

**INTERACTIVE APPLICATION USING NEURAL
NETWORK**

Submitted in partial fulfilment of the requirements for
the award of
Bachelor of Engineering degree in Computer Science and Engineering

by

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING

**SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade “A” by NAAC

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MARCH - 2022



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Sumith Pokkuluri (38110573), Sai Sushvanth Siginamsetty (38110532) who carried out the project entitled "**INTERACTIVE APPLICATION USING NEURAL NETWORK**" under my supervision from October 2021 to May 2022

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DECLARATION

I Sumith Pokkuluri, Sai Sushvanth Siginamsetty hereby declare that the Project Report entitled **INTERACTIVE APPLICATION USING NEURAL NETWORK** done by me under the guidance of **Dr.R.Subhashini .M.E., Ph.D** (Internal) is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering / Technology degree In COMPUTER SCIENCE AND TECHNOLOGY.

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ABSTRACT

A Chatbot is a software that can communicate with a human by using natural language. One of the essential tasks in artificial intelligence and natural language processing is the modelling of conversation. Since the beginning of artificial intelligence, it's been the hardest challenge to create a good chatbot. Although chatbots can perform many tasks, the primary function they have to play is to understand the utterances of humans and to respond to them appropriately. These software are used to perform tasks such as quickly responding to users, informing them, helping to purchase products and providing better service to customers. In this project a chatbot is build using the deep learning method by using the data. The machine is made to implant the learning to distinguish the sentences and choosing itself as reaction to answer a question. The main focus will be on the automatic generation of conversation "Chat" between a computer and a human by developing an interactive artificial intelligent agent through the use of natural language processing and deep learning techniques such as Long Short-Term Memory, Gated Recurrent Units and to predict a suitable and automatic response to customers' queries

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1 INTRODUCTION

Domain overview:

1.1.Data Science:

Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data, and apply knowledge and actionable insights from data across a broad range of application domains.

The term "data science" has been traced back to 1974, when Peter Naur proposed it as an alternative name for computer science. In 1996, the International Federation of Classification Societies became the first conference to specifically feature data science as a topic. However, the definition was still in flux.

The term "data science" was first coined in 2008 by D.J. Patil, and Jeff Hammerbacher, the pioneer leads of data and analytics efforts at LinkedIn and Facebook. In less than a decade, it has become one of the hottest and most trending professions in the market.

Data science is the field of study that combines domain expertise, programming skills, and knowledge of mathematics and statistics to extract meaningful insights from data.

Data science can be defined as a blend of mathematics, business acumen, tools, algorithms and machine learning techniques, all of which help us in finding out the hidden insights or patterns from raw data which can be of major use in the formation of big business decisions.

Data Scientist:

Data scientists examine which questions need answering and where to find the related data. They have business acumen and analytical skills as well as the ability to mine, clean, and present data. Businesses use data scientists to source, manage, and analyze large amounts of unstructured data.

1.2 ARTIFICIAL INTELLIGENCE:

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.

Artificial intelligence (AI) is [intelligence](#) demonstrated by [machines](#), as opposed to the natural intelligence [displayed by humans](#) or [animals](#). Leading AI textbooks define the field as the study of "[intelligent agents](#)" any system that perceives its environment and takes actions that maximize its chance of achieving its goals. Some popular accounts use the term "artificial intelligence" to describe machines that mimic "cognitive" functions that humans associate with the [human mind](#), such as "learning" and "problem solving", however this definition is rejected by major AI researchers.

Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

AI applications include advanced web search engines, recommendation systems (used by YouTube, Amazon and Netflix), Understanding human

speech (such as Siri or Alexa), self-driving cars (e.g. Tesla), and competing at the highest level in strategic game systems (such as chess and Go). As machines become increasingly capable, tasks considered to require "intelligence" are often removed from the definition of AI, a phenomenon known as the AI effect. For instance, optical character recognition is frequently excluded from things considered to be AI, having become a routine technology.

Artificial intelligence was founded as an academic discipline in 1956, and in the years since has experienced several waves of optimism, followed by disappointment and the loss of funding (known as an "AI winter"), followed by new approaches, success and renewed funding. AI research has tried and discarded many different approaches during its lifetime, including simulating the brain, modeling human problem solving, formal logic, large databases of knowledge and imitating animal behavior. In the first decades of the 21st century, highly mathematical statistical machine learning has dominated the field, and this technique has proved highly successful, helping to solve many challenging problems throughout industry and academia.

The various sub-fields of AI research are centered around particular goals and the use of particular tools. The traditional goals of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects. General intelligence (the ability to solve an arbitrary problem) is among the field's long-term goals. To solve these problems, AI researchers use versions of search and mathematical optimization, formal logic, artificial neural networks, and methods based on statistics, probability and economics. AI also draws upon computer science, psychology, linguistics, philosophy, and many other fields.

The field was founded on the assumption that human intelligence "can be so precisely described that a machine can be made to simulate it". This raises philosophical arguments about the mind and the ethics of creating artificial beings endowed with human-like intelligence. These issues have been explored by myth, fiction and philosophy since antiquity. Science fiction and futurology have also suggested that, with its enormous potential and power, AI may become an existential risk to humanity.

As the hype around AI has accelerated, vendors have been scrambling to promote how their products and services use AI. Often what they refer to as AI is simply one component of AI, such as machine learning. AI requires a foundation of specialized hardware and software for writing and training machine learning algorithms. No one programming language is synonymous with AI, but a few, including Python, R and Java, are popular.

In general, AI systems work by ingesting large amounts of labeled training data, analyzing the data for correlations and patterns, and using these patterns to make predictions about future states. In this way, a chatbot that is fed examples of text chats can learn to produce life like exchanges with people, or an image recognition tool can learn to identify and describe objects in images by reviewing millions of examples.

AI programming focuses on three cognitive skills: learning, reasoning and self-correction.

Learning processes. This aspect of AI programming focuses on acquiring data and creating rules for how to turn the data into actionable information. The rules, which are called algorithms, provide computing devices with step-by-step instructions for how to complete a specific task.

Reasoning processes. This aspect of AI programming focuses on choosing the right algorithm to reach a desired outcome.

Self-correction processes. This aspect of AI programming is designed to continually fine-tune algorithms and ensure they provide the most accurate results possible.

AI is important because it can give enterprises insights into their operations that they may not have been aware of previously and because, in some cases, AI can perform tasks better than humans. Particularly when it comes to repetitive, detail-oriented tasks like analyzing large numbers of legal documents to ensure

relevant fields are filled in properly, AI tools often complete jobs quickly and with relatively few errors.

