A
Project Report
on

Feasibility study of AI Adoption in business verticals

Developed By

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developed at

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as

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Under The Guidance of

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Submitted To

Department of MCA
Faculty of IT & Computer Science
PARUL University

CERTIFICATE

This is to certify that **Mr. Pawan Rajpurohit, Enrollment No. 170511201722** student of Master of Computer Applications has satisfactorily completed the Major Project on **"Feasibilty study of AI Adoption in Business verticals"** at **Collabera Inc Pvt Ltd** as fulfillment of MCA Semester VI.

Seat No. _____ Date of Submission: _____

_____	_____	_____
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Department of MCA
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Preface

This project of “Feasibility Study of AI Adoption in Business Verticals: Feedo Chatbot a Feedback chatbot” titled as “**Feedo**” gives complete information of services or plan. There will be a three user’s User, Admin and Botmaster. This website provides a portal to users for feedback leaving option. For users this website provides information of company, users can select options and request will go to admin. The Feedo chatbot is the only option in the environment of the company that allows the users to express their experiences and thoughts about the company processes and tasks.

at the last, I gratefully acknowledge and express my gratitude towards external and internal guide and friends who supported me in preparing this project.

Acknowledgement

I would like to thank respected **Dr. Priya Swaminarayan** for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a major project report. It helped me a lot to realize of what I study for.

Secondly, I would like to thank my parents who patiently helped me as I went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs. It is very common to see that a man's quest of knowledge never ends. Theory and Practical knowledge are essential and complimentary to each other. I am very thankful to **Prof. Kaushal Gor,** Faculty of the MCA Department, who provided this opportunity for me to work on the major project topic. I express our deepest gratitude to our project guide **Dr. Priya Swaminarayan**, whose continuous encouragement and valuable suggestions has helped me to complete my project successfully.

I express my sincere thanks to the entire Parul University units for their kind help and cooperation. Finally, I am thankful to the entire staff of the M.C.A. department, and all our colleagues for their kind cooperation. All of these have made my project a success.

Pawan Rajpurohit (170511201722)

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1. About Department of MCA

The Department of Master of Computer Application at Parul Institute of Engineering and Technology - MCA emphasizes on building professionals in the domain of computer applications by providing necessary environment by means of facilitating suitable blend of technical and non-technical learning experience. The department cultivates students in various curricular, co-curricular and extra-curricular activities in order to produce future system analysts, system designers, and system programmers, application programmers, testing professionals, system managers, project managers, researchers and other leading positions in systems/IT department.

The department offers various subjects from diversified technical/non-technical areas such as – core IT domain, management, communication skills, mathematics & logic building and rich pool of elective subjects.

By means of active collaboration with eminent academicians and industry-professionals, the Department emphasizes on continuous improvements in course curriculum, teaching-learning practices and evaluation methods. The department of MCA also emphasizes on offering diversified additional courses related to carrier development, communication skills improvement, skill development courses, vocational courses and entrepreneurship for overall development of student.

The department of MCA focuses on project-based learning, and hence students are motivated to work on tiny hands-on projects in practical oriented subjects to get better exposure. Moreover, throughout their MCA studies, students are required to work on around 3 mini/major projects in individual/team to get enough confidence on software-development and thereby become industry-ready.

2. Company Profile

Collabera Inc is a company headquartered in Basking Ridge, New Jersey that provides professional information technology recruiting, staffing, consulting, and business services to companies worldwide. Collabera is one of the largest minority-owned IT staffing firm in the country, according to Staffing Industry Analysts, an industry advisory firm. Additionally, Collabera is the largest privately held Technology Company in New Jersey, by revenue, with $525 million in revenue for 2015 and approximately 4,200 employees throughout their New Jersey offices.

Collabera's North American headquarters is in Basking Ridge, New Jersey, while its Asia Pacific headquarters is in Vadodara, Gujarat India. Collabera has offices in the United States, India, the Philippines, Singapore, Canada, the United Kingdom, Ireland, and Malaysia.

Originally under the name GCI (Global Consultants, Inc.), Collabera opened for business in 1991, providing information technology services to companies worldwide. The company was purchased by Hiten Patel in 1997 for $2 million and grew into a $520 million company by 2014.Shortly thereafter, in 2007, GCI began a series of company acquisitions, including IVL India (for SAP Services).Planet Asia, and Blue Hammock (for Strategic Consulting).In 2008, GCI changed its name to Collabera.

In 2012, Collabera began a period of corporate expansion and reorganization as their IT services wing became a $100 million section of the company, which was by then worth $500 million overall. The company built a third development center (along with existing ones in Bangalore and Trivandrum) named "Collabera House" in Vadodara, India, with plans to open another in the country The following year, Raj Mamodia was appointed as Collabera's new CEO.Then, in 2014, Collabera spun off its IT services wing into the subsidiary company Brillio, while Collabera retained its staffing service business. Raj Mamodia was transitioned to the role of CEO of Brillio, and Hiten Patel resumed his previous role as Collabera's CEO. [1]

3. Project Profile

3.1 Project Definition

The project Feasibility study of AI adoption in business verticals is all about automating business processes using Artificial Intelligence. In which, Manual tasks in the business that consumes more time, efforts and resources will be taken as problem statement.

A chatbot (sometimes referred to as a chatterbot) is programming that simulates the conversation or "chatter" of a human being through text or voice interactions. Chatbot virtual assistants are increasingly being used to handle simple, look-up tasks in both business-to-consumer (B2C) and business-to-business (B2B) environments. The addition of chatbot assistants not only reduces overhead costs by making better use of support staff time, it also allows companies to provide a level of customer service during hours when live agents aren't available.

So, Feedo is an innovative way to bring back the solutions and suggestions that user has, Because user of the process is the only one who can tell, i.e. How can it be improved?, What lacks? How to a particular business process can be carried out? Etc.

3.2 Project Description

Many Indian enterprises have started their AI journeys only recently and have made selective investments to automate their adoption. According to the report, nearly one in five organizations has already inched ahead with similar implementations. This number is anticipated to soar considerably over the next 13 months with nearly seven in 10 firms (68.6 percent) set to leverage cognitive systems, indicating that the technology will reach mainstream adoption.

So, it is very important now to adopt AI in the business, Because AI is the only feasible tool that exists in the market that allows a business to grow and persist in the competition.

Chatbot is a technique to save resources of an organization and maintain productivity even while in down-times. A chatbot is artificial intelligence (AI) software that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, and mobile apps or through the telephone.

Chat bots are important, A chatbot is often described as one of the most advanced and promising expressions of interaction between humans and machines. However, from a technological point of view, a chatbot only represents the natural evolution of a Question Answering system leveraging Natural

Language Processing (NLP). Formulating responses to questions in natural language is one of the most typical Examples of Natural Language Processing applied in various enterprises' end-use applications. [2]

3.3 Existing System

In this project, analyzing the existing scenarios where AI can be adopted is the prior task. Therefore, existing system can be any manual task that is supposed to be automated. So, there is not any existing or legacy system as such for this project.

There are many chat bots existing in the environment of the company, but they all are assigned particular jobs and designed accordingly. Hence, creating a chatbot for a need is the task that is being accomplished throughout this project.

A business process that can be defined in a following manner: Any task or process has two users, 1- Who creates it, 2- Who uses it, So every process must have a section that allows users who have created it to understand that what they have created is worth or not.
Therefore the chatbot for feedback is proposed.

3.4 Problem Statements

Business processes that are manual and cumbersome must be automated using Artificial Intelligence. To do feasibility study of AI adoption in business verticals. Following scenario is being considered.

In the process of recruiting, the candidates apply and then visit the company premise. But at the end they do not get any chance to register their views about the whole process they went through and/or the interview they have given. Such scenarios can affect the company reputation and productivity, so understanding the issues and suggestions given by the candidates is a must for a business to have.

Artificial intelligence chatbot is a technology that makes interactions between man and machines using natural language possible. This research is focused on enabling chatbot to become an interface between that can process the question with the relation to the topic chatbots is designed. Therefore, that is why the Feedo chatbot project is proposed.

3.5 Needs for New System

Computer programs which can have real conversations are known as chatbots. A chat interface allows chatbots to converse with users. Chatbots can be used with almost all popular messaging apps. These bots can be given distinct personalities as well. Chatbots can understand written and spoken text, and

interpret its meaning. The bot can then look up relevant information and deliver it to the user. Most modern smartphone apps rely on chatbots to function.

The cost and power of a chatbot depend on the technology it uses. **There are two categories of chatbots**:

1. General purpose chatbots
2. Specialized chatbots

The general purpose chatbots are the ones that are basic and have no special knowledge or tasks. In other words, a general purpose Chatbot will be a bot that is for entertainment purpose only. While on the other hand the second category is about the specialized chatbots, today in the market this category of Chatbot are more famous. Such chatbots can accomplish tasks that only human could do initially.

To save resources like time, money and effort of any task or process in the business, Tasks must be automated, easy to carry and intuitive. The system is not changed only a feature to an application is being added to predict the future performance.

Feedback is such a crucial factor in any business, that if it does not exit than it might affect the business in long run. Any business when needs to grows, the feedbacks of users help it a lot, In terms of which direction should they take to grow the business.

