

PROJECT REPORT ON ONLINE AI CHATBOT

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**BACHELOR OF COMPUTER APPLICATIONS
(HATIM)**



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CERTIFICATE

This is to certify that Daniel Lalawmpuia Zadeng and Lalrosangliana Fanchun of Group 1 has fully completed the project entitled, "ONLINE AI CHATBOT" in order to meet the requirement of the Mizoram University for the VI Semester Bachelor of Computer Application in the year 2023(JANUARY-MAY). It is to certify that all the corrections/suggestions indicated for internal assessment has been incorporated in the project. The project report has been approved as it satisfies the academic requirements in respects of the project work prescribed for the BCA Course.

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1. INTRODUCTION

1.1 OVERVIEW

This project mainly focuses on creating an Online Ai Chatbot in which customers will be able to easily find a Chabot that will be able to answer questions(about Mizoram) given to it by the users. This will seriously help customers as it will be accessible online and it will also be able to easily answer questions that are not easily found on the internet.

1.2 OBJECTIVE

The main objective of this project is to create an Online website that can be easily accessed, easy and simple to use by anyone so that they can easily ask any questions through this chatbot.

1. Our project is an AI chatbot that has extensive knowledge about the history of Mizoram.
2. Historical events: The chatbot could be trained to understand and discuss significant historical events, such as wars, revolutions, and political movements
3. Important figures: It could also be trained to recognize and discuss important figures from history, such as political leaders, kings, artists, writers, and poets, etc.
4. Historical artifacts: It could also be trained to recognize and discuss historical artifacts, such as art and architecture, tools and weapons, and other objects of cultural significance.

1.3 SCOPE

The scope of this project is to provide information about the Karaoke's and give easy access to the customer's like:

1. Key Location's
2. Historical events, artifacts and names
3. Important factual knowledge about Mizoram
4. Facts about the different districts

2. SYSTEM REQUIREMENTS

2.1 Hardware Requirements

This project is designed in such a way that it can be implemented almost on any Computer system. Thus, the hardware requirement is not high.

- (i) Color Monitor
- (ii) Processor- Pentium IV and above
- (iii) RAM 256 MB and above
- (iv) Secondary memory (not more than 1 GB)
- (v) QWERTY or IBM compatible keyboard
- (vi) Optical Mouse

2.2 Software Requirements

The software used for designing the Users Interface (front- end) and fir the making of the server side (back-end) used are as follows:

- PYTHON
- PYTORCH
- CSS
- JAVASCRIPT
- NUMPY
- FLASK
- WAITRESS
- NLTK

3. Details of Hardware and Software used

3.1 Details of Hardware

The main details of the hardware and scripting language used to create this project are given below:

1. Color Monitor: A color monitor to view the normal output settings. A monitor is one of the most important output devices for a computer which displays all processes and application done by the machine in the form of Graphical User Interface or Command Line Interface.

2. Processor: The processor is the main processing unit to run the project in the computer.

3. RAM: The main is the place in which the application is stored while the process is running. For a project as this, the RAM need not be high and can be run in full performance even in 128MB of memory.

4. Secondary memory: The secondary memory is the memory in which the application can be stored as a backup file in the computer.

5. QWERTY or IBM compatible Keyboard: The Keyboard is the main input device to enter the necessary information and data.

3.2 Details of Software

Overview of Front-End: PYTORCH

PyTorch is a machine learning framework based on the Torch library, used for applications such as computer vision and natural language processing, originally developed by Meta AI and now part of the Linux Foundation umbrella. It is free and open-source software released under the modified BSD license. Although the Python interface is more polished and the primary focus of development, PyTorch also has a C++ interface.

PYTHON

Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation via the off-side rule. Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional

programming. It is often described as a "batteries included" language due to its comprehensive standard library.

FLASK

Flask is a micro web framework written in Python. It is classified as a microframework because it does not require particular tools or libraries. 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, upload handling, various open authentication technologies and several common framework related tools.

NUMPY

NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. The predecessor of NumPy, Numeric, was originally created by Jim Hugunin with contributions from several other developers. In 2005, Travis Oliphant created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors. NumPy is a NumFOCUS fiscally sponsored project.