Artificial neural networks and deep learning artificial intelligence technologies are quickly evolving, primarily because AI processes large amounts of data much faster and makes predictions more accurately than humanly possible.

Natural Language Processing (NLP):

Natural language processing (NLP) allows machines to read and understand human language. A sufficiently powerful natural language processing system would enable natural-language user interfaces and the acquisition of knowledge directly from human-written sources, such as newswire texts. Some straightforward applications of natural language processing include information retrieval, text mining, question answering and machine translation. Many current approaches use word co-occurrence frequencies to construct syntactic representations of text. "Keyword spotting" strategies for search are popular and scalable but dumb; a search query for "dog" might only match documents with the literal word "dog" and miss a document with the word "poodle". "Lexical affinity" strategies use the occurrence of words such as "accident" to assess the sentiment of a document. Modern statistical NLP approaches can combine all these strategies as well as others, and often achieve acceptable accuracy at the page or paragraph level. Beyond semantic NLP, the ultimate goal of "narrative" NLP is to embody a full understanding of commonsense reasoning. By 2019, transformer-based deep learning architectures could generate coherent text.

1.3 MACHINE LEARNING

Machine learning is to predict the future from past data. Machine learning (ML) is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of Computer Programs that can change when exposed to new data and the basics of Machine Learning, implementation of a simple machine learning algorithm using python. Process of training and prediction involves use of specialized

algorithms. It feed the training data to an algorithm, and the algorithm uses this training data to give predictions on a new test data. Machine learning can be roughly separated in to three categories. There are supervised learning, unsupervised learning and reinforcement learning. Supervised learning program is both given the input data and the corresponding labeling to learn data has to be labeled by a human being beforehand. Unsupervised learning is no labels. It provided to the learning algorithm. This algorithm has to figure out the clustering of the input data. Finally, Reinforcement learning dynamically interacts with its environment and it receives positive or negative feedback to improve its performance.

Data scientists use many different kinds of machine learning algorithms to discover patterns in python that lead to actionable insights. At a high level, these different algorithms can be classified into two groups based on the way they “learn” about data to make predictions: supervised and unsupervised learning. Classification is the process of predicting the class of given data points. Classes are sometimes called as targets/ labels or categories. Classification predictive modeling is the task of approximating a mapping function from input variables(X) to discrete output variables(y). In machine learning and statistics, classification is a supervised learning approach in which the computer program learns from the data input given to it and then uses this learning to classify new observation. This data set may simply be bi-class (like identifying whether the person is male or female or that the mail is spam or non-spam) or it may be multi-class too. Some examples of classification problems are: speech recognition, handwriting recognition, bio metric identification, document classification etc.

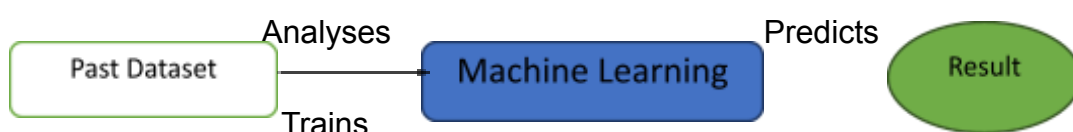


Fig (1): Process of Machine learning

Supervised Machine Learning is the majority of practical machine learning uses supervised learning. Supervised learning is where have input variables (X) and an output variable (y) and use an algorithm to learn the mapping function from the input to the output **is $y = f(X)$** . The goal is to approximate the mapping function so well that when you have new input data (X) that you can predict the output variables

(y) for that data. Techniques of Supervised Machine Learning algorithms include **logistic regression, multi-class classification, Decision Trees** and **support vector machines etc.** Supervised learning requires that the data used to train the algorithm is already labeled with correct answers. Supervised learning problems can be further grouped into **Classification** problems. This problem has as goal the construction of a succinct model that can predict the value of the dependent attribute from the attribute variables. The difference between the two tasks is the fact that the dependent attribute is numerical for regression and categorical for classification. A classification model attempts to draw some conclusion from observed values. Given one or more inputs a classification model will try to predict the value of one or more outcomes. A classification problem is when the output variable is a category, such as “red” or “blue”.

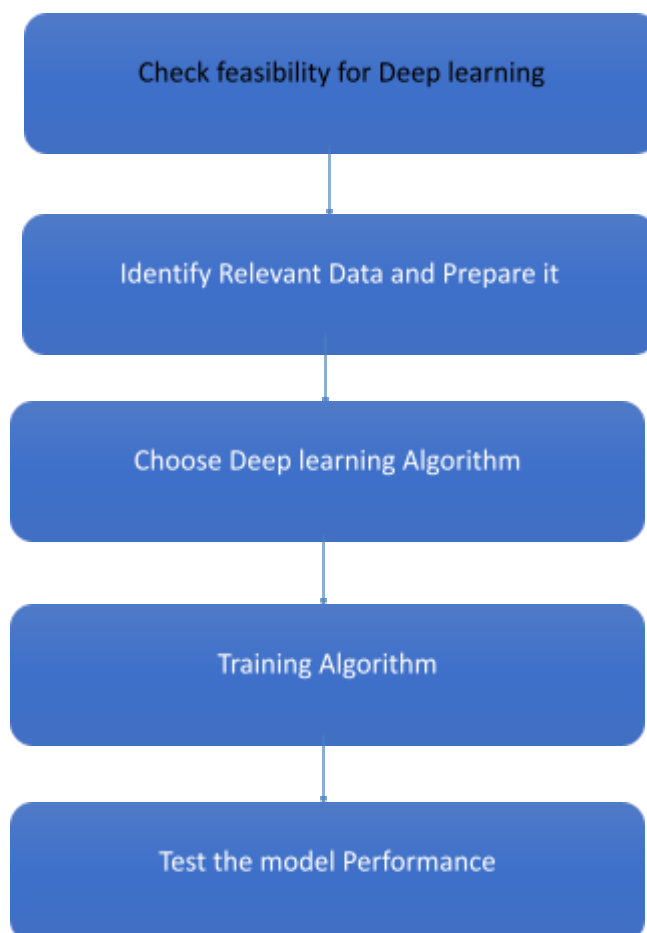
1.4 DEEP LEARNING

Deep learning is a branch of machine learning which is completely based on artificial neural networks, as neural network is going to mimic the human brain so deep learning is also a kind of mimic of human brain. It's on hype nowadays because earlier we did not have that much processing power and a lot of data. A formal definition of deep learning is- neurons Deep learning is a particular kind of machine learning that achieves great power and flexibility by learning to represent the world as a nested hierarchy of concepts, with each concept defined in relation to simpler concepts, and more abstract representations computed in terms of less abstract ones. In brain approximately 100 billion neurons all together this is a picture of an individual neuron and each neuron is connected through thousands of their neighbors. The question here is how it recreates these neurons in a computer. So, it creates an artificial structure called an artificial neural net where we have nodes or neurons. It has some neurons for input value and some for output value and in between, there may be lots of neurons interconnected in the hidden layer.