The system that allows the users to say and recruiters to listen is something that is required. A protocol is being decided that the user must have a portal or a web destination in the area of company, Where he can come and share his thoughts about the company and the rate the experiences he had. There are many ways in which business owners are using chatbots to enhance customer experience.
Using chatbots for specialized tasks:

There are several tasks which chatbots can do quickly and more efficiently than their human counterparts. Tasks such as checking the weather, ordering a pizza or hiring cabs can be done more efficiently with chatbots. In a similar vein, businesses can use Chatbot to automate tasks such as inventory ordering and management and now to receive feedbacks.

Better service on smart phones and tablets:

The world is moving towards a mobile future. Today, mobile phone users far outnumber the laptop and PC users. Use of chatbots in mobile apps has helped in creating more streamlined app interfaces. The user can browse, compare, buy and get support from a single interface. That is why the Feedo Chatbot is being made as a smartphone friendly application. [9]

Chatbots have existed for decades, but businesses have only recently begun to exploit the opportunities they provide. You can find chatbots in messaging apps on smartphones for personal use or on company websites for business use. A well-optimized chatbot can be a great addition to a company's website because it can help to boost your conversion rates.

The real credit for bringing chatbots further into the spotlight goes to Facebook Messenger, because Facebook made it possible to integrate chatbots into the platform.

In 2016, messaging apps had already surpassed social media and the four biggest messaging apps had reached about 4 billion users, which is a huge potential for businesses. [10]

To gain following benefits the Chatbot is being adopted,

1. Chatbots have potential: Even though they are increasingly used, the modern chatbot is still a young technology. With the continuing development of AI, the potential for bots in business and personal lives is unlimited.
2. They can be easy to build: It depends on what you want to achieve, of course, but you can design a simple chatbot based on the Facebook Messenger without any programming experience.
3. Chatbots emphasize the company's brand and image: The chatbot represents the company when it is communicating with the customer, so, from a marketing point of view, it is a perfect embodiment of brand building.
4. They offer straightforward services: A well-optimized chatbot communicates only the essentials and does not overwhelm the user.
5. Chatbots automate processes: Bots are able to take on human work for, generally speaking, mundane or basic analytic tasks. [10]

3.6 Proposed System

The proposed system is an Artificial Intelligent process that allows the business to save resource and makes maximum output out of it. Proposed system can generate same output as existing systems or better than that. Proposed system that holds the objective of proving optimum solution for any business process.

The business process that holds much weightage on the resources of the business that needs an optimum solution, In businesses like staffing and delivery process are much more longer and time consuming, A proposed AI solution is the one that does not decrease the length of the task but improves it at every step of its execution.

Feedo's Feedback Bot leverages the power of conversational interfaces to better understand what your customers think about your services. Segment your users and run multi-channel feedback campaigns using customizable bots to get all insights in one place. Feedo's intuitive dashboard brings all the qualitative and quantitative feedback together to provide actionable insights.

3.7 Scope

The scope of project is the business that holds rights and uses the project. The system that can be adopted in any business vertical is expected to work in the area of the business. The main area of project is to predict the future performance of any selected business parameters. Business processes like staffing which includes sales and delivery, can be improved by an adoption of AI that either allows the business to predict the future or allows the business person to understand the current situation.

Talent acquisition leaders report that their hiring volume will increase next year but their recruiting teams will remain the same size or even contract. This means recruiters will be expected to become more efficient by “doing more with less.”

Manually screening resumes is still the most time-consuming part of recruiting, especially when 75% to 88% of the resumes received for a role are unqualified. Screening resumes and short listing candidates to interview is estimated to take 23 hours of a recruiter’s time for a single hire.

AI for recruiting represents a boon for recruiters if it can successfully automate time-consuming, repetitive tasks such as screening resumes or scheduling interviews with candidates.

The best AI-powered technology will be designed to not only automate a part of your workflow but to integrate seamlessly with your current recruiting stack so it doesn't disrupt your workflow.

As a bonus, speeding up these parts of recruiting through automation reduces time-to-hire, which means you'll be less likely to lose the best talent to faster moving competitors.

3.8 Outcomes

The outcomes of this project are predicting future. As in, Business that needs a better way of conceiving the future scenarios of any business process. Performance of any business process that needs an operation into evaluation of the future performance.

The chatbot allows the organization to understand the need of candidates and customers, for performance improvement and technical improvement. The data generated by the chatbot is expected to be used for better future understandings as well as predictions. The business process that has feedback as its last step, Is very crucial and integral part of the business.

The feedback step allows the users to express themselves and the recruiters and company people get to understand what they can improve and be better at. Outcomes such as better business prediction can make the company grow more in a very secure manner, any organization, always seeks growth with the security of its assets and income.

If an organization has data about how the user is feeling about their business and processes, then using the same data, the organization can make changes into business processes and allows the new changes for betterment of the business as well as the whole organization.

3.9 Tools & Technology used

Python (Programming Language): Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales. Van Rossum led the language community until stepping down as leader in July 2018.

Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented, imperative, functional and procedural, and has a large and comprehensive standard library. Hence, as a programming platform Python has been selected because it provides wide range of libraries and tools compatibility. [3]

AIML: AIML, or Artificial Intelligence Markup Language, is an XML dialect for creating natural language software agents. The XML dialect called AIML was developed by Richard Wallace and a worldwide free software community between 1995 and 2002. AIML formed the basis for what was initially a highly extended Eliza called "A.L.I.C.E. ("Artificial Linguistic Internet Computer Entity"), which won the annual Loebner Prize Competition in Artificial Intelligence three times, and was also the Chatterbox Challenge Champion in 2004.

AIML allows creating the dialog flow in an easy fashion, in other words tags. So AIML has been selected as a core tool for the project. [4]

Flask Web Framework: Flask is a micro web framework written in Python. It is classified as a micro framework because it does not require particular tools or libraries (except for some basics standard libraries such as bottom.py).

It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common functions. However, Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, and upload handling, various open authentication technologies and several common framework related tools.

Extensions are updated far more regularly than the core Flask program. Flask is commonly used with MongoDB, which gives it more control over databases and history. Flask has its own benefits and allows running apps using its own server [5]

3.10 Project Plan

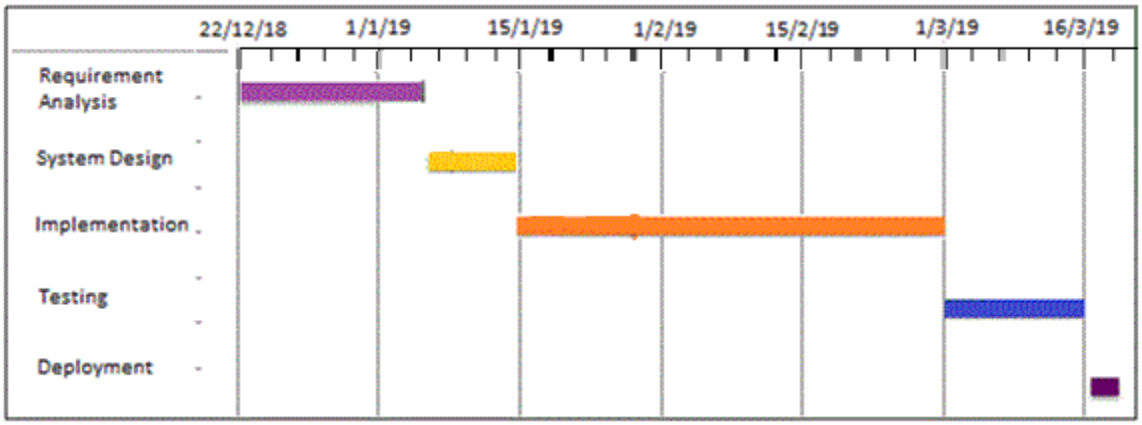


Figure 1 - Gantt chart

The figure 1 shows the Gantt chart of the project development. In other words, when which task is being done, that is shown graphically in the figure 1.

4. Requirement Analysis

4.1 Feasibility Study

The following feasibility studies have been done for the project.

1. Technical Feasibility:

The technicality of the project is to deliver an output with some visualization and/or numerical data representation or create a data for future analysis. So here, two programming languages are under focus. Python and R Programming language. These two languages are two of the most dominant programming languages in data analysis and have great support libraries for Artificial Intelligence, especially Python Programming language.

The selected business process is about how the business can improve. For which feedback is a must parameter to have. When a user uses a system or goes through a process, he certainly has thoughts and suggestions. To capture such valuable feedbacks it must technically feasible to create such a system.

Under the study of Feasibility study of AI adoption, Chatbot has happened to be most technically feasible to create in a span of short period academically. The technology that has most features and technical support for creation of such project is Python. The supportive libraries that exist in Python environment are opulent and have great documentation support.

2. Economical Feasibility:

Economic feasibility analysis is the most commonly used method for determining the efficiency of a new project. It is also known as cost analysis. It helps in identifying profit against investment expected from a project. Cost and time are the most essential factors involved in this field of study. [12]

The purpose of an economic feasibility study (EFS) is to demonstrate the net benefit of a proposed project for accepting or disbursing electronic funds/benefits, taking into consideration the benefits and costs to the agency, other state agencies, and the general public as a whole. [13]

The environment that this project need is the very basically equipped systems and some licensed versions of tools like Power BI by Microsoft. Other economical hikes are unexpected during this project because mostly the project will be carried out by open source technologies.

This assessment investigates whether any aspect of the proposed project conflicts with legal requirements like zoning laws, data protection acts, or social media laws. Let’s say an

organization wants to construct a new office building in a specific location. A feasibility study might reveal the organization's ideal location isn't zoned for that type of business. That organization has just saved considerable time and effort by learning that their project was not feasible right from the beginning. [14]

The business process needs are very miscellaneous and mostly the technologies needed are free or open source. Python and AIML are a perfect fit to any Economical study of the project. These technologies are open source and need no extra knowledge from the programmers. So programmer can learn such technologies on their own and develop the chatbot from scratch.