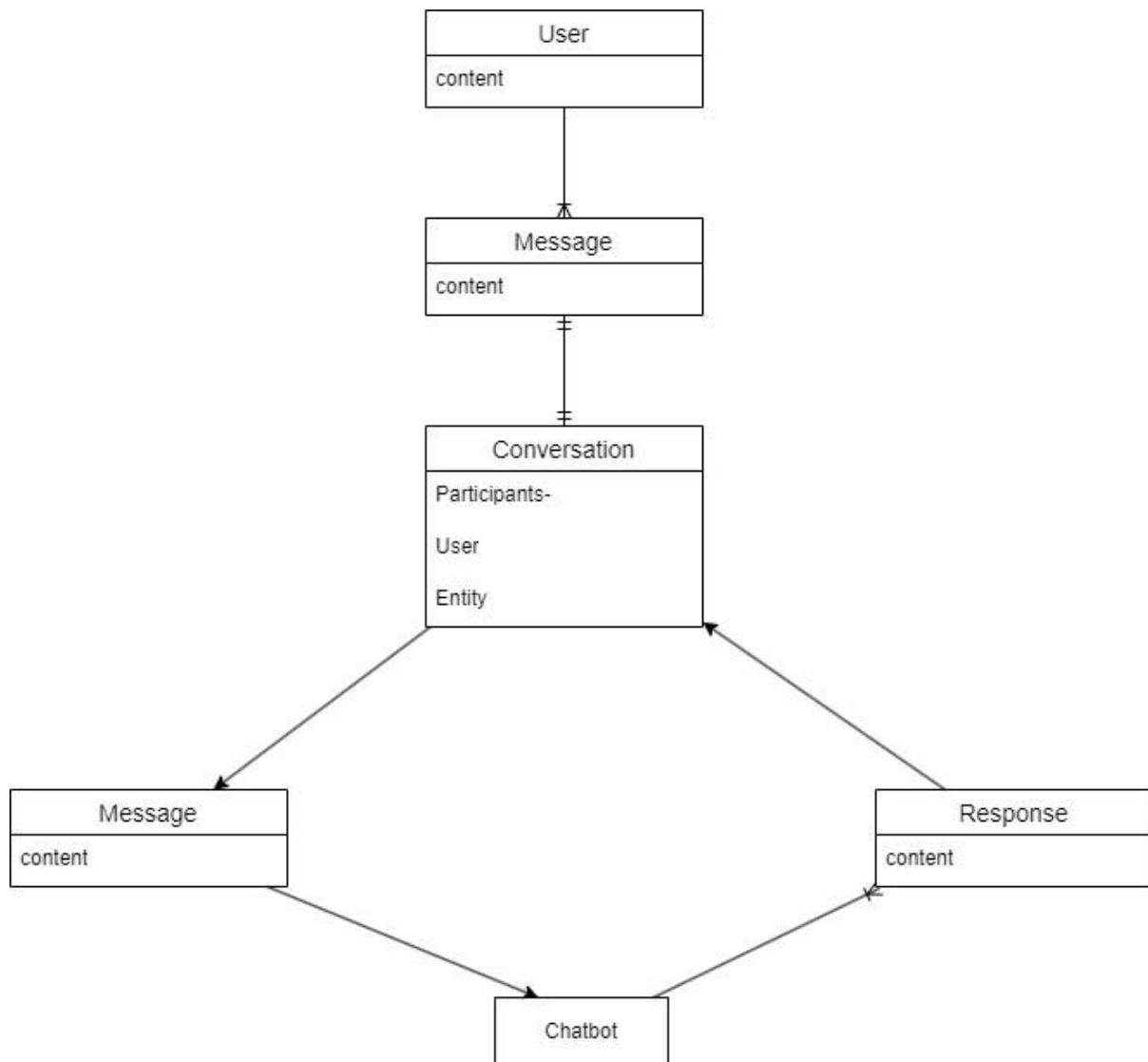
NLTK

The **Natural Language Toolkit**, or more commonly **NLTK**, is a suite of libraries and programs for symbolic and statistical natural language processing (NLP) for English written in the Python programming language. It was developed by Steven Bird and Edward Loper in the Department of Computer and Information Science at the University of Pennsylvania. NLTK includes graphical demonstrations and sample data. It is accompanied by a book that explains the underlying concepts behind the language processing tasks supported by the toolkit, plus a cookbook.

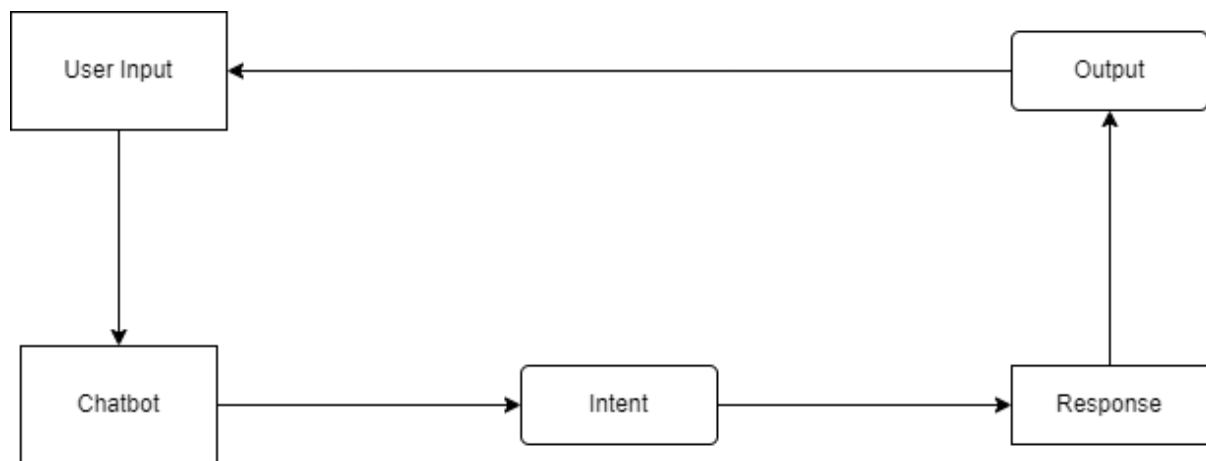
NLTK is intended to support research and teaching in NLP or closely related areas, including empirical linguistics, cognitive science, artificial intelligence, information retrieval, and machine learning. NLTK has been used successfully as a teaching tool, as an individual study tool, and as a platform for prototyping and building research systems.