Fig (2): Workflow process

It need to identify the actual problem in order to get the right solution and it should be understood, the feasibility of the Deep Learning should also be checked (whether it should fit Deep Learning or not). It needs to identify the relevant data which should correspond to the actual problem and should be prepared accordingly. Choose the Deep Learning Algorithm appropriately. Algorithm should be used while training the dataset. Final testing should be done on the dataset



Fig(3) : Work flow in Deep learning

Deep learning (also known as deep structured learning) is part of a broader family of machine learning methods based on artificial neural networks with representation learning. Learning can be supervised, semi-supervised or unsupervised.

Deep-learning architectures such as deep neural networks, deep belief networks, deep reinforcement learning, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, speech recognition, natural language processing, machine translation, bioinformatics, drug design, medical image analysis, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance.

Artificial neural networks (ANNs) were inspired by information processing and distributed communication nodes in biological systems. ANNs have various differences from biological brains. Specifically, neural networks tend to be static and symbolic, while the biological brain of most living organisms is dynamic (plastic) and analogue.

The adjective "deep" in deep learning refers to the use of multiple layers in the network. Early work showed that a linear perceptron cannot be a universal classifier, but that a network with a non-polynomial activation function with one hidden layer of unbounded width can. Deep learning is a modern variation which is concerned with an unbounded number of layers of bounded size, which permits practical application and optimized implementation, while retaining theoretical universality under mild conditions. In deep learning the layers are also permitted to be heterogeneous and to deviate widely from biologically informed connectionist models, for the sake of efficiency, trainability and understandability, whence the "structured" part.

Deep learning is a class of machine learning algorithms that uses multiple layers to progressively extract higher-level features from the raw input. For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits or letters or faces.

Interpretations:

Deep neural networks are generally interpreted in terms of the universal approximation theorem or probabilistic inference.

The classic universal approximation theorem concerns the capacity of feed-forward neural networks with a single hidden layer of finite size to approximate continuous functions. In 1989, the first proof was published by George Cybenko for sigmoid activation functions and was generalised to feed-forward multi-layer architectures in 1991 by Kurt Hornik. Recent work also showed that universal approximation also holds for non-bounded activation functions such as the rectified linear unit.

The universal approximation theorem for deep neural networks concerns the capacity of networks with bounded width but the depth is allowed to grow proved that if the width of a deep neural network with ReLU activation is strictly larger than the input dimension, then the network can approximate any Lebesgue integrable function; If the width is smaller or equal to the input dimension, then deep neural network is not a universal approximator.

The probabilistic interpretation derives from the field of machine learning. It features inference, as well as the optimization concepts of training and testing, related to fitting and generalization, respectively. More specifically, the probabilistic interpretation considers the activation nonlinearity as a cumulative distribution function. The probabilistic interpretation led to the introduction of dropout as regularizer in neural networks. The probabilistic interpretation was introduced by researchers including Hopfield, Widrow and Narendra and popularized in surveys such as the one by Bishop.

Deep learning revolution:

In 2012, a team led by George E. Dahl won the "Merck Molecular Activity Challenge" using multi-task deep neural networks to predict the biomolecular target of one drug. In 2014, Hochreiter's group used deep learning to detect off-target and toxic effects of environmental chemicals in nutrients, household products and drugs and won the "Tox21 Data Challenge" of NIH, FDA and NCATS.

Significant additional impacts in image or object recognition were felt from 2011 to 2012. Although CNNs trained by back-propagation had been around for decades, and GPU implementations of NNs for years, including CNNs, fast

implementations of CNNs on GPUs were needed to progress on computer vision. In 2011, this approach achieved for the first time superhuman performance in a visual pattern recognition contest. Also in 2011, it won the ICDAR Chinese handwriting contest, and in May 2012, it won the ISBI image segmentation contest. Until 2011, CNNs did not play a major role at computer vision conferences, but in June 2012, a paper by Ciresan et al. at the leading conference CVPR showed how max-pooling CNNs on GPU can dramatically improve many vision benchmark records. In October 2012, a similar system by Krizhevsky et al. won the large-scale ImageNet competition by a significant margin over shallow machine learning methods. In November 2012, Ciresan et al.'s system also won the ICPR contest on analysis of large medical images for cancer detection, and in the following year also the MICCAI Grand Challenge on the same topic. In 2013 and 2014, the error rate on the ImageNet task using deep learning was further reduced, following a similar trend in large-scale speech recognition.

Image classification was then extended to the more challenging task of generating descriptions (captions) for images, often as a combination of CNNs and LSTMs.

Some researchers state that the October 2012 ImageNet victory anchored the start of a "deep learning revolution" that has transformed the AI industry.

In March 2019, Yoshua Bengio, Geoffrey Hinton and Yann LeCun were awarded the Turing Award for conceptual and engineering breakthroughs that have made deep neural networks a critical component of computing.

2 LITERATURE SURVEY

General

A literature review is a body of text that aims to review the critical points of current knowledge on and/or methodological approaches to a particular topic. It is secondary sources and discuss published information in a particular subject area and sometimes information in a particular subject area within a certain time period. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area and precedes a research proposal and may be just a simple summary of sources. Usually, it has an organizational pattern and combines both summary and synthesis.

A summary is a recap of important information about the source, but a synthesis is a re-organization, reshuffling of information. It might give a new interpretation of old material or combine new with old interpretations or it might trace the intellectual progression of the field, including major debates. Depending on the situation, the literature review may evaluate the sources and advise the reader on the most pertinent or relevant of them. Loan default trends have been long studied from a socio-economic stand point. Most economics surveys believe in empirical modeling of these complex systems in order to be able to predict the loan default rate for a particular individual. The use of machine learning for such tasks is a trend which it is observing now. Some of the survey's to understand the past and present perspective of loan approval or not.