The run time environment of the project is also economical feasible, the server and platform both are open source technologies and need no other extra cost rather than deployment tools, i.e. Hardware.

3. Operational Feasibility:

Operational feasibility refers to the measure of solving problems with the help of a new proposed system. It helps in taking advantage of the opportunities and fulfills the requirements as identified during the development of the project. It takes care that the management and the users support the project.

After analyzing the technical, economic, and scheduling feasibility studies, next would come the operational analysis. In order to determine if the redesign of the workspace environment would work, an example of an operational feasibility study would follow this **path based on six elements**:

1. **Process** – Input and analysis from everyone the new redesign will affect along with a data matrix on ideas and suggestions from the original plans.
2. **Evaluation** – Determinations from the process suggestions; will the redesign benefit everyone? Who is left behind? Who feels threatened?
3. **Implementation** – Identify resources both inside and out that will work on the redesign. How will the redesign construction interfere with current work?
4. **Resistance** – What areas and individuals will be most resistant? Develop a change resistance plan.
5. **Strategies** – How will the organization deal with the changed workspace environment? Do new processes or structures need to be reviewed or implemented in order for the redesign to be effective?
6. **Adapt & Review** – How much time does the organization need to adapt to the new redesign? How will it be reviewed and monitored? What will happen if through a monitoring process, additional changes must be made?

The most important part of operational feasibility study is input—from everyone, especially when it affects how or what an organization does as far as processes. If the process were to build a new sports arena for a client, then a study determining how the arena will operate in a way that is conducive to its inhabitants, parking, human flow, accessibility and other elements is a good example of an operational feasibility study.

Create a sample operational feasibility study if you plan to change something inside the company that will affect how the organization runs or when a client asks you to explore a new product or process that will affect elements within their own organization. [11]

The operational feasibility of the project is to fulfill the organizational objectives to better the business and omit the errors that are more likely to happen.

The project when developed requires business connection in real terms. To plot the data and predict the future scenarios need direct and constant connection with actual business data. Henceforth, it is to be noted that what the data is and how it will be predicted is not a subject to disclosure. In other words, the data and interoperability is proprietary to the company.

The operation feasibility study has been done in terms of what things will be needed and those things are feasible or not. Once the project is fully developed, it needs a hosting server and an UI device for execution.

It is to be noted that the project is supposed to run in local environment, but must run online. So the operation performed will be executed on the server and catch the data provided by the user. Later on, it is expected to analyze the stored data and create visualization and future prediction.

4.2 Users of the system

The system end users of the system refer to the people who use computers to perform their jobs, like desktop operators. Further, end users can be divided into various categories. Very first users are the hands-on users. They actually interact with the system. They are the people who feed in the input data and get output data. [15]

The project mainly has three users,

1. Admin
2. User
3. Botmaster

These three users will have the prominent roles in the environment of Feedo chatbot project. The admin is expected to manage the backend part, like maintaining the feedbacks received and forwarding them into respective departments. The admin will have many rights like to view the feedbacks and delete them after analysis.

On the other hand the second user is the End User of the system. The UI will be provided to users and using that users will access the Feedo bot. User will follow the instructions given by the chatbot(of course as per its design) and fit their feedback into the system. After everything the user must say send to submit the copy of feedback they have given.

The other and last user of the Feedo chatbot is the botmaster. According to a Google definition a botmaster is a person who controls a bot or teaches the bot how to behave and react into certain situation. The botmaster will be responsible for bot's behavior and reactions as well as the answers it gives on a particular question asked.

4.3 Modules of the system

The modules of the system Feedo are as explained below,

1. Chatting Module
2. Feedback Module
3. Knowledge Module

These modules of the system are based on purely internal functionality.

4.4 Process Model

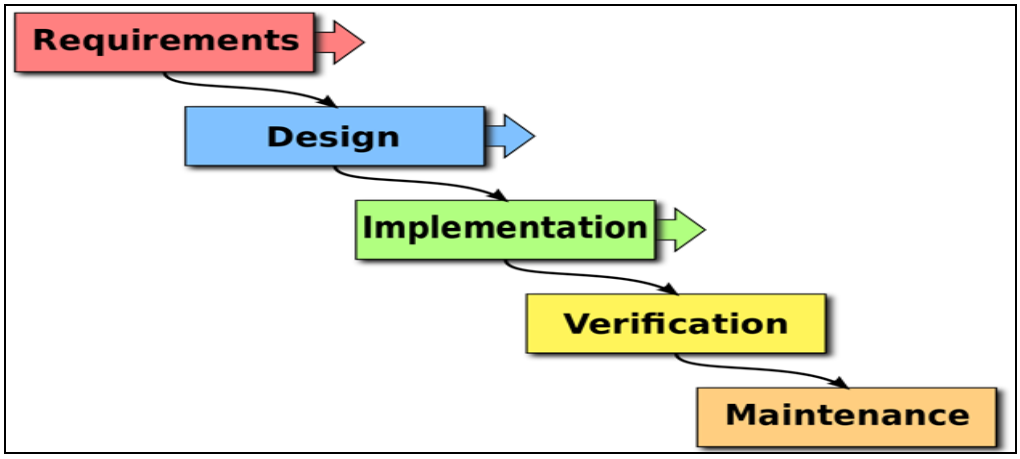


Figure 2 – Waterfall Process Model

As the figure 2 shows, the project follows the waterfall model.

The project Feasibility Study of AI Adoption in Business Verticals has fixed requirements. For any such scenarios where requirements are not going to be changed, Waterfall model is very much suitable for such projects.

Benefit of using Waterfall model is to not make any process difficult and go through the each stage once and get the project in a very easy manner. Especially when the requirements of the users are the fixed than Waterfall model is the utmost suitable. Hence Waterfall model is selected as the process model for Feasibility Study of AI Adoption in Business Verticals.

4.5. Hardware & Software Requirements

Server Side

Software Requirements

1. Operating system: window 7 or Above
2. Database: MySQL Server
3. Browser: Mozilla, Opera, Chrome, Internet Explorer
4. Web Server: Flask Server

Hardware Requirements

1. Processor: Intel® Core™ i3-8145U
2. RAM: 2GB
3. Hard disc: 20GB

Client Side

Software Requirements

1. Operating system: window 7 or Above
2. Operating system for Mobiles: Latest Android OS/Latest iOS
3. Browser: Mozilla, Opera, Chrome, Internet Explorer

Hardware Requirements

1. Processor: Latest processor
2. RAM: 2GB
3. Hard disc: 20GB

4.6 Use Cases

There are some functions and operations some of which will be handled by users and some will be handled by administrator.

1. Chat
2. Leave Feedback
3. Add information
4. View information
5. Update information
6. View logs
7. Delete logs
8. View feedbacks
9. Delete feedbacks

4.7 Use Case Diagram

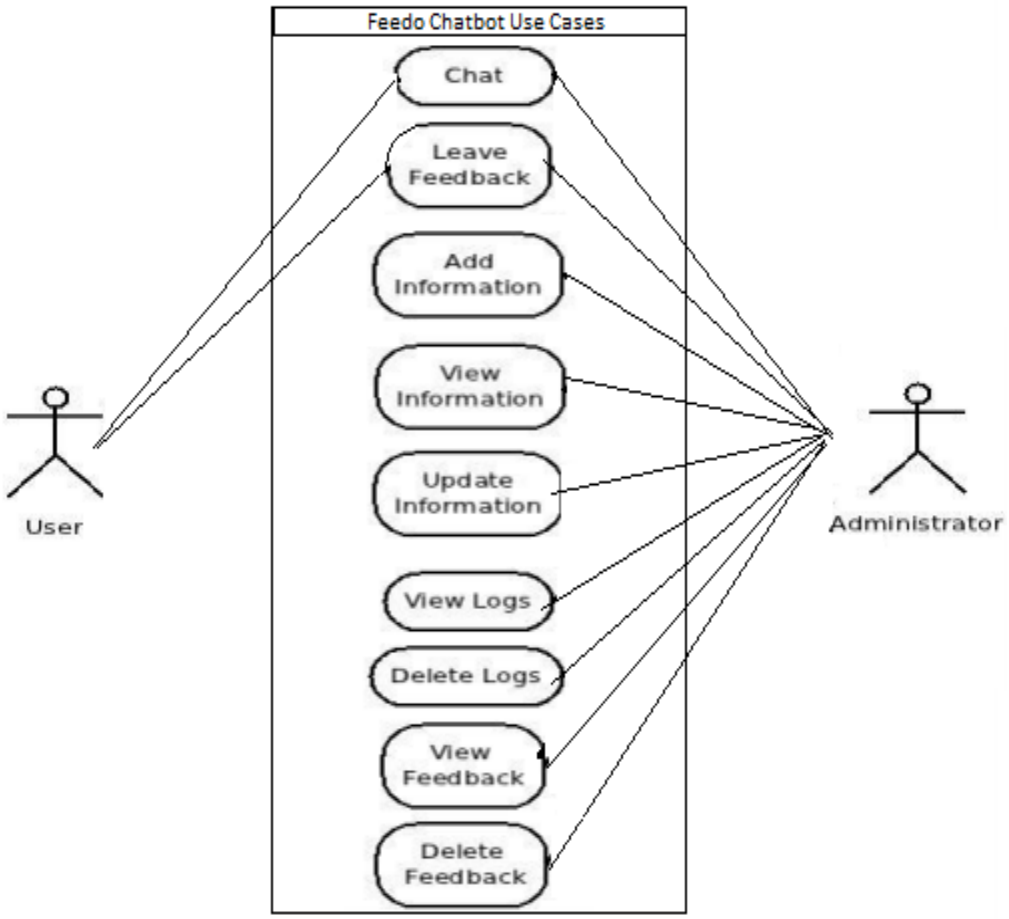


Figure 3 – Use Case Diagram

The Figure 3 shows the use case diagram of the Feedo chatbot. There are functions connected to actors like User and Administrator that shows which function is carried out by whom.

