REVA UNIVERSITY
Bengaluru, India

A Project Report on

EduBot: RACE Powered Chatbot

Submitted in Partial Fulfilment for Award of Degree of

Master of Business Administration

In Business Analytics

Submitted By

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R19MBA63

Under the Guidance of

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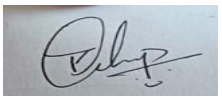
August, 2022

REVA UNIVERSITY
Bengaluru, India

Candidate's Declaration

I, **Pradeep Thota** hereby declare that I have completed the project work towards the first year of Master of Business Administration in Business Analytics at, REVA University on the topic entitled **EduBot: RACE Powered Chatbot** under the supervision of **Ravi Shukla Consultant Data Scientist, Dell Technologies.** This report embodies the original work done by me in partial fulfilment of the requirements for the award of degree for the academic year **2022.**



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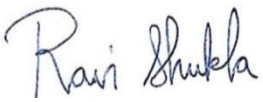

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Acknowledgment

I would like to thank our Hon'ble Chancellor, Dr. P Shayma Raju, Pro-Vice Chancellor, Dr. M. Dhanamjaya, Registrar, Dr. N Ramesh and the RACE team, for supporting the RACE program specifically designed for working professionals and providing facilities and infrastructure required and conductive conditions to offer the best learning experience. I am very happy to be called as a part of this program and REVA university.

Place: Bengaluru

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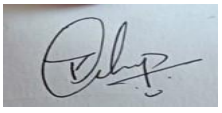

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List of Abbreviations

Sl. No	Abbreviation	Long Form
1	NLP	Natural Language Processing
2	AI	Artificial Intelligence
3	DL	Deep Learning
4	ML	Machine Learning
5	EC	Educational Chatbot
6	MIM	Mobile Instant Messaging

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Abstract

The chatbot may be outlined as an AI-based mostly trojan horse that simulates human conversations. they're conjointly called digital assistants that perceive human capabilities. Bots analyze and process user requests to quickly and accurately respond. Bots may be used on various websites, programs, etc., and communicate via voice in addition to text. Existing systems, such as faculty websites, contain data on faculty (infrastructure, departments, faculties, placements, etc.), which users must look for through a time-consuming internet navigation process.

With the technological advancement, REVA Academy for Corporate Excellence, REVA University needs a chatbot as FAQs alone cannot address all the considerations of the user thus Associate in nursing's interactive and easy means of language is needed that may have the least waiting time with correct and appropriate answers to the user queries.

This project is going to introduce a Chatbot for "REVA Academy for Corporate Excellence, REVA University" a text-based chatbot, using CRISP-DM as methodology and a Naïve Bayes algorithm with MultinomialNB as a classifier that can allow the user to give commands or queries and can get replies as if a real person is responding to the user. This Chatbot is usually a form of service which can be the agent providing a solution to a user enquiry.

Keywords: Artificial Intelligence, Chatbot, Natural Language Processing, Naïve Bayes, MultinomialNB.

Contents

Chapter 1: Introduction

Chatbots are computer programs that will generate the answers same as human-like conversation (Garcia Brustenga et al., 2018; Pham et al., 2018), and mainly these chatbots are categorized into two types they are test-based chatbots usually used in mobile apps or websites, the second type is audio-based and examples are Ok Google, Siri, or Alexa, or maybe a combination of both (Følstad & Brandtzaeg, 2018), (Wageeh et al., 2019). These computerized conversational agents have become so accustomed to simulating customer service interactions across a variety of sectors that it has become a common practice. The affordability, cost, development possibilities, and adaptability made possible by social networks and Mobile Instant Messaging (MIM) programs (apps) like WhatsApp, Line, Facebook, and Telegrams are contributing to the expansion of the use of chatbots. Because of this, chatbots made popular by applications for Social Media, Arduino, and MIM (de Oliveira et al., 2016) are generally accepted and used.