4. System Analysis

4.1 Entity-Relationship Diagram



4.2 Data Flow Diagram

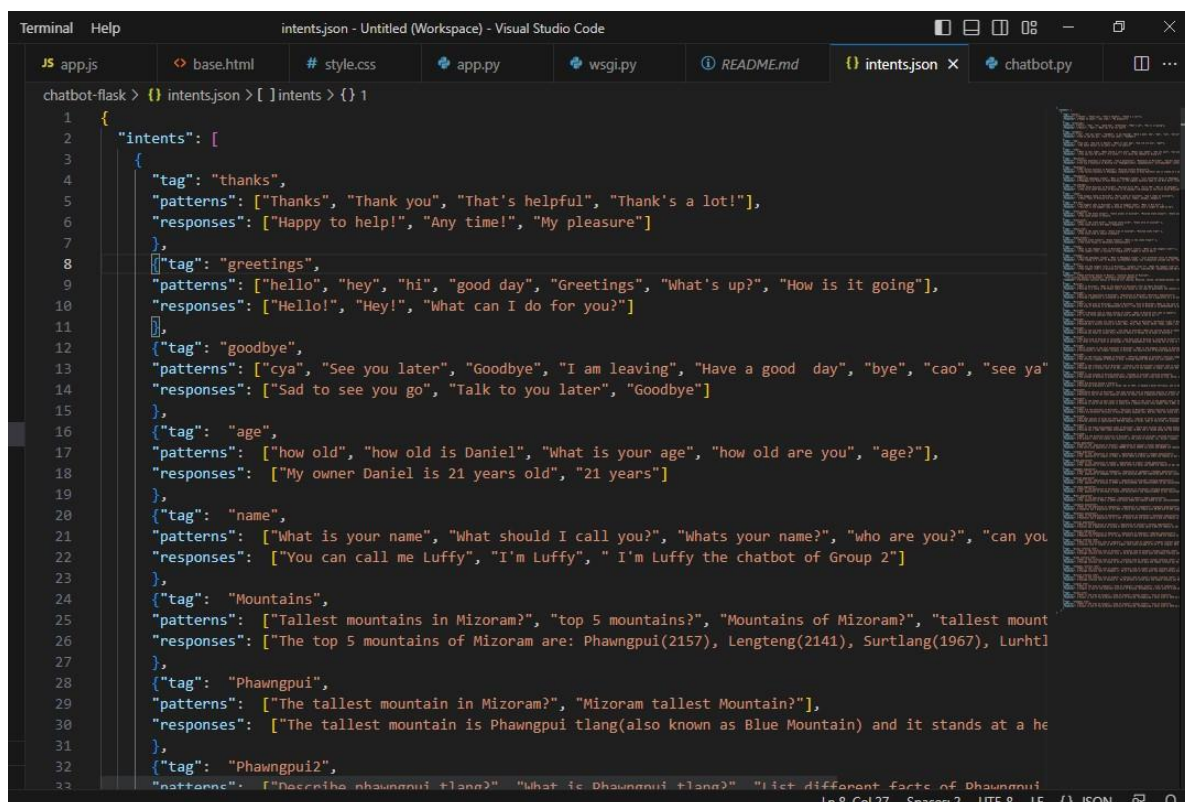


4.3 Physical and logical structure

In the backend of the project we do not use the normal database as have used a rule based chatbot which gives us complications in the entering of new intents. We first create the intents.json file consisting of three distinct rows .These records store the necessary data and information in different fields according to the input of the user.

The three rows that we create are shown below:

ROW NAME(s): Tags, Patterns and Responses



```
1 {
2   "intents": [
3     {
4       "tag": "thanks",
5       "patterns": ["Thanks", "Thank you", "That's helpful", "Thank's a lot!"],
6       "responses": ["Happy to help!", "Any time!", "My pleasure"]
7     },
8     {
9       "tag": "greetings",
10      "patterns": ["hello", "hey", "hi", "good day", "Greetings", "What's up?", "How is it going"],
11      "responses": ["Hello!", "Hey!", "What can I do for you?"]
12    },
13    {
14      "tag": "goodbye",
15      "patterns": ["cya", "See you later", "Goodbye", "I am leaving", "Have a good day", "bye", "cao", "see ya"],
16      "responses": ["Sad to see you go", "Talk to you later", "Goodbye"]
17    },
18    {
19      "tag": "age",
20      "patterns": ["how old", "how old is Daniel", "What is your age", "how old are you", "age?"],
21      "responses": ["My owner Daniel is 21 years old", "21 years"]
22    },
23    {
24      "tag": "name",
25      "patterns": ["What is your name", "What should I call you?", "Whats your name?", "who are you?", "can you"],
26      "responses": ["You can call me Luffy", "I'm Luffy", "I'm Luffy the chatbot of Group 2"]
27    },
28    {
29      "tag": "Mountains",
30      "patterns": ["Tallest mountains in Mizoram?", "top 5 mountains?", "Mountains of Mizoram?", "tallest mount"],
31      "responses": ["The top 5 mountains of Mizoram are: Phawngpui(2157), Lengteng(2141), Surtlang(1967), Lurhtl"]
32    },
33    {
34      "tag": "Phawngpui",
35      "patterns": ["The tallest mountain in Mizoram?", "Mizoram tallest Mountain?"],
36      "responses": ["The tallest mountain is Phawngpui tlang(also known as Blue Mountain) and it stands at a he"]
37    },
38    {
39      "tag": "Phawngpui2",
40      "patterns": ["Describe phawngpui tlang?", "What is Phawngpui tlang?", "List different facts of Phawngpui"]
41    }
42   ]
43 }
```