5. Design

5.1 Use Case Scenarios:

1. Chat: In this scenario, the actor user will interact with the application. User will give an input in form of question or query, and the application will provide an output in form of an answer or result.

2. Leave Feedback: User if wants to give any feedback than he can Leave Feedback option, he may send a feedback to the recruiters. User needs to provide details like name, email id, suggestion and/or complaint.

3. Add information: The actor Administrator can add information in terms of general questions that user may ask, update the knowledge base of the bot.

4. View information: The actor Administrator can view the information that the application contains. This information generally will be about user and the conversations they had.

5. Update information: The actor Administrator can update the information of the application. There is a common database of Feedo web application. Therefore, the Administrator can update the information any time he wants, General information about inactive users and their data must be deleted after some period. Therefore, the Administrator has privileges to delete the information of Feedo web application.

6. View Logs: The Administrator can view the logs of application of Web and Mobile both. The Application maintains some logs for quick information storage and retrieval. Therefore, the administrator has rights to view the logs.

7. Delete logs: The Administrator actor can when feels required delete the logs. After some period, the logs may become useless for the user and admin also. Therefore, to delete them the administrator has rights.

8. View feedback: When a user submits any feedback about the application or service, the administrator can see what users have submitted. In other words, the admin has rights to view all the stored feedbacks.

9. Delete feedback: If admin has viewed and acknowledged a feedback after that, he may delete that. Admin if needs to delete any viewed or unviewed that he will be having full rights to do so.

5.2 Structured Diagrams

5.2.1 Data Flow Diagram

- **Context level data flow diagram**

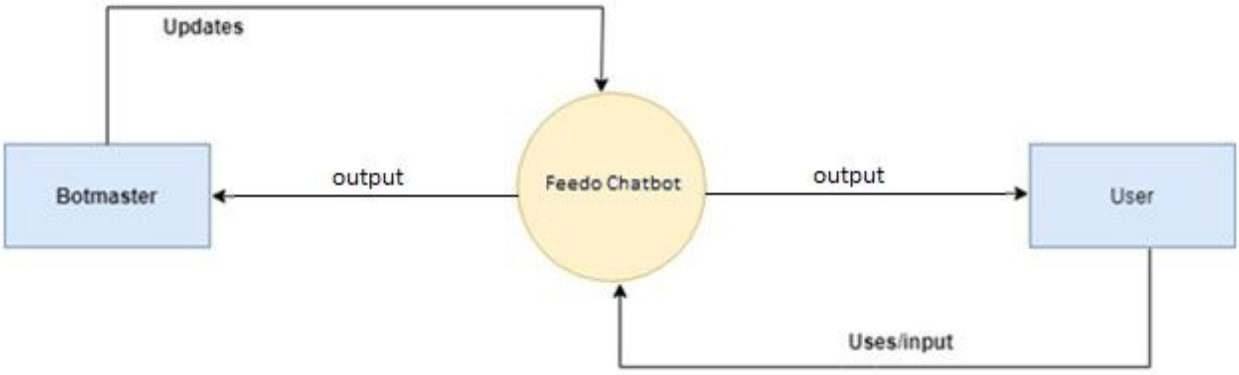


Figure 4 – Context Level data flow diagram

The figure 4 shows the context level data flow diagram of the Feedo Chatbot. In which, it is understood; that there are two main users of the system, 1st is end user and 2nd is Botmaster.

- **First level Data Flow Diagram – Botmaster**

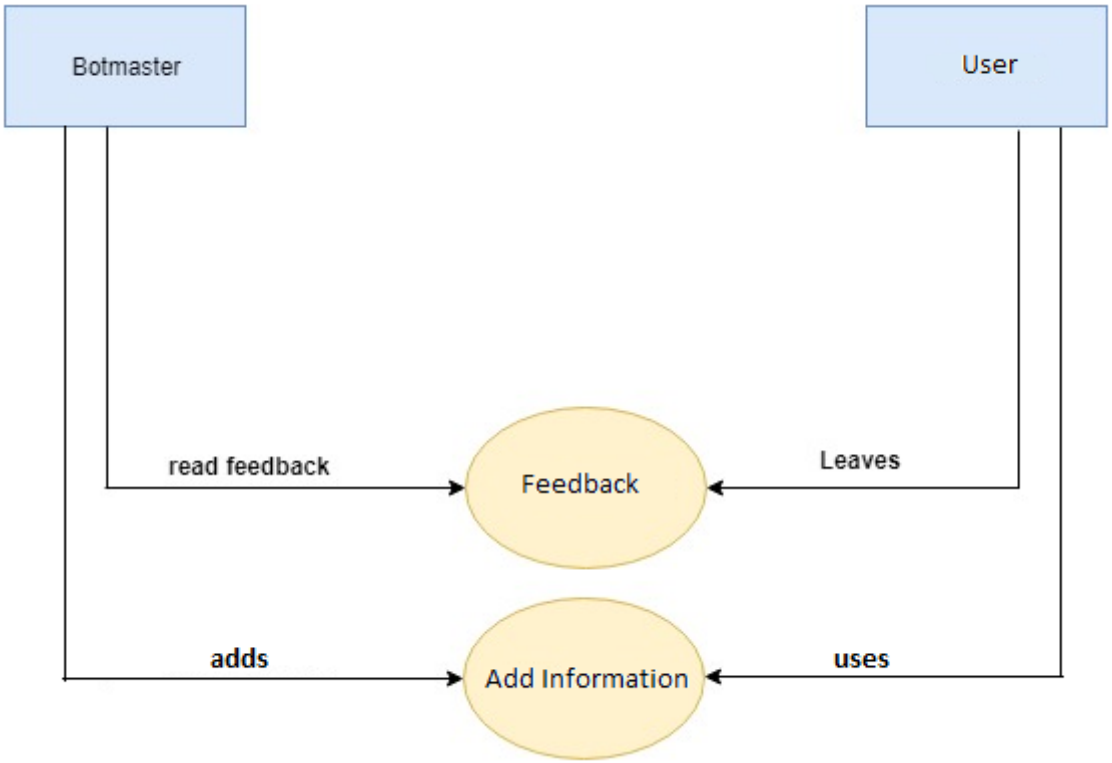


Figure 5 – First level data flow diagram- Botmaster

The figure 5 shows the 1st level of data flow diagram. In which user gives feedback, That Botmaster uses, and botmaster adds information like questions and answers. This is botmaster side data flow diagram.

- **First level Data Flow Diagram – Admin**

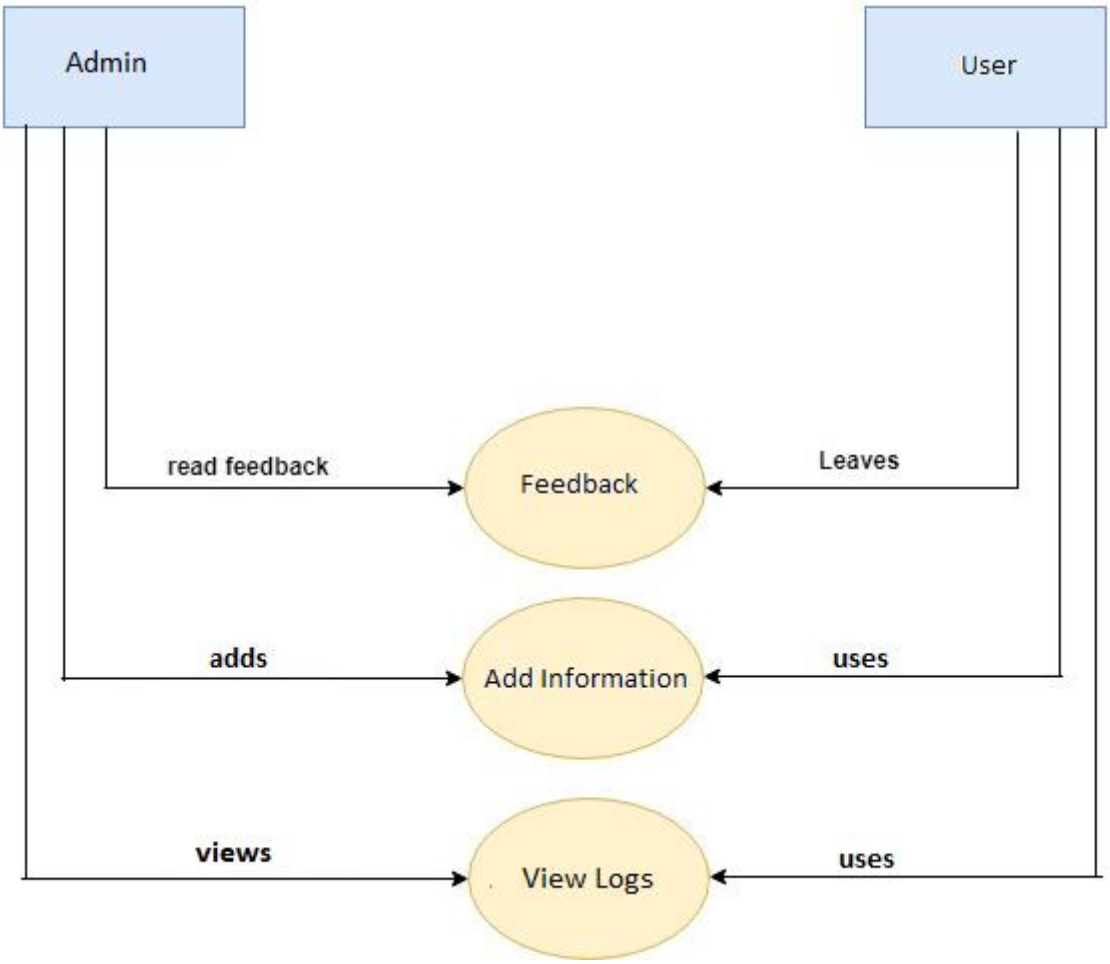


Figure 6 First level data flow diagram - Admin

Figure 6 shows First level Data Flow Diagram of the admin side.