These bots are discovered to effectively support knowledge generation and dissemination, collaborative learning, multimodal communication, scaffolding, real-time feedback, individualized learning, scalability, and interaction. However, given MIM's potential for conceiving the ideal learning environment, it is now routinely forgotten whether or not teachers can participate in demanding learning activities, particularly nonstop. Chatbots may be able to overcome this obstacle, particularly by automatically facilitating learning dialogue and interactions for large numbers of students. Although the use of chatbots in education is novel, it is also constrained by a lack of resources, according to (Okonkwo and Ade-Ibijola 2021), who also note that the current focus of research on educational chatbots is on those that are specifically designed for learning, economics, medical education, and programming courses.

Therefore, the initial goal of this study is to address the gaps in the existing body of knowledge regarding the application, style, and development of educational chatbots. The usefulness of educational chatbots is then investigated for team-based projects during a design course using a quasi-experimental technique by locating the study that supported these chosen research gaps.

Chapter 2: Literature Review

According to (Adamopoulou & Moussiades, 2020) there are 6 types of chatbot parameters that are:

1. Open and closed domain names in the information domain
2. Chatbots that are interpersonal, intrapersonal, and inter-agent
3. Informative, entirely chat-based objectives.
4. Task-based fully enter processing and reaction generation: rule-based full version, retrieval-based full version, and generative full version
5. Resources useful for Humans
6. Create either open-supply or closed systems.

Usually, the “Chatbot” word came from 2 keywords called “chat” which represents a normal chat or conversation, and “Bot” which represents the robot (Chocarro et al., 2021). These chatbots are normally a program that is written in several languages based on their requirements and these chatbots will produce an appropriate response as per the user input (Colace et al., 2018).

These criteria indicate that a chatbot can support various conversations and interact functionalities based entirely on requirements, systems, and technology. Nowadays these chatbots are built using artificial intelligence (AI), which in turn led to the development of numerous new chatbot systems including Google Dialog Flow, IBM Watson Conversation, Amazon Lex, Flow XO, and Chatterbot (Adamopoulou & Moussiades, 2020). Even though chatbot use of AI is amazing, they have limited usage because they primarily depends on the concept called ANI (de Oliveira et al., 2016).

Therefore, it might only be practical to complete a single task entirely based on a programmed reaction, which involves analyzing inputs, disseminating information, and anticipating further actions. While restricted, ANI is the most practical form of artificial intelligence that humanity has created so far (Fryer et al., 2019). On the other hand, such a conundrum also enables a non-technical person to design and expand chatbots without having a deep understanding of AI, system learning, or neuro-linguistic programming (Gonda et al., 2019). Big-tech companies like Google, Facebook, and Microsoft also see chatbots as the next fabled period of the IoT era, according to (Flstad et al. 2019), even though this fosters an "openness with IT" (van Eeuwen, 2017) across several disciplines.

Thus, chatbots designed with educational purposes in mind are referred to as instructional chatbots. (While Riel., 2020) described them as software that helps in achieving educational and pedagogical aspirations while staying inside the confines of a typical chatbot, (Bii., 2013) defined instructional chatbots as chatbots created for conveying learning objectives. According to an empirical study, ECs serve as specialized coaching assistants or learning partners who provide scaffolding (Tutor Support) through exercise activities (Chen et al., 2020; Conde et al., 2021). (Conde et al., 2021). Additionally, it can serve as a platform for general records like rubrics, study guides, and contents (Wageeh et al., 2019). Students are open to the use of chatbots in the classroom as a suitable educational tool for better instruction. On the other hand, ECs were categorized by (Conde et al., 2021; Ciechanowski et al., 2019) based entirely on 8 responsibilities inside the educational setting.

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Chapter 3: Problem Statement

REVA Academy for Corporate Excellence, REVA University has an existing system of chat interface where an executive will be chatting from the backend. FAQs alone cannot address all the concerns of the user so an interactive and user-friendly way of conversation is required that can have least waiting time with accurate and suitable answers to the user queries. Current existing process has when a customer needs any immediate assistance from the university, the user can chat through a chat window available in official website, in this process one of the executive will connect to assets the customer so the all the questions can be answered but the problem arises in non-working hours where no executive can be connected to the chat and will be very hard to get the assistance for hours till the executive connects to the chat.