5. System Design and Implementation

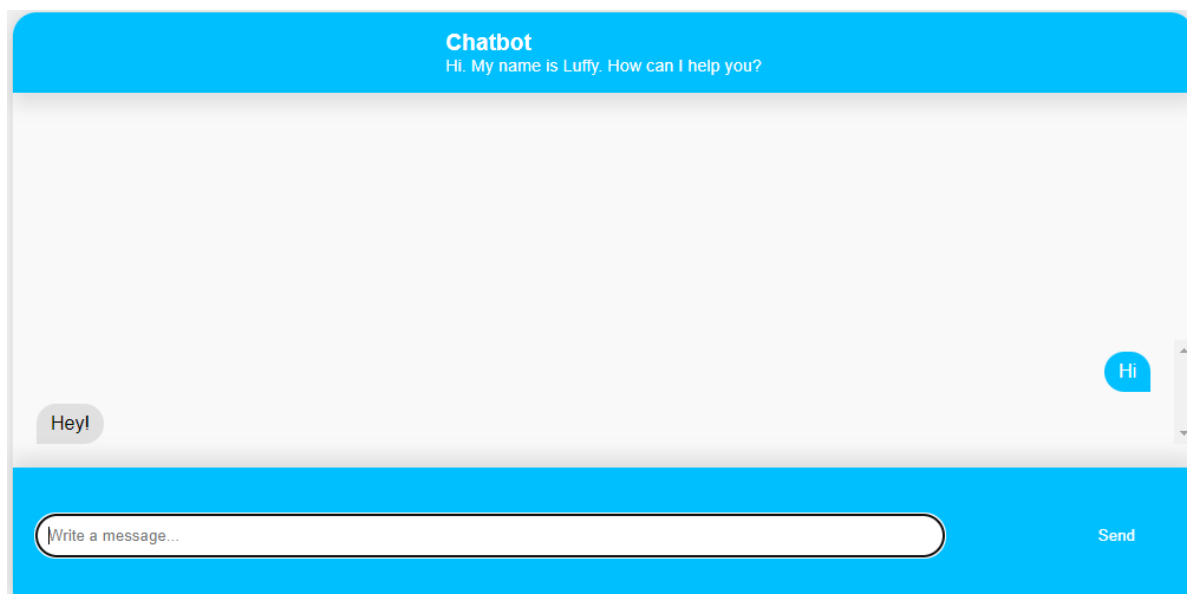
5.1 USER SIDE

CONTENT

5.1. CHATBOT

5.1 HOMEPAGE

Here the users would communicate with the Chatbot.



6. CODING SYSTEM

6.1 Back-end

6.1.1 Nltk_utils.py

```
import numpy as np
import nltk
# nltk.download('punkt')
from nltk.stem.porter import PorterStemmer
stemmer = PorterStemmer()

def tokenize(sentence):
    """
    split sentence into array of words/tokens
    a token can be a word or punctuation character, or number
    """
    return nltk.word_tokenize(sentence)

def stem(word):
    """
    stemming = find the root form of the word
    examples:
    words = ["organize", "organizes", "organizing"]
    words = [stem(w) for w in words]
    -> ["organ", "organ", "organ"]
    """
    return stemmer.stem(word.lower())

def bag_of_words(tokenized_sentence, words):
    """
    return bag of words array:
    1 for each known word that exists in the sentence, 0 otherwise
    example:
    sentence = ["hello", "how", "are", "you"]
    words = ["hi", "hello", "I", "you", "bye", "thank", "cool"]
```

```
bag = [ 0, 1, 0, 1, 0, 0, 0]
"""
# stem each word
sentence_words = [stem(word) for word in tokenized_sentence]
# initialize bag with 0 for each word
bag = np.zeros(len(words), dtype=np.float32)
for idx, w in enumerate(words):
    if w in sentence_words:
        bag[idx] = 1

return bag
```