5.2.2 System Flow Chart

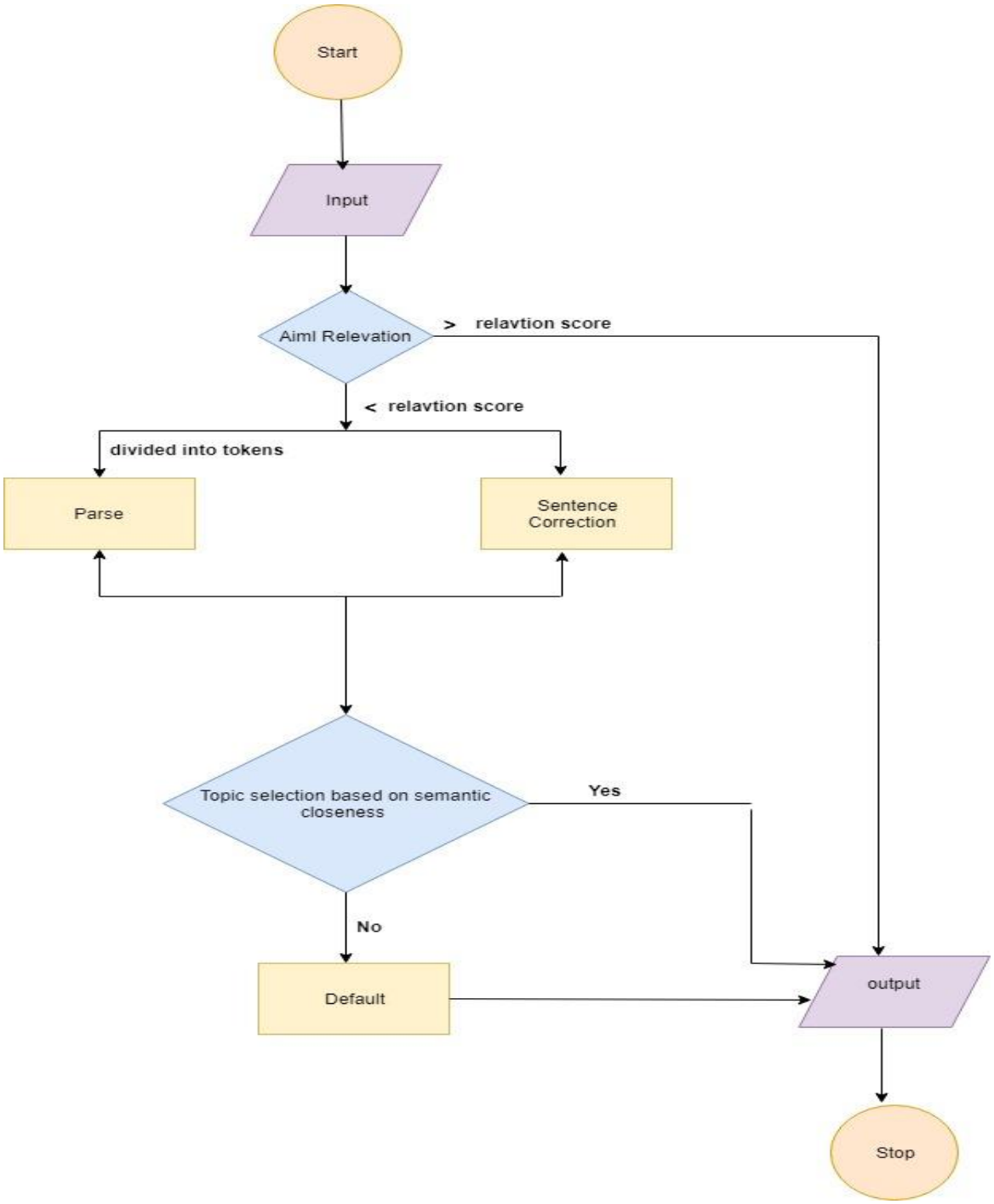


Figure 7 – System Flow chart

The figure 7 shows the entire system workflow. How a user question is found out answer for. When a user asks a question how the system takes decisions is shown in the figure 7.

5.2.3 Structure Diagram

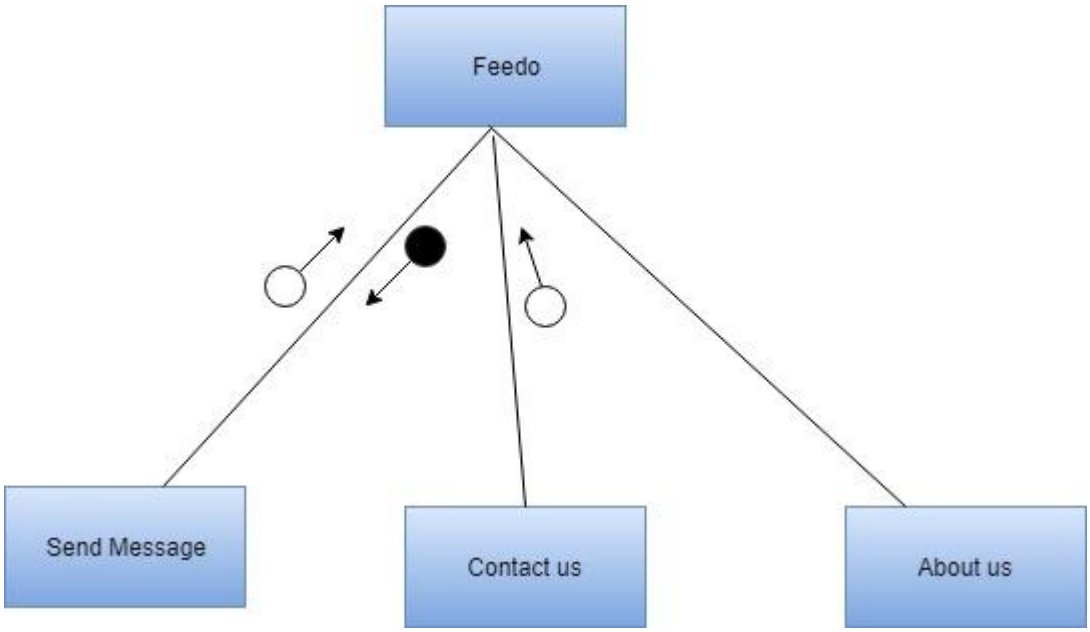


Figure 8 – Structure Diagram

The figure 8 shows structure diagram shows how the system is having different modules and how the data flows within them.