Chapter 4: Objectives of the Study

The objective of this project is to develop an Interactive chatbot which will be assisting the customers 24/7 round the clock with their multiple questions related to different courses available in RACE like Master of Business Administration in Business Analytics, Master of Technologies in Cybersecurity/ Artificial Intelligence etc., with all the details like duration, fee, eligibility, affiliation etc., without delay in the response so going to avoid long queue of waiting for customers to get response.

Data collection is the crucial part of the project and have collected the dump of it from the previous chat history available in the server and prepared it into a CSV file and used as the input for this project. The collected data are parsed, and information is extracted using different techniques in NLP.

The instant output/response will be displayed to user as soon as user raises a question/doubt in the chat window once the model is implemented and deployed.

Chapter 5: Project Methodology

CRISP-DM is the methodology used in this project. It involves 6 steps which are captured Figure 5:

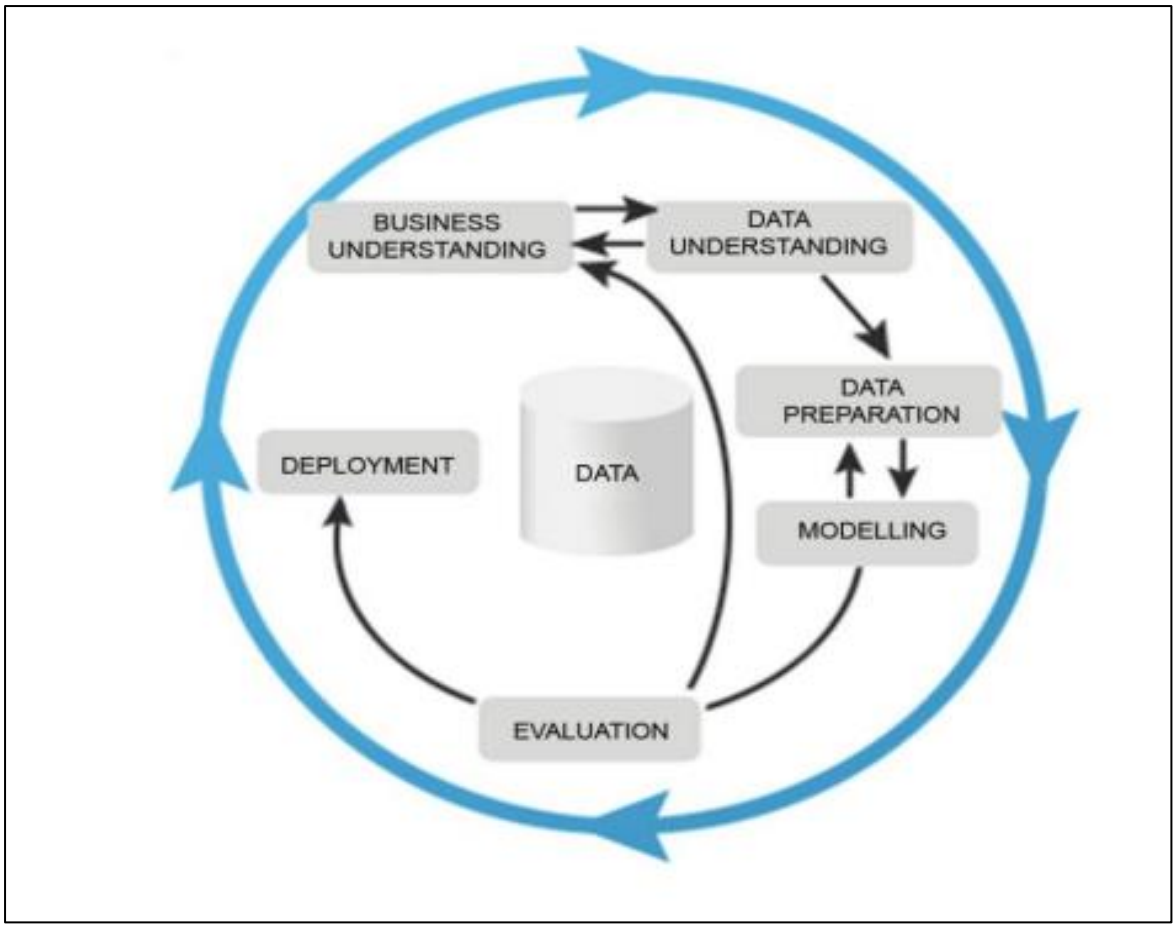

Figure 5: CRISP-DM High Level Steps (Wikipedia).