6.1.2 Intents.json

```
{
  "intents": [
    {
      "tag": "thanks",
      "patterns": ["Thanks", "Thank you", "That's helpful", "Thank's a lot!"],
      "responses": ["Happy to help!", "Any time!", "My pleasure"]
    },
    {
      "tag": "greetings",
      "patterns": ["hello", "hey", "hi", "good day", "Greetings", "What's up?", "How is it going"],
      "responses": ["Hello!", "Hey!", "What can I do for you?"]
    },
    {
      "tag": "goodbye",
      "patterns": ["cya", "See you later", "Goodbye", "I am leaving", "Have a good day", "bye", "cao", "see ya"],
      "responses": ["Sad to see you go", "Talk to you later", "Goodbye"]
    },
    {
      "tag": "age",
      "patterns": ["how old", "how old is Daniel", "What is your age", "how old are you", "age?"],
      "responses": ["My owner Daniel is 21 years old", "21 years"]
    },
    {
      "tag": "name",
      "patterns": ["What is your name", "What should I call you?", "Whats your name?", "who are you?", "can you tell me your name?"],
      "responses": ["You can call me Luffy", "I'm Luffy", "I'm Luffy the chatbot of Group 2"]
    },
    {
      "tag": "Mountains",
      "patterns": ["Tallest mountains in Mizoram?", "top 5 mountains?", "Mountains of Mizoram?", "tallest mountains?"],
      "responses": ["The top 5 mountains of Mizoram are: Phawngpui(2157), Lengteng(2141), Surtlang(1967), Lurhtlang(1935), Tan tlang(1837)"]
    },
    {
      "tag": "Phawngpui",
      "patterns": ["The tallest mountain in Mizoram?", "Mizoram tallest Mountain?"],
      "responses": ["The tallest mountain is Phawngpui tlang(also known as Blue Mountain) and it stands at a height of 2157 meters."]
    }
  ]
}
```



```

{"tag": "Phawngpui2",
  "patterns": ["Describe phawngpui tlang?", "What is Phawngpui tlang?", "List different facts of Phawngpui tlang?"],
  "responses": ["Phawngpui also known as Blue Mountain, is the highest mountain peak in the Mizo Hills (Lushai Hills) and in the state of Mizoram, India,[3] with an elevation of 2157 m.[4] It is in Lawngtlai district, in the southeastern region of Mizoram near the Myanmar border. Phawngpui is the highest peak of the Lushai Hills. There is a semicircular series of cliffs on the western side called Thlazuang Khàm, which have a sharp and deep fall; mountain goats live there. These cliffs are believed to be haunted by spirits.[5] On the peak, there is a level ground of about 2 km2 in area.A highly revered peak, considered to be the abode of local deities, Phawngpui was a major centre of folk religion and location for folklore stories. The name is derived from the Lai language, phong, meaning \"grassland\" or \"meadow\", and the suffix -pui meaning, \"great\". This was because the mountain was mostly covered with all types of meadows, hence appropriately the \"great meadow\". The mountain was, according to the belief of the natives, the abode of several spiritual races. The most important folktale, perhaps, is that of a deity king named \"Sangau\"; the actual town at the base of the mountain has become Sangau. Sangau had a son who married the princess of another royal family called Cherian. At the wedding was an exchange of gifts, a couple of hoolock gibbons from Sangau and a pine tree from Cherian. The base area, the main entrance of the mountain bears that name Farpak (meaning pine only)"]
},
{"tag": "Ch.Chhunga",
  "patterns": ["First Chief Minister of Mizoram?", "Mizoram First CM?", "First CM?", "Who is Ch.Chhunga?", "Ch Chhunga?" ],
  "responses": ["The First Chief Minister of Mizoram is Ch.Chhunga", "CH.Chhunga is the first Chief Minister of Mizoram?"]
},
{"tag": "Lakes",
  "patterns": ["The biggest lakes of Mizoram?", "Major lakes of mizoram?", "Top 5 lakes of mizoram?"],
  "responses": ["Major lakes of Mizoram are Rih dil, Palak dil, Tamdil, Rungdil, Rengdil"]
},
{"tag": "Rih dil",
  "patterns": ["The biggest Lake in Mizoram?", "name of biggest lake?", "What is Rih Dil?" ],
  "responses": ["Rih dil is the biggest lake in Mizoram is Tlawng river with a length of 1485.15 km"]
},
{"tag": "State_animal",
  "patterns": ["What is the State animal?", "State animal of mizoram?", "Mizoram state animal?", "State animal?" ],
  "responses": ["The state animal is Serow"]
},
{"tag": "State_bird",
  "patterns": ["What is the state bird?", "mizoram state bird?", "State bird of mizoram?" ],
  "responses": ["The state bird is Mrs Hume's Pheasant"]
}

```

```

},
{"tag": "State_tree",
"patterns": ["What is the state tree?", "State tree of mizoram?", "Mizoram state tree?" ],
"responses": ["The state tree is Ceylon Ironwood"]
},
{"tag": "State_flower",
"patterns": ["Mizoram state flower?", "State Flower?", "What is the state Flower?" ],
"responses": ["The state Flower is Renanthera Imschootiana"]
},
{"tag": "Tlawng",
"patterns": ["What is the longest river in Mizoram?", "Longest river?", "What is the longest river?" ],
"responses": ["The longest river in mizoram is Tlawng with a length of 185.15 kms"]
},
{"tag": "Tlawng2",
"patterns": ["Describe phawngpui tlang?", "What is Phawngpui tlang?", "List different facts of Phawngpui tlang?"],
"responses": ["The Tlawng is a river of Mizoram, northeastern India. Its tributaries include the Tut, Teirei and the Ngashih. The Tlawng River is one of the longest rivers in Mizoram, measuring 234 km in length (Distance) or 185.50 km net displacement (a straight line) (as of 23.9.2015) Between Zobawk village near Lunglei Town to Bairabi (Mizoram Border) It originates in Zopui Hill (Near Zobawk) some 8 kilometres (5 mi) east of Lunglei at an elevation of 1,395 metres (4,577 ft). After the confluence with Tut and Teirei River it eventually enters Cachar District."]
},
{"tag": "Rivers",
"patterns": ["What are the longest river's in Mizoram?", "longest river's?", "Name the longest river's?" ],
"responses": ["The longest river's in mizoram are Tlawng(185.15 kms), Tiau(159.39), Chhimtuipui(138.46)"]
},
{"tag": "Dance",
"patterns": ["Name different dances of Mizos?", "Cultural dances of Mizoram?",
"List cultural dances of Mizoram?", "Different cultural dances?"],
"responses": ["Different cultural dances of Mizoram are: Chailam, Khuallam, Cheraw, Sarlamkai/Solakia, Chawnglaizawn, Chheihlam, Tlanglam and Zangtalam"]
},
{"tag": "Mizoram",
"patterns": ["What is Mizoram?", "What is the meaning of Mizoram?", "Tell me about Mizoram?"],
"responses": ["Mizoram is a state in Northeast India, with Aizawl as its seat of government and capital city. The name of the state is derived from 'Mizo', the self-described name of the native inhabitants, and 'Ram', which in the Mizo language means 'land'. Thus 'Mizo-ram' means 'land of the Mizos.'"]
}