5.3 Entity Relationship Diagram

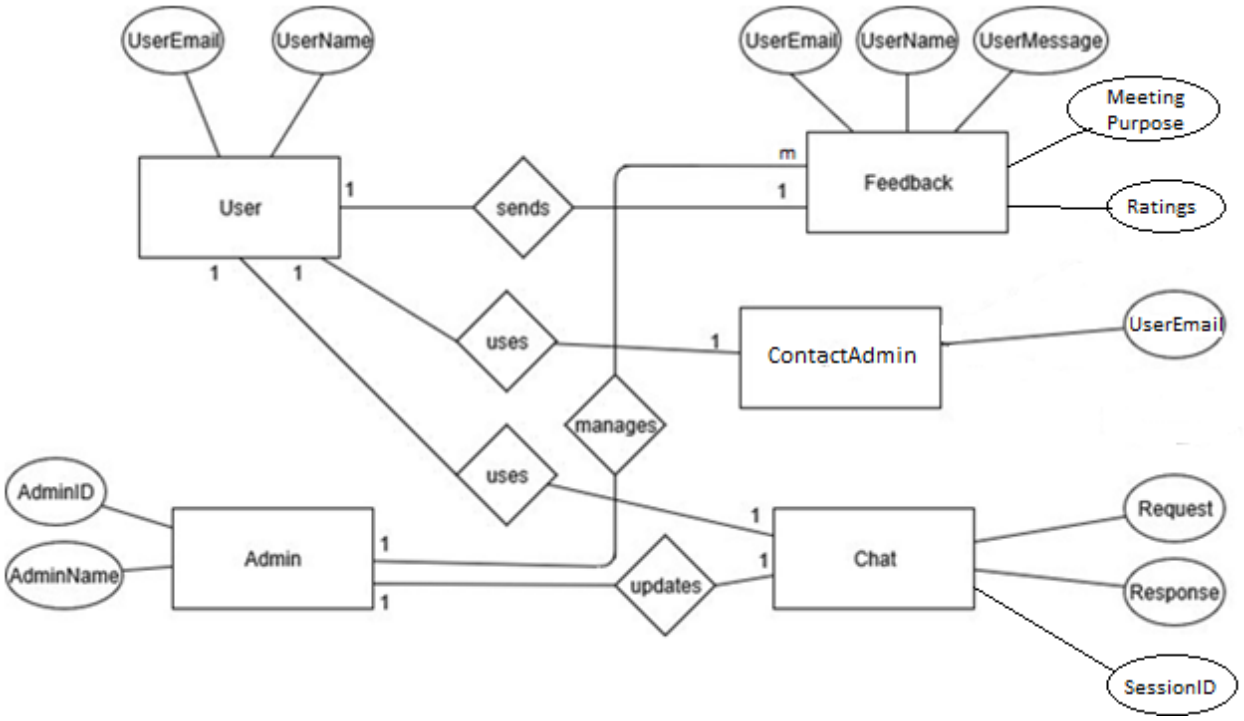


Figure 9 – ER Diagram

The ER diagram shows that how the entities exist in a system scope, and what kind of relations they hold with their respective attributes. The figure 9 shows ER diagram of Feedo Chatbot project.

5.4 Data Dictionary

Feedbacks Table

Field Name	Data Type	Data Format	Field Size	Description
Date/Time	Varchar	YYYY/MM/DD HH:MM:SS	20	Save the date and time of entry.
Session ID	Varchar	XX-XX-XX-XX-XX	10	To save the unique value
Interview(Y/N)	Varchar	YES/NO	3	Yes, if user has given interview, else no
E-Mail ID	Varchar	username@domain.exnt	50	Email id of user
Name	Char	Fname Lname	50	Name of user
Time	Varchar	Time Slot Format	50	Time In/Out
Ratings	Varchar	E/A/P	10	Rate the experience

Table 1 - Feedback table

The Feedback table stores the data like Date/Time, Name and E-Mail ID of the user who is giving the feedback. And the rating he wishes to give again his overall experience at the company. The Table 1 shows the data dictionary of feedbacks table. The session ID column is the primary key in the table of feedbacks.

Chat History

Field Name	Data Type	Data Format	Field Size	Description
Date/Time	Varchar	YYYY/MM/DD HH:MM:SS	20	Save the date and time of entry.
Session ID	Varchar	XX-XX-XX-XX-XX	10	To save the unique value
User Message	Varchar	None	20	Message from User
Bot Message	Varchar	None	20	Message from Bot

Table 2 - Chat History File

The chat history file stores the whatever conversation happens between the user and the chatbot. This is very important from the perspective of the admin, because whenever the admin wants to improve the chatbot, He must have an option to know what kind of questions user have asked so far and how the bot is handling it. So the Table 2 shows the text file's data dictionary. The session id column is the foreign key in the table of chat history.

Contact Us Table

Field Name	Data Type	Data Format	Field Size	Description
Date/Time	Varchar	YYYY/MM/DD HH:MM:SS	20	Save the date and time of entry.
Session ID	Varchar	XX-XX-XX-XX-XX	10	To save the unique value
Name	Varchar	None	20	Name of the user
Email	Varchar	None	20	Email ID of the user
Message	Varchar	None	50	The message from user

Table 3 – Contact Us Table

The contact us option for user has fields like Name, Email ID and Message. The user when wishes to connect to the admin or botmaster, he can user this option to send messages to the admin. The Table 3 shows the content fields of the contact us section.

6. Agile Documentation

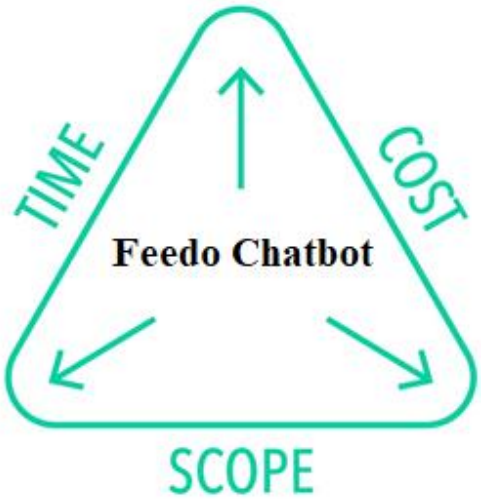
6.1 Agile Project Charter

Agile Project Charter

Project Name	Feasibility Study of AI Adoption in Business Verticals: Feedo A Feedback Chatbot
Project Sponsor	Collabera Inc.
Project Manager	Omkar Muley
Stakeholders	1. Omkar Muley- Role: Developer 2. Pawan Rajpurohit - Role: Testing and Developer
Expected Start Date	09-01-2019
Milestones	1. Requirement Analysis [✓] 2. Design [✓] 3. Development [✓] 4. Testing [✓] 5. Maintenance [✓]
Deliverables	1. A Running website. 2. Project documentation. 3. How-To-Use manual.

Project Details

Mission	1. Satisfy real world users' needs fully or partially. 2. Have project execution feedbacks and fulfill the criteria of 7/10. Means have at least seven positive feedbacks out of 10.

Vision	 Try to optimize the three sides of the triangle. 1-Time 2-Cost 3-Scope.
Scope	The project Feedo has scope like … 1. It is feedback purpose chatbot application. 2. It works on its own database and does not connect to any other chatbot.
Success Criteria	The project will be called successful if … 1. The project runs online through internet. 2. Project handles exception on its own. 3. Project satisfies the soul purpose of existence. 4. Project has some security means.
Project Completion estimate	The project is expected to end by 16th March 2019.
Approaches	The SDLC life cycle will be followed throughout the project development. The steps are as following … 1. Requirement Analysis 2. Design

	3. Development 4. Testing 5. Maintenance
Assumptions and Constraints	Assumptions: - The project is assumed to be working over internet. - The project is assumed to be a stand alone application. - The project has user input as a base of any execution. I.e. enter a query to get an answer. Constrains: - The project needs an internet connection to work. - The project is not expected to solve any specific domain query. - Feedo Bot requires user input in text to start execution.
Project Benefit	The project allows a user to give feedbacks about the processes he has gone through in the premises of the company.

6.2 Agile Roadmap

Task ID	Task Name	Responsible	Start	End	Days	Status
TA 1.0	Chat	Omkaar & Pawan	9-Jan-19	20-Feb-19	41	Complete
TA 1.1	Chat-UI	Pawan	9-Jan-19	20-Jan-19	11	Complete
TA 1.2	Messages and Reply	Omkaar	21-Jan-19	31-Jan-19	10	Complete
TA 1.3	Voice Input	Pawan & Omkaar	1-Feb-19	20-Feb-19	20	Complete
TA 2.0	Feedback	Omkaar & Pawan	21-Feb-19	5-Mar-19	13	Complete
TA 2.1	Feedback form	Omkaar	21-Feb-19	28-Feb-19	8	Complete
TA 2.3	Online Database	Pawan	1-Mar-19	5-Mar-19	5	Complete
TA 3.0	UX	Omkaar & Pawan	6-Mar-19	16-Mar-19	11	Complete
TA 3.1	UX Building	Omkaar	6-Mar-19	10-Mar-19	5	Complete
TA 3.2	AIML file creation	Omkaar & Pawan	11-Mar-19	16-Mar-19	6	Complete

Figure 11 – Agile Roadmap

The figure 11 shows the agile roadmap plan. It is also called as Agile Schedule. As it can be seen, each task has its own task ID and start and end dates.

6.3 Agile Project Plan

Sprints	Activity	Description	Progress	Duration	Start Date	End Date
Chatting	Chatting UI	Chatting UI shows the messages of ChatBot and User.	★★★★★	11	9-Jan-19	20-Jan-19
	Messages and reply	This activity has Text area and send button.	★★★★★	10	21-Jan-19	31-Jan-19
	Voice Input	Voice inpurt method is implemented is made.	★★★★★	20	1-Feb-19	20-Feb-19
Feedback	Feedback Conversations	In this activity, feedbacks conversations are made.	★★★★★	8	21-Feb-19	28-Feb-19
	Online Database	Online Database Configuration.	★★★★★	5	1-Mar-19	5-Mar-19
UX	UX Building	Developing the UX based UI	★★★★★	5	6-Mar-19	10-Mar-19
	AIML file creation	Create AIML file for replys of the user questions.	★★★★★	6	11-Mar-19	16-Mar-19

Figure 12 – Agile Project Plan

As the figure 12 shows the project plan has tasks and their progress. This is overall plan of the project.

6.4 Agile User Story

User Story ID	As a *<type of user>*	I want to *<perform some task>*	so that I can *<achieve some goal>*
1	User	Delete the chat or refresh the chat	restart the chat without restarting the application.
2	User & Tester	Send Feedback to the developers.	I can report any issues or bugs if any.
3	User	Cancel the feedback.	restart the chat if made any mistakes.

Figure 13 – Agile User Story

The figure 13 shows the users story. Which are based on the requirements of the users of the system.