Business Understanding — The goal of this stage is to understand the business goal and then convert it into a measurable and specific project goals and then formalize it as problem statement.

Data Understanding — The goal of this stage is to gather data and then explore and comprehend the data.

Data Preparation – The goal of this stage is to select the final data which will be relevant to the data mining objectives, clean and transform the data.

Data Modelling - The goal of this stage is, to apply the modelling techniques and record it.

Model Evaluation – The goal of this stage is, to assess the degree to which model meets the business requirements and to test the model in the real applications.

Deployment - The goal of this stage is to determine the model deployment strategy based on evaluation result and plan for monitoring and maintenance of models in the business environment.

Chapter 6: Business Understanding

REVA Academy for Corporate Excellence, REVA University needs transformation from traditional chat with an executive to support that helps the customer to get the instant response for all their questions, by implementing this the business need not to assign a dedicated resource to solve all the question raised by the customer related to the course, later RACE department can assign this dedicated executive to focus on the other task like acquiring the students, etc.

By executing this business can save time and gets monetary gain which is spent on the resource who is working on the live chat session and providing the exact information that customer needs at the same time without any delay.

Chapter 7: Data Understanding

Data comprises of unstructured data of chat which are in the form JSON Figure 7, excel, notepad. Data is collected from university GitHub repository and all the FAQ's which are available in REVA Academy for Corporate Excellence, REVA University official website (https://race.reva.edu.in/pgdm-mba-in-business-analytics/#faq). Here data is in unstructured with many special characters, date, time, executive name etc and FAQ's Table 7.1 are in notepad as downloaded from website in unstructured text format and are converted into structured text format of CSV file.


```
{
  "id": "206ef860-4c20-11eb-9856-b5a88d1782cb",
  "type": "chat",
  "pageId": "5bed1e510e6b3311cb795470",
  "visitor": {
    "name": "admin",
    "id": "4170ebd01f43b7487217d4f4ce40e8771f498f935631dc5860f6b83cb168cec7",
    "email": "vijay.kumawat@innoserv.co.in"
  },
  "location": {
    "countryCode": "IN",
    "city": "Vijayawada"
  },
  "messageCount": 1,
  "chatDuration": 0,
  "rating": 0,
  "createdOn": "2021-01-01T10:57:36.735Z",
  "messages": [
    {
      "sender": {
        "t": "s"
      },
      "type": "msg",
      "time": "2021-01-01T10:57:36.735Z",
      "msg": "Welcome to RACE, if you need help simply reply to this message, we are online and ready to help!"
    },
    {
      "sender": {
        "t": "v"
      },
      "type": "msg",
      "time": "2021-01-01T10:59:12.233Z",
      "msg": "hi"
    }
  ],
  "domain": "race.reva.edu.in"
```