This chatbots in education was developed by Amina Khatra for Digitalizing education and reinventing the learning experience is one of the big challenges in this age of information. In the field of E-learning, the application of a chatbot as part of the education has shown interesting potential, both as a teaching and administrative tool. Chatbots have been 'trending' for a few years and quite a few papers examining it in the educational sector have been published, albeit very little interest seems to have been given to the summation of this knowledge. In an attempt to fill the knowledge gap this thesis performed a literature study to examine the documented

features and possible uses for chatbots in an educational context. Since quite a few chatbot technologies have been developed at this time and exhibit varied functions, this study was limited to only examine bots based on the XML derived language AIML. The results imply that chatbots in education have quite a few uses and even more possible features. An AIML-based chatbot can be both simple and complex to implement, all depending on the effort put into implementation. The tool is diverse and may be used for many different purposes and aims, the only limitation being the creators creativity and imagination.

A survey paper on chatbot was developed by wati Singh Ena Garg Nandita Goyal and This paper tells the basic and virtual strategies and framework that gives individuals the help from their mental issues and stress which they experience. The principle point is to give some constructive data by offering responses in exchange or expression so individuals can think and take their troubles in a constructive manner and attempt to make an idealistic encompassing and the point of accomplishing the mental weight free individual is satisfied. Here and there, individuals with a negative weight can't communicate their sentiments to other people and discover no real way to get themselves out. In this paper, we'll be introducing an Artificial Intelligence based conversational stage which is named as "Animo", whose design is to carry on like a companion which will at that point help the individuals by empowering them and managing them to put all their negative sentiments out. Chatbots, which are an interface for discussion, portrays another manner by which teenagers associates with PC frameworks. The chatbot is planned in such a manner thus, that the juvenile associating with it can pose inquiries from it which is very like an individual posing inquiry to some other individual. The chatbot depends on innovations like RNN and customer server design.

A Systematic Approach to Implementing Chatbots in Organizations – RTU Leo Showcase Was developed by Antons Mislevics , Janis Grundspenkis, Leo is a chatbot that was successfully developed to support potential new students during the admission process. While developing Leo the authors have concluded that existing publications do not cover the approach of developing virtual assistants or chatbots in

organizations in enough details. This paper is aimed to fill-in this gap by describing a systematic approach that was followed by RTU team while developing Leo

The Effect of Social Presence and Chatbot Errors on Trust was developed by Diana-Cezara Toader , Gratiela Boca and this article explores the potential of Artificial Intelligence (AI) chatbots for creating positive change by supporting customers in the digital realm. Our study, which focuses on the customer and his/her declarative psychological responses to an interaction with a virtual assistant, will fill a gap in the digital marketing research, where little attention has been paid to the impact of Error and Gender, as well as the extent to which Social Presence and Perceived Competence mediate the relationships between Anthropomorphic design cues and Trust. We provide consistent evidence of the significant negative effect of erroneous conversational interfaces on several constructs considered in our conceptual model, such as: perceived competence, trust, as well as positive consumer responses. We also provide support to previous research findings and confirm that people employ a biased thinking across gender and this categorization also influences their acceptance of chatbots taking social roles. The results of an empirical study demonstrated that highly anthropomorphized female chatbots that engage in social behaviors are significantly shaping positive consumer responses, even in the error condition. Moreover, female virtual assistants are much more commonly forgiven when committing errors compared to male chatbot

3. AIM AND SCOPE

3.1 Project Goals:

Load the data

- Loading the given dataset
- Import required libraries packages

Pre-process the data

- Reshape, data augmentations

Define model

- Sequential or Functional
- Number of layers to be used, Number of nodes to be used in the model, Evaluation metrics

Compile the model

- Define loss function, optimizer, weights and bias

Fit the model

- Train data, Test data, epoch, Batch size.

3.2 Objectives:

Chatbots provide a natural language user interface to information systems. This allows (enterprise) applications to be easily integrated without the user having to install additional software. The chatbot backend uses existing interfaces to access integrated applications services and provides them in the same communication channel. This will reduce media discontinuity and application overload within daily work routines. Instead of learning user interfaces, employees can execute processes or tasks intuitive and with natural language. Here our goal is to develop a Chatbot by using neural network.

3.3 Scope:

Most of the related works is to support the customers query's and information's and reduces the availability of human presents in all time. It quite close to be mainstream customer support and evolved by riding the artificial intelligence wave. Artificial intelligence, programming languages, databases, and APIs are rapidly evolving and we can see their direct impact on chatbots.

3.4 SYSTEM REQUIREMENTS:

1. Software Requirements:

Operating System : Windows / Linux
Simulation Tool : Anaconda with Jupyter Notebook

2. Hardware requirements:

Processor : Pentium IV/III
Hard disk : minimum 80 GB
RAM : minimum 2 GB

4 EXPERIMENTAL OR MATERIALS AND METHODS

4.1 Overview of the system:

Define a problem
Gathering image data set
Evaluating algorithms
Detecting results

The steps involved in Building the data model is depicted below.

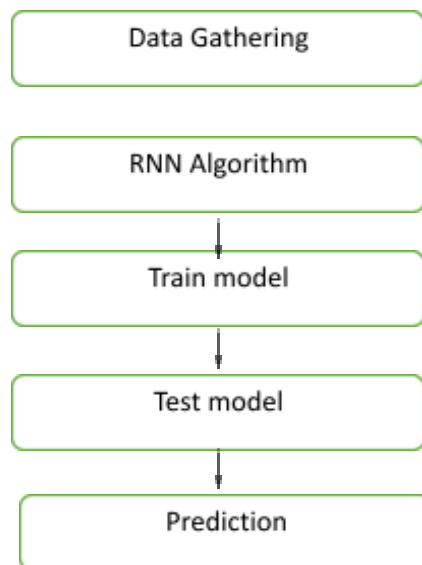
4.2 Feasibility Study

Splitting the dataset:

The data use is usually split into training data and test data. The training set contains a known output and the model learns on this data in order to be generalized to other data later on. It has the test dataset (or subset) in order to test our models and it will do this using Tensor flow library in Python using the Keras method.