```

```

},
{"tag": "Mizoram2",
 "patterns": ["What is the population of Mizoram?", "Population of Mizoram?","Mizoram's Population?"],
 "responses": ["Mizoram's population is estimated to be 1.21 million","Mizoram has a population of 1.21 million people"]
},
{"tag": "Mizoram3",
 "patterns": ["What is the area of Mizoram?", "Area of Mizoram?", "Size of Mizoram?","What is the size of Mizoram?"],
 "responses": ["The area of Mizoram is 21,081km2(8139 sq mi)", "The size of Mizoram is 21,081km2(8139 sq mi)"]
},
{"tag": "Mizoram4",
 "patterns": ["What is Mizoram rank in India interms of area?", "What is Mizoram area rank in India?"],
 "responses": ["It is the fifth smallest state of India with 21,087 km2 (8,142 sq mi)."]
},
{"tag": "Mizoram5",
 "patterns": ["What different tribes are there in Mizoram?", "Tribes of Mizoram?","Different tribes of Mizoram?"],
 "responses": ["Mizoram has a diverse culture of Lusei, Hmar, Mara, Pawi, Paite, Ralte, Thado, Lakher, etc. "]
},
{"tag": "Mizoram6",
 "patterns": ["What is the old name of Mizoram?", "old name of mizoram?","What was mizoram called as before it became a state?"],
 "responses": ["Mizoram was known as Lushai Hills District before it became to be known as Mizoram"]
},
{"tag": "Mizoram7",
 "patterns": ["How much area of Mizoram is forested?", "how many area of Mizoram is covered by forest?","Forest cover of Mizoram?"],
 "responses": ["In terms of forest cover as percentage of total geographical area, Mizoram has an area of (84.53%) covered by forest"]
},
{"tag": "Mizoram8",
 "patterns": ["Which religion is the most prominent in Mizoram?", "What is the biggest religion in Mizoram?","biggest religion of Mizoram?","religion in Mizoram?"],
 "responses": ["Christianity is the largest religion in Mizoram. The majority 87% of Mizoram population are Christian in various denominations"]
},

```

```

{"tag": "Mizoram9",
  "patterns": ["What is the official language of Mizoram?", "official language in mizoram?", "official language?"],
  "responses": ["The official language of Mizoram is Mizo, although English and Hindi are also spoken"]
},
{"tag": "Mizoram10",
  "patterns": ["What is the literacy rate of Mizoram?", "literacy rate of mizoram?", "literacy rate in mizoram?"],
  "responses": ["Mizoram has a literacy rate of 91.58%, which is one of the highest in India, with over 93% of women being literate."]
},
{"tag": "Mizoram11",
  "patterns": ["What is the economy of Mizoram based on?", "economy of mizoram?", "mizoram economy?"],
  "responses": ["The economy of Mizoram is primarily based on agriculture, with crops such as rice, maize, and vegetables being the main produce."]
},
{"tag": "Mizoram12",
  "patterns": ["When did Mizoram became a State?"],
  "responses": ["Mizoram was previously a part of Assam, but in 1972, it became a Union Territory, and in 1987, it became a full-fledged state of India."]
},
{"tag": "Mizoram13",
  "patterns": ["Population density of Mizoram?", "how does mizoram rank on population density in India?", "mizoram population density?"],
  "responses": ["Mizoram is one of the least populous states in India, with a population density of just 52 people per square kilometer."]
},
{"tag": "Mizoram14",
  "patterns": ["What is the female to male ratio in Mizoram?", "What is the ratio of the genders male to female?", "female to male ratio?"],
  "responses": ["Mizoram is one of the few states in India with a female-to-male ratio higher than 1,000, with 1,004 females for every 1,000 males."]
},
{"tag": "Mizoram15",
  "patterns": ["What are the festivals of Mizoram?", "Festivals of Mizoram?", "famous festivals in mizoram?"],

```

"responses": ["There are different festivals in Mizoram namely Chapchar Kut, Mim Kut, Pawl Kut which are the main cultural festivals accompanied with other festivals such as Christmas (due to Mizoram being predominantly Christian), Lyuva Khutla, Anthurium Festival, Khuado Kut, Hlukhla Kut."]

},

{"tag": "Mizoram16",

"patterns": ["How many species of birds are there in Mizoram?", "species of birds in mizoram?", "Different kinds of birds in mizoram?"]],

"responses": ["Mizoram consists of approximately 640-645 species of birds. Some of the birds are Ardeidae, Falconidae, Corvidae, etc."]