Figure 7.1: JSON Raw Data Sample

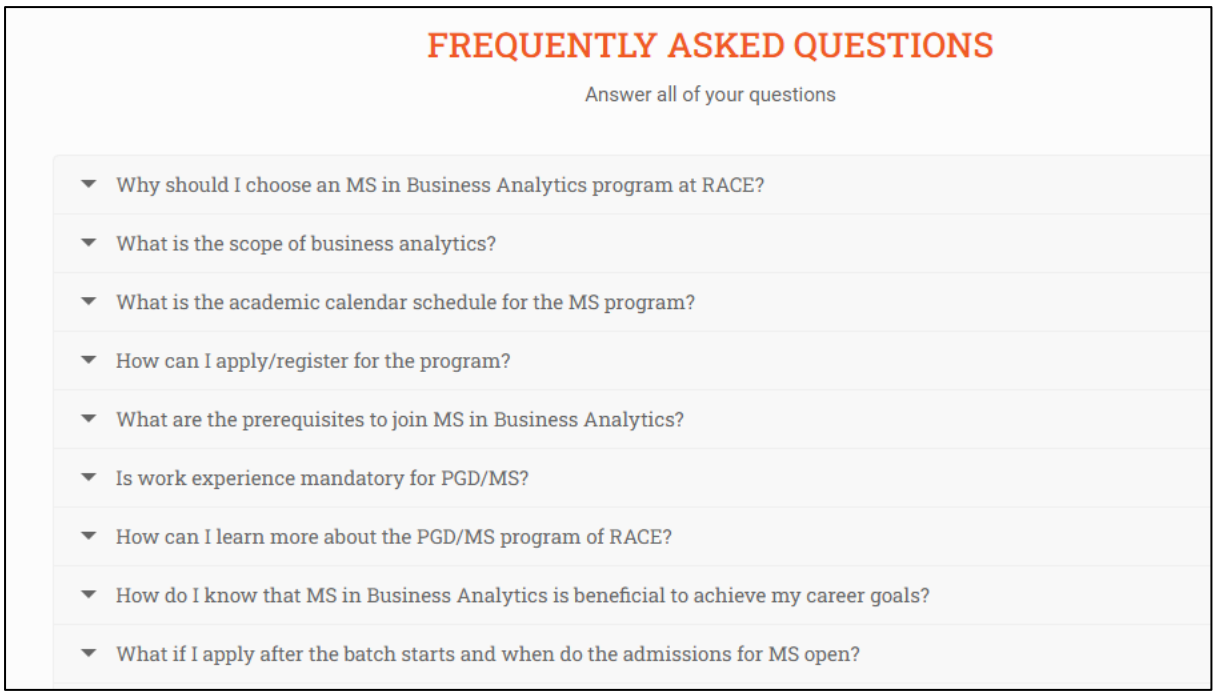

Table 7.2: FAQ's sample raw data.

Chapter 8: Data Preparation

The input for RACEBOT is .CSV file and all the data for this CSV are collected from are JSON, excel, notepad which are downloaded from RACE Git repository and from FAQs of RACE official website.

CSV file contains of 2 columns heading with Questions and Responses Table 8, all the questions which are captured from the raw data file has put into CSV file of Questions column and for this question have provided with numerical same number for all the relevant question and its mapping is done in model preparation step.

	Question	response
2	i need to discuss on the cybersecurity program	1
3	PG Diploma/M.Tech/MS in\nCYBERSECURITY	1
4	For dip in cyber ersececurity	1
5	Hello, I would like to know more about MS in Cyber Security at your Univers	1
6	I want to do mtech in cybersecurity	1
7	I am looking for PG Diploma in cybersecurity	1
8	Do u provide training in cybersecurity	1
9	Looking for Cybersecurity courses	1
10	How much is the course fees for cyber security	4
11	Near information about cyber security diploma course	1
12	I heard that REVA uni will be offering an MS program in AI in collaboration v	1
13	I would like to know M tech cyber security program	1
14	I want to know about data analyst course	1
15	admission m.tech	3
16	need some details about mba in business analytics	2
17	Am 33 years old I can do MBA course	2
18	class for mba	2
19	I wanted to do M-Tech	3

Table 8 : Data Preparation sample file.

Chapter 9: Modeling

Modelling/ Flow of the project as follows in Figure 9.