6.5 Agile Release Plan

Sprint ID	Task ID	Sprint Name	Start	End	Days	Status	Release Date
1	TA 1.0	Chat	9-Jan-19	20-Feb-19	42	Complete	21-Feb
	TA 1.1	Chat-UI	9-Jan-19	20-Jan-19	11	Complete	
	TA 1.2	Messages and reply	21-Jan-19	31-Jan-19	10	Complete	
	TA 1.3	Voice Input	1-Feb-19	20-Feb-19	20	Complete	
2	TA 2.0	Feedback	21-Feb-19	5-Mar-19	13	Complete	06-Mar
	TA 2.1	Feedback Conversations	21-Feb-19	28-Feb-19	8	Complete	
	TA 2.2	Online Database	1-Mar-19	5-Mar-19	5	Complete	
3	TA 3.0	UX	6-Mar-19	16-Mar-19	11	Complete	17-Mar
	TA 3.1	UX Building	6-Mar-19	10-Mar-19	5	Complete	
	TA 3.2	AIML file creation	11-Mar-19	16-Mar-19	6	Complete	

Figure 14 – Agile Release Plan

The figure 14 shows the agile release plan with the release dates. In other words which sprint is going to be released on which date.

6.6 Agile Sprint Backlogs

Task Name	Story	Sprint Ready	Priority	Status	Story Points	Assigned to Sprint
Sprint/Task 1 - Chat Interface	No	No		Complete	25	No
Chat-UI	No	Yes	Medium	Complete	15	No
Message and reply	Yes	Yes	Medium	Complete	10	No
Voice Input	No	Yes	Low	Complete	0	Yes
Sprint 2/Task - Feedback	Yes	Yes		Complete	25	Yes
Feedback Conversations	No	Yes	Low	Complete	8	Yes
Database configuration	No	Yes	Low	Complete	8	Yes
Online Database	Yes	No	High	Complete	9	Yes
Sprint/Task 4 - UX	Yes	Yes		Complete	25	Yes
UX Building	Yes	Yes	Low	Complete	5	Yes
AIML file creation	No	Yes	High	Complete	10	Yes

Figure 15 – Agile Sprint Backlogs

The figure 15 shows sprints of tasks with their respective Status and other details like Story Points and Priority.

5. Implementation

5.1 Page Layout

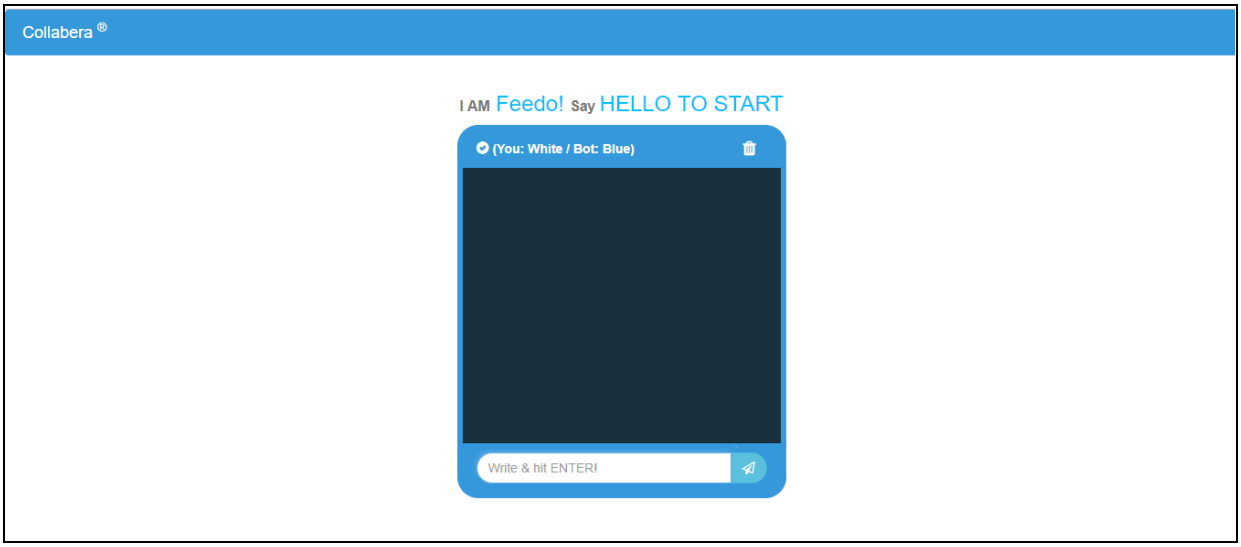


Figure 16 – Chatbot Welcome Screen

The Figure 16 shows the screenshot of the main chatbot UI. Where user can user the text box to write the messages he wishes to send to the chatbot, And in the center of the box messages from the chatbot will appear. It is to be noted that the messages sent by the user are stored along with the message replies from the bot.

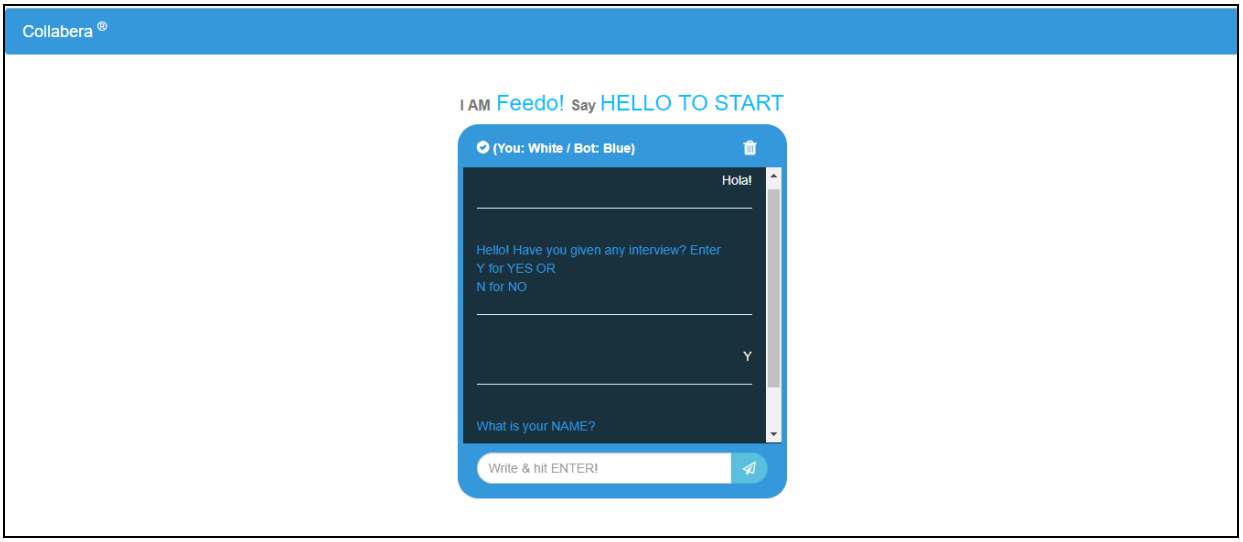


Figure 17 – Chatbot Messages

The figure 17 shows how the question from the user arises and bot answers them. The blue colored messages are from bot and the white colored messages are of user. The UI message box has an icon of dustbin. This represents a button to clear the message box.

5.2 Form Layout

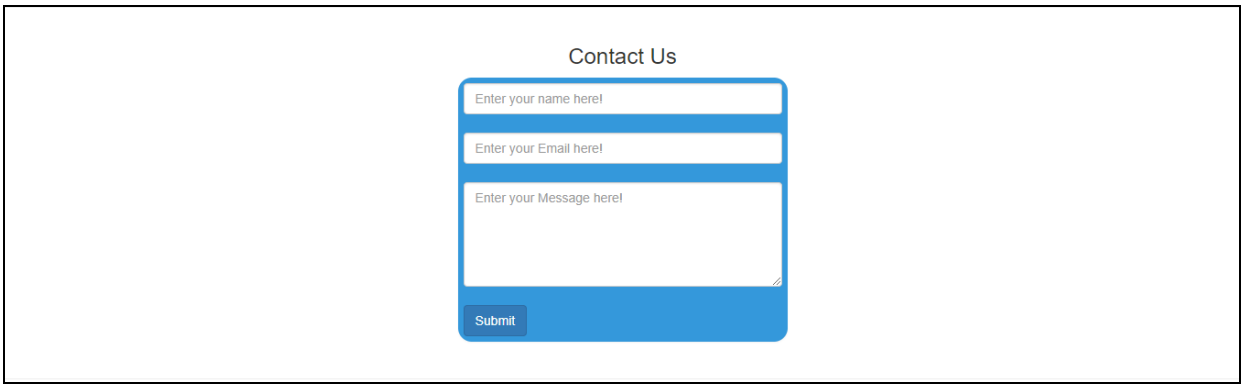


Figure 18 – Contact Us Page

The figure 18 shows contact us form layout. Here user if has any doubt or needs any kind of help or wishes to connect to the developers. He can use this form and submit it to the developers.