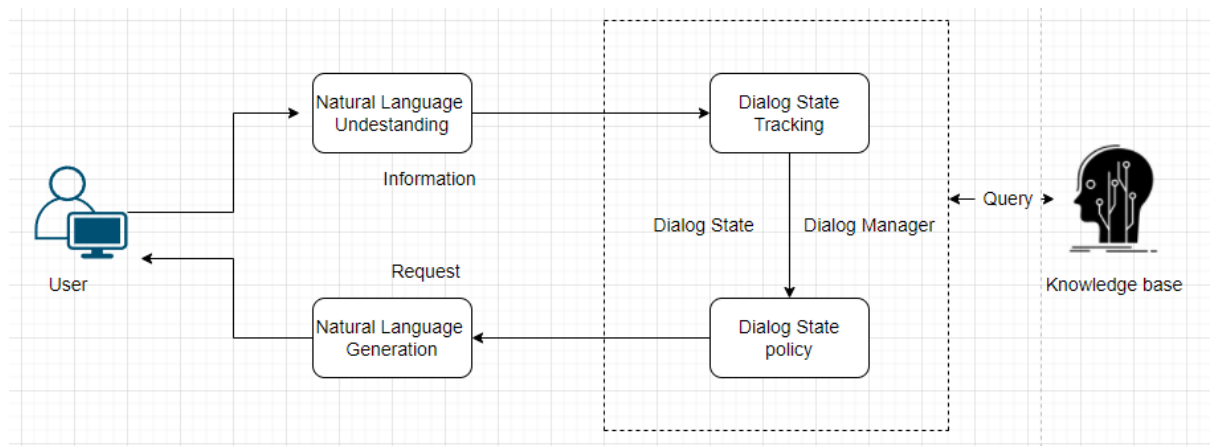
Construction of a Detecting Model:

Deep learning needs data gathering have lot of past image data's. Training and testing this model working and predicting correctly.