},

{"tag": "Mizoram17",

"patterns": ["What is the human developement index of Mizoram?", "where does mizoram rank in human developement index?", "mizoram HDI rank?"]],

"responses": ["Mizoram has a high (HDI) human development index (0.688) and is ranked among the top states(12th) in India in terms of quality of life."]

},

{"tag": "Mizoram18",

"patterns": ["What are the different districts of Mizoram?", "districts of mizoram?", "mizoram districts?"]],

"responses": ["At present, there are eleven (11) districts in the state of Mizoram, viz. Aizawl, Lunglei, Siahia, Champhai, Kolasib, Serchhip, Mamit, Lawngtlai, Hnahthial, Saitual and Khawzawl."]

},

{"tag": "Aizawl population",

"patterns": ["What is the population of Aizawl?", "population of aizawl?", "aizawl population?"]],

"responses": ["The metro area population of Aizawl 400309 of which 199270 are males and 201039 are females as per censusindia2011.com"]]

},

{"tag": "Lunglei population",

"patterns": ["What is the population of Lunglei?", "population of lunglei?", "lunglei population?"]],

"responses": ["The population of Lunglei is 57011 of which 29474 are males and 27537 are females as per censusindia2011.com"]]

},

{"tag": "Siahia population",

"patterns": ["What is the population of Siahia?", "population of siahia?", "siahia population?"]],

"responses": ["The population of Siahia is 25110 of which 12741 are males and 12369 are females as per censusindia2011.com"]]

},

{"tag": "Champhai population",

"patterns": ["What is the population of Champhai?", "population of champhai?", "champhai population?"]],

```

    "responses": ["The population of Champhai is 125,745 with males(63,388) and females(62,357) as per
censusindia2011.com"]
  },
  {"tag": "Kolasib population",
    "patterns": ["What is the population of Kolasib?", "population of kolasib?", "kolasib population?"],
    "responses": ["The population of Kolasib is 83955 with males(42918) and females(41037) as per
censusindia2011.com"]
  },
  {"tag": "Serchhip population",
    "patterns": ["What is the population of Serchhip?", "population of serchhip?", "serchhip population?"],
    "responses": ["The population of Serchhip is 21158 with males(10777) and females(10381) as per
censusindia2011.com"]
  },
  {"tag": "Mamit population",
    "patterns": ["What is the population of Mamit?", "population of mamit?", "mamit population?"],
    "responses": ["The population of Mamit is 86364 with males 44828 and females 41536 as per
censusindia2011.com"]
  },
  {"tag": "Lawngtlai population",
    "patterns": ["What is the population of Lawngtlai?", "population of lawngtlai?", "lawngtlai population?"],
    "responses": ["Lawngtlai has a population of 117,894 of which male and female were 60,599 and 57,295
respectively as per censusindia2011.com"]
  },
  {"tag": "Hnahthial population",
    "patterns": ["What is the population of Hnahthial?", "population of hnahthial?", "hnahthial population?"],
    "responses": ["Hnahthial has a population of of 7,187 of which 3,573 are males while 3,614 are females as
per censusindia2011.com"]
  },
  {"tag": "Saitual population",
    "patterns": ["What is the population of Saitual?", "population of saitual?", "saitual population?"],
    "responses": ["Siatual has a population of 11,619 of which 5,727 are males while 5,892 are females as per
censusindia2011.com"]
  },
  {"tag": "Khawzawl population",
    "patterns": ["What is the population of Khawzawl?", "population of khawzawl?", "khawzawl population?"],
    "responses": ["Khawzawl has a population of of 11,022 of which 5,616 are males while 5,406 are females as
per censusindia2011.com"]
  },

```

```

{"tag": "Lunglei literacy rate",
  "patterns": ["What is the literacy rate of Lunglei?", "literacy rate of lunglei?", "lunglei literacy rate?", "literacy of lunglei?"],
  "responses": ["Literacy rate of Lunglei is 98.27 % higher than state average of 91.33 %. In Lunglei, Male literacy is around 98.45 % while female literacy rate is 98.08 %."]}
},
{"tag": "Aizawl literacy rate",
  "patterns": ["What is the literacy rate of Aizawl?", "literacy rate of aizawl?", "aizawl literacy rate?", "literacy of aizawl?"],
  "responses": ["Average literacy rate of Aizawl city is 98.36 percent of which male and female literacy was 98.52 and 98.21 percent."]}
},
{"tag": "Siaha literacy rate",
  "patterns": ["What is the literacy rate of Siaha?", "literacy rate of siaha?", "aizawl literacy rate?", "literacy of aizawl?"],
  "responses": ["Average literacy rate of Siaha is 95.10 % percent of which male and female literacy was 96.09 % and 94.09 % percent."]}
},
{"tag": "Champhai literacy rate",
  "patterns": ["What is the literacy rate of Siaha?", "literacy rate of siaha?", "aizawl literacy rate?", "literacy of aizawl?"],
  "responses": ["Average literacy rate of Champhai is 95.41 % percent of which male and female literacy was 92.64 and 87.34 percent."]}
},
{"tag": "Kolasib literacy rate",
  "patterns": ["What is the literacy rate of Siaha?", "literacy rate of siaha?", "aizawl literacy rate?", "literacy of aizawl?"],
  "responses": ["Average literacy rate of Kolasib is 96.38 percent of which male and female literacy was 96.87 % and 95.86 % percent."]}
},
{"tag": "Lunglei area",
  "patterns": ["What is the area of Lunglei?", "area of Lunglei?", "lunglei area??", "size of lunglei?"],
  "responses": ["Lunglei is one of the prominent districts of Mizoram. Encompassing a total area of 4,538 square kilometres (1,752 sq mi), the district of Lunglei has a population of 137,155."]}
},
{"tag": "Aizawl area",
  "patterns": ["What is the area of Aizawl?", "area of aizawl?", "aizawl area??", "size of aizawl?"],
  "responses": ["Aizawl is one of the prominent districts of Mizoram. Encompassing a total area of 3576.31 square kilometres (1,752 sq mi), the district of Lunglei has a population of 137,155."]}