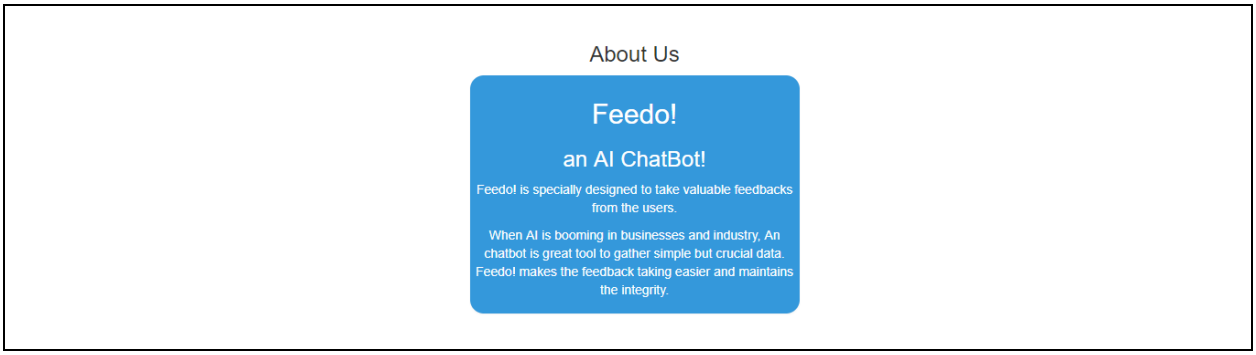


Figure 19 – About Us

The figure 19 shows the screenshot of about us section in the Feedo chatbot. Here users can read about the purpose and functionality of the Feedo chatbot

5.3 Coding Conventions

```
<aiml version = "1.0.1" encoding = "UTF-8"?>
  <category>
    <pattern> WHO IS ABRAHAM LINCOLN </pattern>
    <template>Abraham Lincoln was the US President during American civil war.</template>
  </category>
```

Figure 20 – AIML Code snippet

Figure 20 shows the main logic of the Chatbot, The category tag takes the question and for the same template tag takes what the Chatbot will be responding to. Likewise there are other several tags that help the botmaster to train the bot.

The AIML is a tool that allows the functionalities to work in any programming language (most but not all). In Python there is a library called aiml to be installed. Following the Python as a base programming language AIML is in the role of main structure of the project.

Python is meant to be an easily readable language. Its formatting is visually uncluttered, and it often uses English keywords where other languages use punctuation. Unlike many other languages, it does not use curly brackets to delimit blocks, and semicolons after statements are optional. It has fewer syntactic exceptions and special cases than C or Pascal.

Consider following example of srai tag in AIML.

```
<category>
   <pattern>WHO IS ALBERT EINSTEIN?</pattern>
   <template>Albert Einstein was a German physicist.</template>
</category>

<category>
   <pattern> WHO IS Isaac NEWTON? </pattern>
   <template>Isaac Newton was a English physicist and mathematician.</template>
</category>
```

Figure 21 – AIML Example - Categories

As the figure 21 shows, create categories first and then make use of srai tag in AIML for creation of generic questions. Such practice helps the bot to answer more adequately.

```
<category>
   <pattern>DO YOU KNOW WHO * IS?</pattern>

   <template>
      <srai>WHO IS <star/></srai>
   </template>

</category>
```

Figure 22 – AIML Example – create srai question

As the figure 22 shows the srai tag will help the bot to answer in more appropriate way when the user asks generic question.

```
Human: Do you know who Albert Einstein is
Robot: Albert Einstein was a German physicist.
```

Figure 23 – AIML Example – The conversation

The figure 23 shows how the user has asked question differently than what the bot was knowing, But by making use of srai tag the botmaster can efficiently answer such question. It is to be noted that there many such tags available in AIML.

8. Testing

8.1 Testing strategy

A test strategy is an outline that describes the testing approach of the software development cycle. It is created to inform project managers, testers, and developers about some key issues of the testing process. This includes the testing objective, methods of testing new functions, total time and resources required for the project, and the testing environment.

Test strategies describes how the product risks of the stakeholders are mitigated at the test-level, which types of test are to be performed, and which entry and exit criteria apply. They are created based on development design documents. System design documents are preliminary used and occasionally, conceptual design documents may be referred to. Design documents describe the functionality of the software to be enabled in the upcoming release. For every stage of development design, a corresponding test strategy should be created to test the next feature sets.

Testing Strategies Consists of following steps:

- Unit testing
- Integration Testing
- Validation Testing
- System Testing

Unit Testing:

1. Unit testing involves testing individual components of the system to see if they are functioning properly.
2. When a program tested all error conditions were checked to see if they are handled properly. Breaking the program down to self-contained portion each of which can be checked at certain key points, faculties of the process.
3. In this testing individual components and modules are tested to ensure that they operate correctly. We had tested each and every module such as dynamic database updating, member, basic profile, contact profile, personal profile, professional profile, more info profile, profile updates, friend's categories, messages, sent messages, photos. For this we have checked the database for particular entry for validation.
4. The key fields for each entry are checked to avoided duplication and relevant data are modified when required.

Integration Testing:

1. Program are invariable related to one and interact in total system. Each program is tested to see whether is confirms to the related program in the system. Each portion is tested against the entire module with both test and live data before entire system is ready to be implemented.
2. The global variable was tested such that the hold data related to current module.

Validation Testing:

1. Validation testing can define in many ways, but a simple definition is that validation succeeds when software functions in a manner that can be reasonably expected by the customer. After each validation test case has been conducted, one of two possible condition exits:
    1. The function or performance conform to a specification and are accepted.
    2. A deviation from specification is uncovered and a deficiency list is created.

System Testing:

1. System testing is critical process that can take as much as 50% of the system development time. The common view of testing held by users is that it is performed to prove that there are no errors in a program. However, as indicated earlier, this is virtually impossible, since the analyst cannot prove that system is free and clear of errors. Testing 2016 - 2017 MS SO, IRS & Impact Analysis 50
2. Therefore, the most useful and practical approach is with the understanding that testing is the process of executing a program with the explicit intention of finding errors that is, making the program fail. The tester, who may be an analyst, a programmer, or a specialist trained in software testing, is an actually trying to make a program fail. A successful test, then, is one that finds an error.
3. System testing is designed to uncover weakness that wearer found in the earlier test, this includes forced system failure and its user in original environment will implant validation of total system as such.
4. The total is also tested for recovery and fallback after various major failures to ensure that no data lost during the emergency.

8.2 Test Cases

Exhaustive testing of almost any non-trivial system is impractical due to the fact that domain of input values to most practical software system is either extremely large or infinite. Therefore, we must design an optimal test suite that is of reasonable size and can uncover as many errors in system as possible. The test cases to consider in the project are:

1. Separate authentication for both the front end as well as back end.
2. Inclusion of all eligible data and modules to be tested.
3. Testing individual module according to requirement.
4. Privacy to the admin as well as the user who becomes the part of the website.
5. Updating of the information from time to time.

Purpose:

The purpose of the test cases is to tests the various input and see whether the output produces any error or not. There are different test cases according to the system. A correct system must accomplish the following:

1. Compute correct results.
2. Operate safely, and cause the system containing the software to operate safely.
3. Perform the tasks required by the system containing the software, as explained in the software applications.
4. Achieve these goals for all inputs.

The test cases are as following:

SN	Requirement ID	Test Case ID	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	R1_FeedoBot	T1_ FeedoBot	To check the order of contents on application.	Check the content on the web app.	The content on the web app must be aligned.	The content of the web app is aligned.	Pass
2	R1_ FeedoBot	T2_ FeedoBot	To check the correctness of information.	Check information.	The information is correct.	The application is showing correct information.	Pass
3	R1_ FeedoBot	T3_ FeedoBot	The feedback must show correct values.	Check the values of feedback.	The stored values must reflect real world values.	The stored values are real world values.	Pass
4	R1_ FeedoBot	T4_ FeedoBot	The about us section must work.	Check about us section.	The about us activity is working.	The about us activity is working.	Pass
5	R1_ FeedoBot	T5_ FeedoBot	The web app must show real-time information.	Check database for information shown.	The web app must be real time.	The web app is real time.	Pass
6	R1_ FeedoBot	T6_ FeedoBot	The UI is proper or not.	Check UI for any error.	The UI must be up-to-date and Intuitive.	The UI is proper.	Pass

9. Future Enhancement

The future enhancement is about what the project will be accomplishing in future runs. The project Feasibility study of Artificial Intelligence Adoption in Business Verticals, is about what is need of Artificial Intelligence is business running, Therefore once the project Feedo is a success then the Future enhancements will be taking into consideration.

Chatbots on the other hand, are a very well timed middle ground between automation, AI, and the changing use of the internet, in a way that could make it extremely effective in doing business online and ushering in some of the other future technological advancements we have all been waiting on.

Gartner predicts that by 2020 people will have more conversations with chatbots than their spouse," said Christi Olson, head of evangelism for search at Bing, as well as one of the world's experts on chatbots, voice search, and voice assistants. "The chatbots of the future don't just respond to questions of users. They talk. They think. They draw insights from knowledge graphs. They are or try to be as intelligence as humans, they forge emotional relationships with customers. [8]

It used to be that only software developers could create chatbots. However, in the last year or so, visual drag-and-drop chatbot building platforms have opened the door for all manner of marketers and communications pros to use chatbots. Now it is easy for anyone to send messages at massive scale through popular mobile chat apps. [8]

Chatbots today are designed to not only perform natural language understanding but are also able to perform cognitive service functions such as:

1. Speech to Text
2. Computer Vision
3. Language Recognition and Translation
4. Content Moderation
5. Speaker Recognition
6. Text Analytics

The project Feedo is a chatbot that is specially made to take feedbacks only. In many cases and scenarios the chatbot might be improved and advancement can take place. The future enhancement and advancements that might take place are as listed below.

1. Developing the voice input/output.
2. Add functionalities like E-Mail sending.
3. Increase the scope of project, I.e. Adding knowledge of contact information.
4. Develop a supportive mobile application.
5. Implement the chatbot on a particular portal for better access.

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