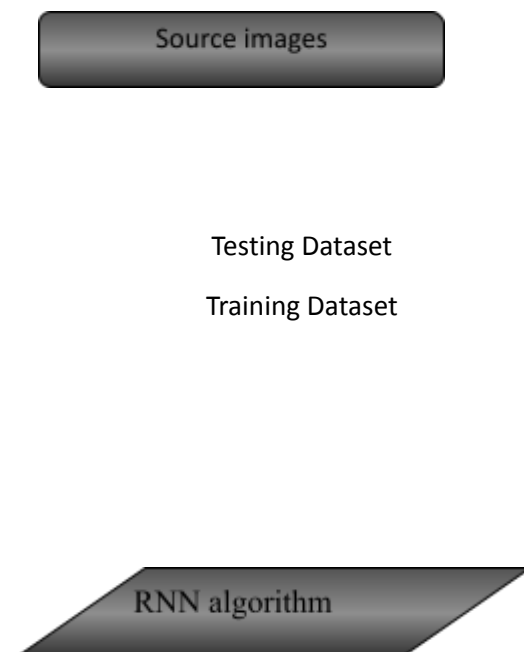
Fig(4): Steps of dataflow diagram

4.3 SYSTEM ARCHITECTURE



Fig(5): System Architecture Diagram

4.4. Work flow diagram:



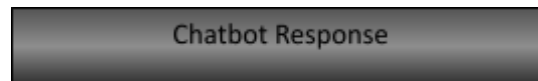


Fig (6): Workflow Diagram

4.5. USE CASE DIAGRAM:

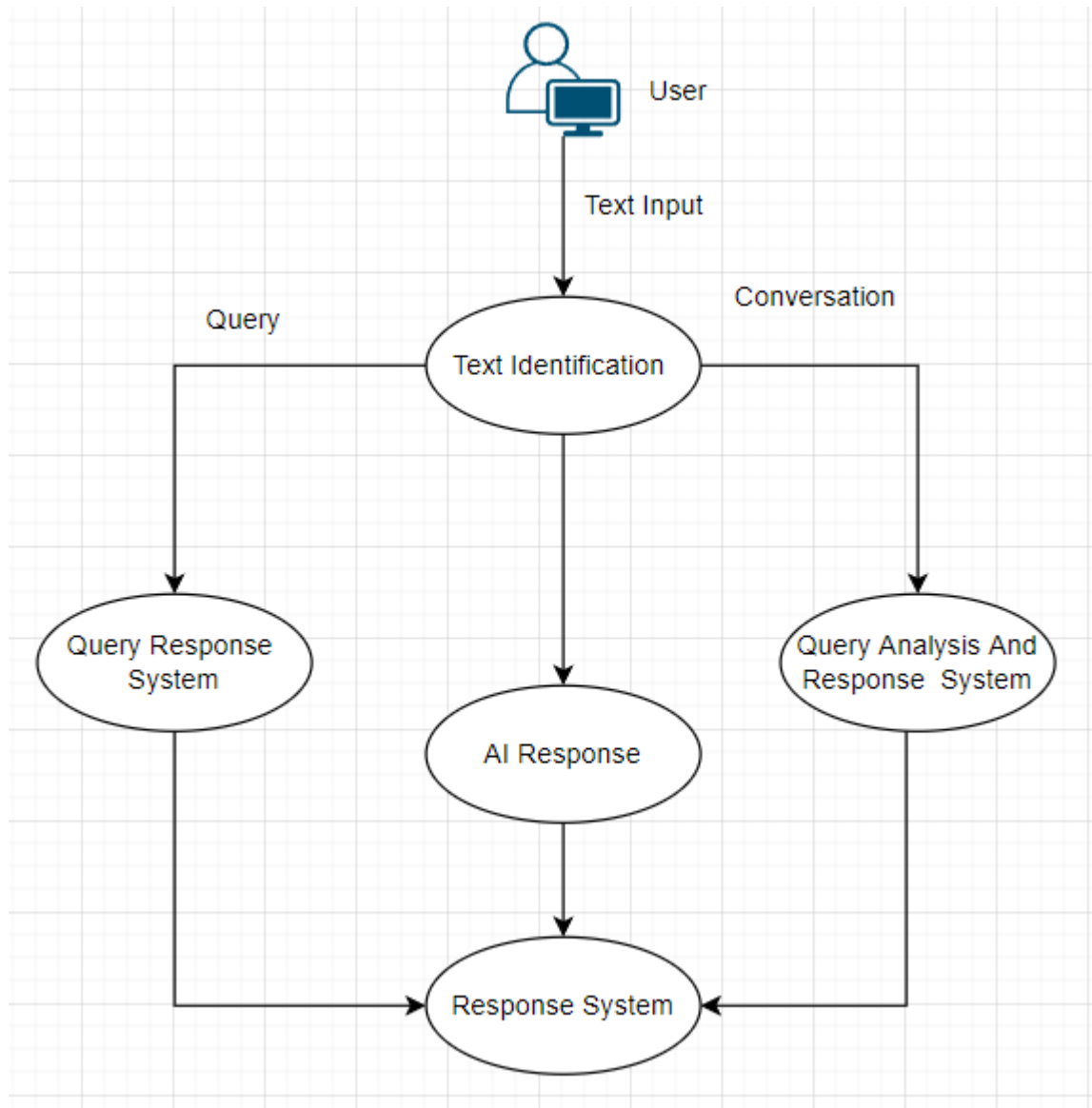


Fig (7) : Use Case Diagram

4.6. CLASS DIAGRAM:

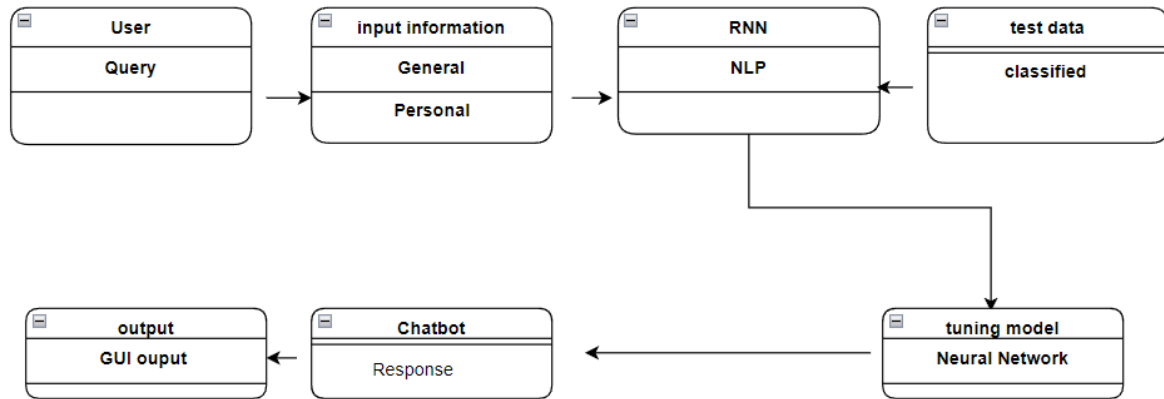


Fig (8) : Class Diagram

4.7. ACTIVITY DIAGRAM:

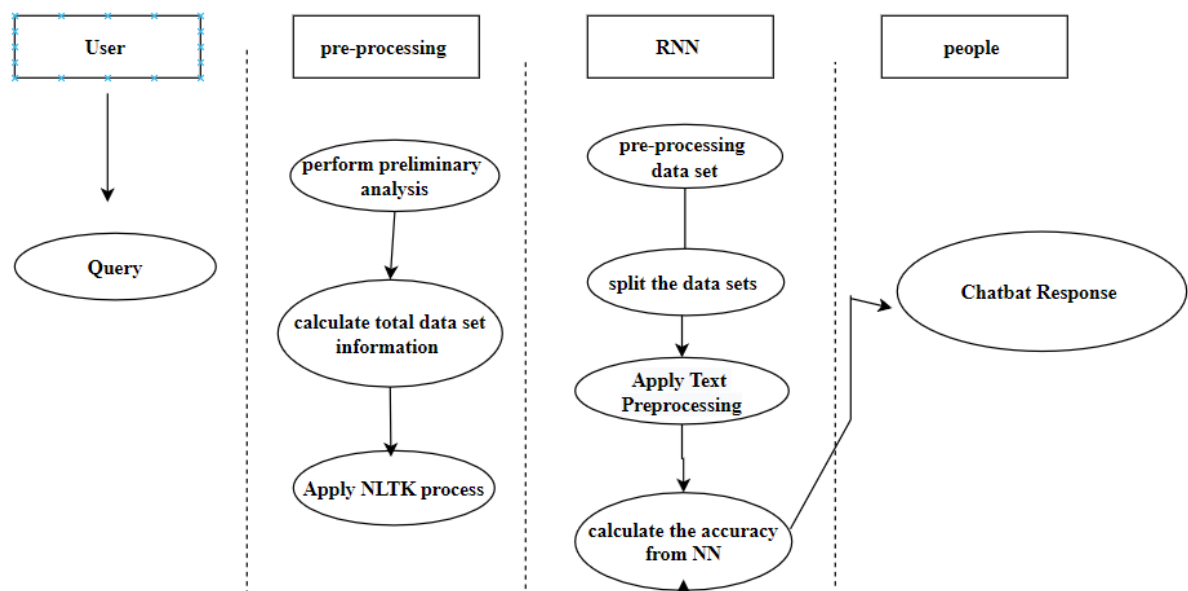


Fig (9): Activity Diagram

4.8. SEQUENCE DIAGRAM:

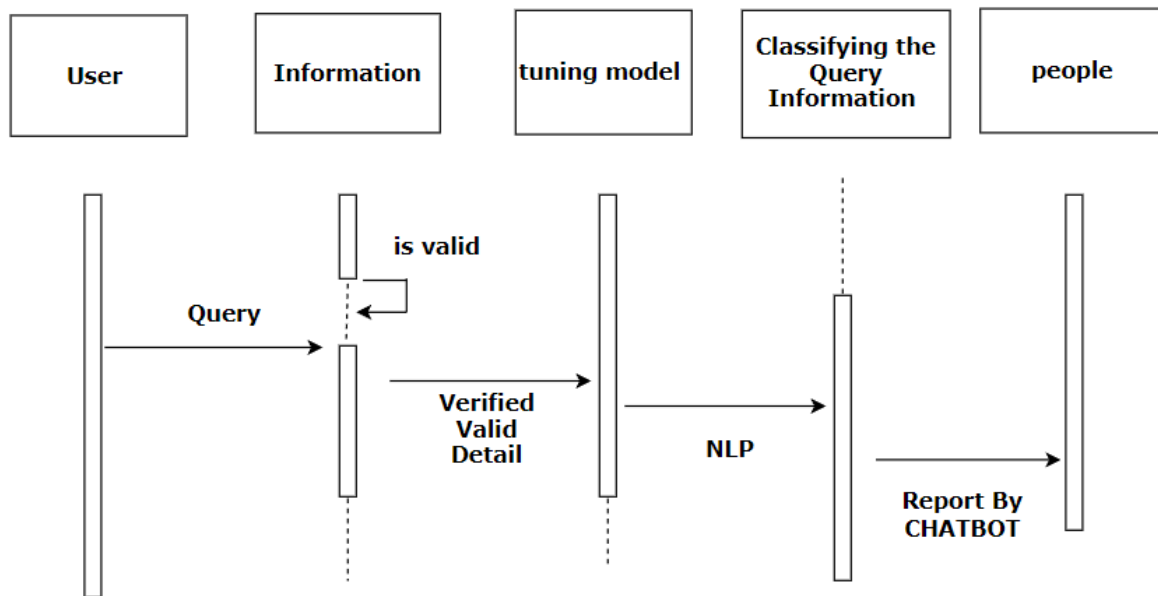


Fig (10): Sequence Diagram

4.9 E.R – DIAGRAM

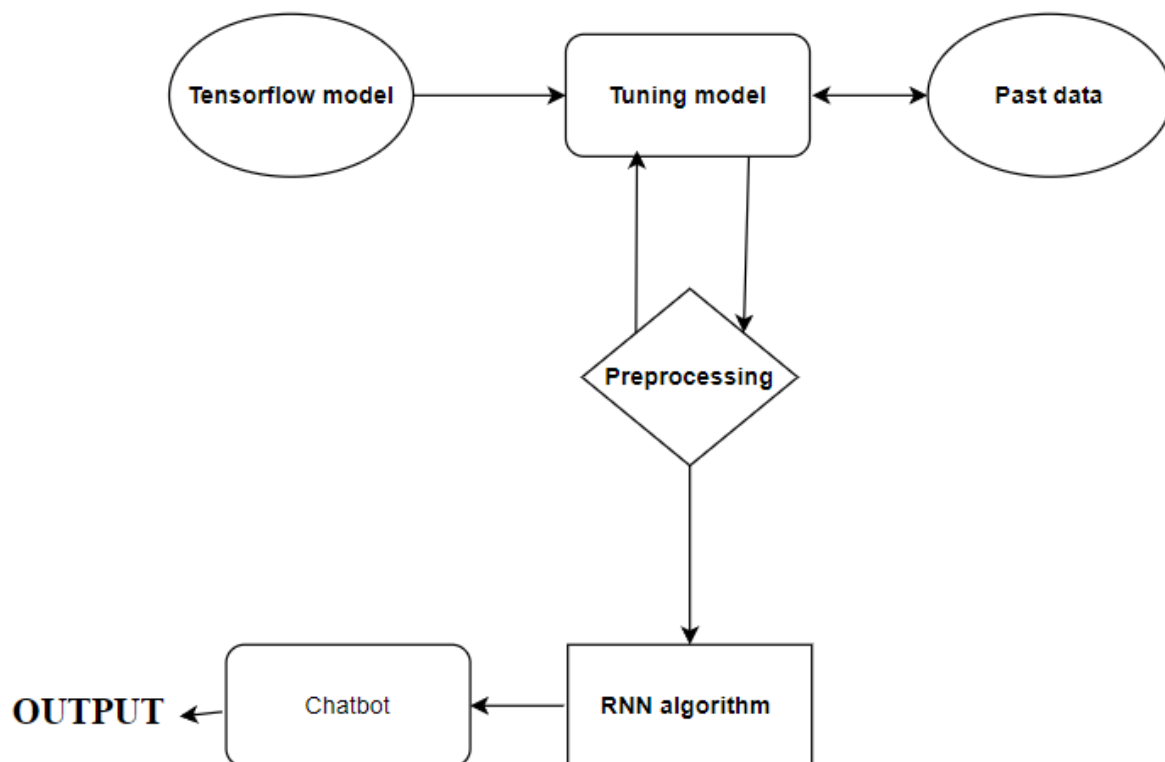


Fig (11) : E.R Diagram

5. RESULTS AND DISCUSSIONS

5.1 Module Description

5.1.1.Chatbot building Module

Import The Given Dataset:

We have to import our data set using keras preprocessing. Then we import our dataset from folder through the data generator function. Here we set train, test, and validation also we set target size, batch size and class-mode from this function we have to train using our own created network by adding layers.

```
:                               intents
0  {'tag': 'hello', 'patterns': ['Hi there', 'How...
1  {'tag': 'name', 'patterns': ['who are you', 'w...
2  {'tag': 'age', 'patterns': [' when is your bir...
3  {'tag': 'family', 'patterns': ['who's your mot...
4  {'tag': 'live', 'patterns': ['where do you liv...

44 documents
17 classes ['afraid', 'age', 'datascience', 'deeplearning', 'eat', 'family', 'feelings', 'goodbye', 'hello', 'live', 'love',
'machinelearning', 'name', 'noanswer', 'options', 'sleep', 'thanks']
71 unique lemmatized words ['s', ',', 'about', 'afraid', 'anyone', 'are', 'awesome', 'be', 'birthday', 'bye', 'can', 'chattin