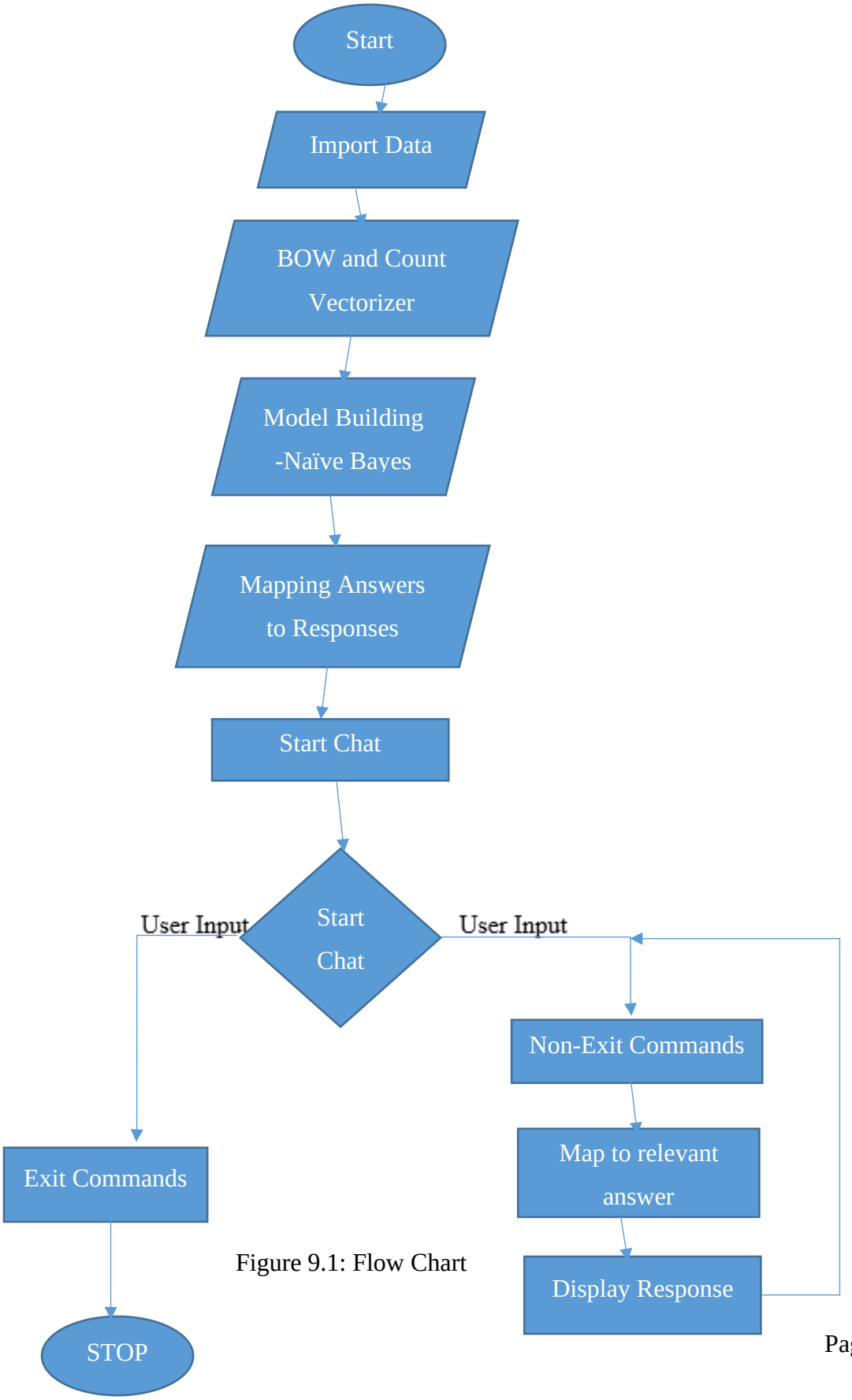

Figure 9.1: Flow Chart

Once after importing the necessary packages and corpus file then all the data taken into Bag of Words and then converted in to Count Vectorizer to transform the data contains in the Questions column in the corpus into the frequency(count) of the words in the text.

As the data preparation step is done then have built the model based on Naïve Bayes – MultinominalNB as the classifier for the model, as the importing is done then have taken all the count vectorizer corpus as the training vectors.

