentiment of the user). In various implementations, a client device such as a smartphone, smartwatch, standalone voice-activated apparatus, or a vehicle computing system (e.g., vehicle navigation or media management system) that operates a chatbot may receive input from the user. The input may arrive during a first "session" between the user and the chatbot in various forms, including but not limited to spoken or voice input, typed input, gesture input, eye movement input, facial expression input, and so forth. The chatbot may semantically process the input to determine a state of the user (e.g., sentiment) expressed by the user, and may store an indication of the state of the user for later use. For example, suppose during a first session a user indicates a negative state, e.g., by saying, "I feel lousy," or by making a facial expression associated with negativity (e.g., frowning, grimacing, etc.). The chatbot may detect and retain in memory an indication of the user's negative state, such as the user's actual statement and/or a sentiment measure. During a subsequent session with the user, the chatbot may form, e.g., from one or more candidate words, phrases, or statements, one or more statements (e.g., empathetic statements such as "I hope you're feeling better," "I hope your dog is feeling better," or inquiries such as "are you feeling better?" etc.) to output to the user based on the stored user state indication. In this manner, the chatbot is able to retain the knowledge of the user's state over time and is able to engage the user in a more understandable manner and effective manner.

24. Number of Claims : 22

25. Patent Status : Published Application

26. How much this invention is related with your IDP/UDP?

71 to 90%

27. Do you have any idea to do anything around the said invention to improve it? (Give short note in not more than 500 words)

No, as of now.



**GUJARAT TECHNOLOGICAL UNIVERSITY
(GTU)
INNOVATION COUNCIL (GIC)
Patent Search & Analysis Report
(PSAR)**



Date of Submission : 15/10/2020

Dear Majithia Jinesh Prashantkumar,

Studied Patent Number for generation of PSAR : 20BE7_170170107039_5

PART 1: PATENT SEARCH DATABASE USED

1. Patent Search Database used : Indian Patent Office database

Web link of database : <http://ipindiaservices.gov.in/publicsearch/>

2. Keywords Used for Search : Language Learning,Independent Learning,Chatbot

3. Search String Used : Language Independent Learning

4. Number of Results/Hits getting : 1910

PART 2: BASIC DATA OF PATENTED INVENTION /BIBLIOGRAPHIC DATA

5. Category/ Field of Invention :

6. Invention is Related to/Class of Invention : Computer Science

6 (a) : IPC class of the studied patent : G06F0017270000, G06N0003080000, G06N0005020000, G06F0017280000, G06N0003040000

7. Title of Invention : SYSTEM AND METHOD FOR LANGUAGE INDEPENDENT ITERATIVE LEARNING MECHANISM FOR NLP TASKS

8. Patent No. :

9. Application Number : 201941006161

9 (a) : Web link of the studied patent : <http://ipindiaservices.gov.in/PublicSearch/PublicationSearch/Patent>

10. Date of Filing/Application (DD/MM/YYYY) : 02/15/2019

11. Priority Date (DD/MM/YYYY) :

12. Publication/Journal Number : 34/2020

13. Publication Date (DD/MM/YYYY) : 08/21/2020

14. First Filled Country : Albania : 100

15. Also Published as

Sr.No	Country Where Filed	Application No./Patent No.
1		

16. Inventor/s Details.

Sr.No	Name of Inventor	Address/City/Country of Inventor
1	BALAJI JAGAN	INDIA
2	GOPICHAND AGNIHOTRAM	INDIA
3	MEENAKSHI SUNDARAM MURUGESHAN	INDIA

17. Applicant/Assignee Details.

Sr.No	Name of Applicant/Assignee	Address/City/Country of Applicant
1	WIPRO LIMITED	INDIA

18. Applicant for Patent is : Company

PART 3: TECHNICAL PART OF PATENTED INVENTION**19. Limitation of Prior Technology / Art**

No limitation found as of now.

20. Specific Problem Solved / Objective of Invention

A method and system of language-independent iterative learning mechanism for Natural Language Processing (NLP) tasks are disclosed. The method includes identifying at least one NLP feature associated with a set of words within a sentence for an NLP task. The method includes creating a pattern associated with the sentence for the NLP task, based on the at least one NLP feature associated with the set of words and the linkage relationship between each subset of two adjacent words. The method further includes computing a confidence score corresponding to the pattern, based on comparison within a trained dataset. The method further includes assigning a pattern category to the pattern, based on the confidence score and a predefined threshold score. The method further includes executing the NLP task based on the assigned pattern category.

21. Brief about Invention

A method and system of language-independent iterative learning mechanism for Natural Language Processing (NLP) tasks are disclosed. The method includes identifying at least one NLP feature associated with a set of words within a sentence for an NLP task. The method includes creating a pattern associated with the sentence for the NLP task, based on the at least one NLP feature associated with the set of words and the linkage relationship between each subset of two adjacent words. The method further includes computing a confidence score corresponding to the pattern, based on comparison within a trained dataset. The method further includes assigning a pattern category to the pattern, based on the confidence score and a predefined threshold score. The method further includes executing the NLP task based on the assigned pattern category.

22. Key learning Points

Language-Independent Iterative Learning through NLP tasks.

23. Summary of Invention

A method and system of language-independent iterative learning mechanism for Natural Language Processing (NLP) tasks are disclosed. The method includes identifying at least one NLP feature associated with a set of words within a sentence for an NLP task. The method includes creating a pattern associated with the sentence for the NLP task, based on the at least one NLP feature associated with the set of words and the linkage relationship between each subset of two adjacent words. The method further includes computing a confidence score corresponding to the pattern, based on comparison within a trained dataset. The method further includes assigning a pattern category to the pattern, based on the confidence score and a predefined threshold score. The method further includes executing the NLP task based on the assigned pattern category.

24. Number of Claims : 10

25. Patent Status

: Published Application

26. How much this invention is related with your IDP/UDP?

71 to 90%

27. Do you have any idea to do anything around the said invention to improve it? (Give short note in not more than 500 words)

No, as of now.