g', 'could', 'data', 'day', 'deep', 'do', 'eat', 'father', 'feeling', 'for', 'friend', 'good', 'goodbye', 'have', 'hello', 'hel
p', 'helpful', 'helping', 'hey', 'hi', 'hola', 'how', 'hug', 'i', 'is', 'kiss', 'later', 'learning', 'like', 'live', 'love', 'm
achine', 'marry', 'me', 'mother', 'name', 'next', 'nice', 'of', 'offered', 'provide', 'science', 'see', 'sleep', 'support', 'th
ank', 'thanks', 'that', 'there', 'till', 'time', 'to', 'what', 'when', 'where', 'who', 'why', 'will', 'you', 'your']
Training data created
```

To Train The Module By Given Dataset:

To train our dataset using classifier and fit generator function also we make training steps per epoch's then total number of epochs, validation data and validation steps using this data we can train our dataset.

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 128)	9216
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 64)	8256
dropout_1 (Dropout)	(None, 64)	0
dense_2 (Dense)	(None, 17)	1105
Total params: 18,577		
Trainable params: 18,577		
Non-trainable params: 0		

```
Epoch 192/200
9/9 [=====] - 0s 2ms/step - loss: 0.0357 - accuracy: 0.9773
Epoch 193/200
9/9 [=====] - 0s 3ms/step - loss: 0.0678 - accuracy: 0.9773
Epoch 194/200
9/9 [=====] - 0s 1ms/step - loss: 0.0593 - accuracy: 1.0000
Epoch 195/200
9/9 [=====] - 0s 2ms/step - loss: 0.0635 - accuracy: 0.9773
Epoch 196/200
9/9 [=====] - 0s 5ms/step - loss: 0.1144 - accuracy: 0.9773
Epoch 197/200
9/9 [=====] - 0s 5ms/step - loss: 0.0703 - accuracy: 0.9773
Epoch 198/200
9/9 [=====] - 0s 4ms/step - loss: 0.1114 - accuracy: 0.9545
Epoch 199/200
9/9 [=====] - 0s 2ms/step - loss: 0.0986 - accuracy: 0.9773
Epoch 200/200
9/9 [=====] - 0s 1ms/step - loss: 0.1160 - accuracy: 0.9773
```