As next step of data modelling, we have all the question that are categorized and provided with numbers for each category in raw corpus file, so must map all the numbers to the relevant answers as shown in the below Figure 9.1 within the code. In this process we have a set of exit commands so that can break the chain of this chat if user provides response with any of this exit commands in the chat window.

```
answers = ["A bespoke M. Tech/M.Sc. in Cybersecurity and program powered by EC-Council,Cloudx, Microsoft Azure Cloud, and
          "PGDM/MBA in Business Analytics is a 100% outcome-driven and skill-based program exclusively designed for worki
           "AI undeniable transformation in the technological world with a PG Diploma/ M. Tech/M.Sc in Artificial Intelli
           "For Fee detail please contact Program office Abhijit Sinha : +91 95388 74441, Basavaraj Shetty: +91 76250 696
           "One with Bachlour's degree with 2 years of work experience are eligible for the course.",
           "Please contact Abhijit Sinha : +91 95388 74441, Basavaraj Shetty: +91 76250 69676.",
           "RACE is a Full time weekend classroom Program approved by AICTE and UGC and powred by EC-Council,Cloudx, Micr
           "RACE is Excecutive Masters program of REVA University and approved by AICTE and UGC, for more information ple
           "I'm RETINA, RACE powered Chatbot.",
           "Yes for more information please contact Abhijit Sinha : +91 95388 74441, Basavaraj Shetty: +91 76250 69676."]
```

Figure 9.2 Answers mapping to response.

Chapter 10: Model Evaluation

Data Evaluation results are captured from Chatbot. The dataset used for training the model consists of 96 questions from different sources. Model got trained in Naïve Bayes with classifier as multinomialNB.

Below is the Figure 10 consisting of the how accurate the model based on multinomialNB classification and have tested with minimum 20 chats consist of 10 questions in each chat and got the accuracy average of 78.3%.

```
racebot = ChatBot()
racebot.start_chat()

Hi, I'm RETINA a RACE powered chatbot!!
are you a chat bot
Accurate: 80.53%
I'm RETINA, RACE powered Chatbot.
thank you, I am looking for weekend PG/Mtech  program for AI
Accurate: 77.57%
AI undeniable transformation in the technological world with a PG Diploma/ M. Tech/M.Sc in Artificial Intelligence program offe
red by RACE. The comprehensive learning approach to master the domains of Artificial Intelligence, Data Science, Business Analy
tics, Business Intelligence, and Deep Learning enables the participants to take on challenging roles in the Artificial Intellig
ence domain
What is the fees
Accurate: 99.48%
For Fee detail please contact Program office Abhijit Sinha : +91 95388 74441, Basavaraj Shetty: +91 76250 69676 or write to rac
e@reva.edu.in
bye
Ok, have a great day!
```

Figure 10: Chatbot response with Accuracy.

Chapter 11: Deployment

After performing data Processing and multiple iteration to get approval of the client then we can deploy this into their official website and this model become the central heart all the question of candidate whoever needs information about the course through this chatbot and have provided this entire model in .py file so it can deploy the same in different flavour of platform like WhatsApp, Telegram, Teams, etc., so that user can get information in every platform as per their mode of browse.

Chapter 12: Analysis and Results

Data Evaluation results are captured from Chatbot. The dataset used for training the model consists of 96 questions from different sources. Model got trained in Naïve Bayes with classifier as multinomialNB.

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e@reva.edu.in
bye
Ok, have a great day!
```

Figure 12: Chatbot response with Accuracy

Chapter 13: Conclusions and Recommendations for future work

In this project have developed a chatbot which is of text based that can help the users to get instant response for all their question without any time delay and at the same time it can also save the time and cost for the RACE department by not assigning a resource to chat with the users all the time and after implementing this resource can be utilised for another work.

This project in future can be enhanced to multiple platforms like Voice bot, Image bot, Video bot, so user can experience new things which are developed with advanced technology than normal and that can lead to acquire more students.

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Appendix

Plagiarism Report[1]

EduBot Powered Chatbot

by Pradeep Thota

Submission date: 19-Aug-2022 11:28PM (UTC+0530)
Submission ID: 1884467245
File name: EduBotPowered_Chatbot_-_Pradeep_Thota.docx (466.23K)
Word count: 3410
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EduBot Powered Chatbot

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