5.1.2. GUI Module

Deployment

GUI

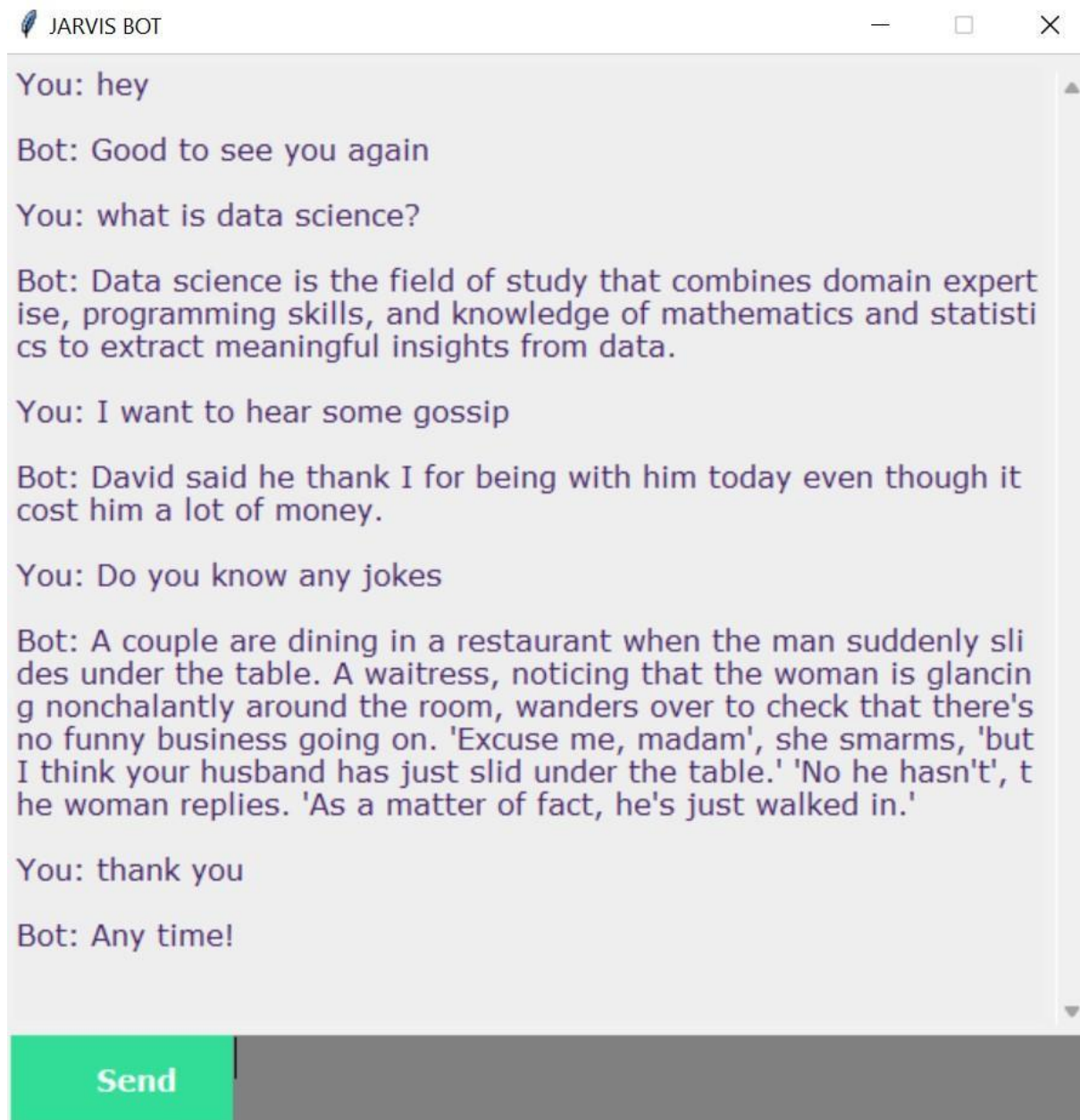


Fig (12): Output Screen

S N	Widget	Description

1	<u>Button</u>	The Button is used to add various kinds of buttons to the python application.
2	<u>Canvas</u>	The canvas widget is used to draw the canvas on the window.
3	<u>Checkbutton</u>	The Checkbutton is used to display the CheckButton on the window.
4	<u>Entry</u>	The entry widget is used to display the single-line text field to the user. It is commonly used to accept user values.
5	<u>Frame</u>	It can be defined as a container to which, another widget can be added and organized.
6	<u>Label</u>	A label is a text used to display some message or information about the other widgets.
7	<u>ListBox</u>	The ListBox widget is used to display a list of options to the user.
8	<u>Menubutton</u>	The Menubutton is used to display the menu items to the user.
9	<u>Menu</u>	It is used to add menu items to the user.
10	<u>Message</u>	The Message widget is used to display the message-box to the user.

11	<u>Radiobutton</u>	The Radiobutton is different from a checkbutton. Here, the user is provided with various options and the user can select only one option among them.
12	<u>Scale</u>	It is used to provide the slider to the user.
13	<u>Scrollbar</u>	It provides the scrollbar to the user so that the user can scroll the window up and down.
14	<u>Text</u>	It is different from Entry because it provides a multi-line text field to the user so that the user can write the text and edit the text inside it.
14	<u>Toplevel</u>	It is used to create a separate window container.
15	<u>Spinbox</u>	It is an entry widget used to select from options of values.
16	<u>PanedWindow</u>	It is like a container widget that contains horizontal or vertical panes.
17	<u>LabelFrame</u>	A LabelFrame is a container widget that acts as the container
18	<u>MessageBox</u>	This module is used to display the message-box in the desktop based applications.

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6 SUMMARY AND CONCLUSION

This paper applied machine learning in prediction of loan approval. Support Vector Machine (SVM) is used to predict the loan approval status of customers for bank loans. The results shown that the prediction accuracy is Train Accuracy: 80% and Test Accuracy: 82%. According to this research paper prediction accuracy is good when compared to other existing systems. In some situations like client going through some disaster so here the algorithm cannot predict the appropriate result. This research paper can find out the client is potential or not.

In future a rigorous analysis of other machine learning algorithms other than these can also be done in future to investigate the power of machine learning algorithms for loan approval prediction

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