```

```
},
{"tag": "Champhai area",
  "patterns": ["What is the area of Aizawl?", "area of aizawl?", "aizawl area??", "size of aizawl?"],
  "responses": ["Aizawl is one of the prominent districts of Mizoram. Encompassing a total area of 3576.31 square kilometres (1,752 sq mi), the district of Lunglei has a population of 137,155."]
}
]
```


6.1.3 Model.py

```
import torch

import torch.nn as nn

class NeuralNet(nn.Module):
    def __init__(self, input_size, hidden_size, num_classes):
        super(NeuralNet, self).__init__()
        self.l1 = nn.Linear(input_size, hidden_size)
        self.l2 = nn.Linear(hidden_size, hidden_size)
        self.l3 = nn.Linear(hidden_size, num_classes)
        self.relu = nn.ReLU()

    def forward(self, x):
        out = self.l1(x)
        out = self.relu(out)
        out = self.l2(out)
        out = self.relu(out)
        out = self.l3(out)
        # no activation and no softmax at the end
        return out
```

6.1.4 Training.py

```
import numpy as np
import random
import json

import torch
import torch.nn as nn
from torch.utils.data import Dataset, DataLoader

from nltk_utils import bag_of_words, tokenize, stem
from model import NeuralNet

with open('intents.json', 'r') as f:
    intents = json.load(f)

all_words = []
tags = []
xy = []

# loop through each sentence in our intents patterns
for intent in intents['intents']:
    tag = intent['tag']
    # add to tag list
    tags.append(tag)
    for pattern in intent['patterns']:
        # tokenize each word in the sentence
        w = tokenize(pattern)
        # add to our words list
        all_words.extend(w)
        # add to xy pair
        xy.append((w, tag))

# stem and lower each word
ignore_words = ['?', '!', '.']
all_words = [stem(w) for w in all_words if w not in ignore_words]

# remove duplicates and sort
```

```

all_words = sorted(set(all_words))
tags = sorted(set(tags))

print(len(xy), "patterns")
print(len(tags), "tags:", tags)
print(len(all_words), "unique stemmed words:", all_words)

# create training data
X_train = []
y_train = []
for (pattern_sentence, tag) in xy:
    # X: bag of words for each pattern_sentence
    bag = bag_of_words(pattern_sentence, all_words)
    X_train.append(bag)
    # y: PyTorch CrossEntropyLoss needs only class labels, not one-hot
    label = tags.index(tag)
    y_train.append(label)

X_train = np.array(X_train)
y_train = np.array(y_train)

# Hyper-parameters
num_epochs = 1000
batch_size = 8
learning_rate = 0.001
input_size = len(X_train[0])
hidden_size = 8
output_size = len(tags)
print(input_size, output_size)

class ChatDataset(Dataset):

    def __init__(self):
        self.n_samples = len(X_train)
        self.x_data = X_train

```

```

self.y_data = y_train

# support indexing such that dataset[i] can be used to get i-th sample
def __getitem__(self, index):
    return self.x_data[index], self.y_data[index]

# we can call len(dataset) to return the size
def __len__(self):
    return self.n_samples

dataset = ChatDataset()
train_loader = DataLoader(dataset=dataset,
                           batch_size=batch_size,
                           shuffle=True,
                           num_workers=0)

device = torch.device('cuda' if torch.cuda.is_available() else 'cpu')

model = NeuralNet(input_size, hidden_size, output_size).to(device)

# Loss and optimizer
criterion = nn.CrossEntropyLoss()
optimizer = torch.optim.Adam(model.parameters(), lr=learning_rate)

# Train the model
for epoch in range(num_epochs):
    for (words, labels) in train_loader:
        words = words.to(device)
        labels = labels.to(dtype=torch.long).to(device)

        # Forward pass
        outputs = model(words)
        # if y would be one-hot, we must apply
        # labels = torch.max(labels, 1)[1]
        loss = criterion(outputs, labels)

```

```
# Backward and optimize
optimizer.zero_grad()
loss.backward()
optimizer.step()

if (epoch+1) % 100 == 0:
    print (f'Epoch [{epoch+1}/{num_epochs}], Loss: {loss.item():.4f}')

print(f'final loss: {loss.item():.4f}')

data = {
    "model_state": model.state_dict(),
    "input_size": input_size,
    "hidden_size": hidden_size,
    "output_size": output_size,
    "all_words": all_words,
    "tags": tags
}

FILE = "data.pth"
torch.save(data, FILE)

print(f'training complete. file saved to {FILE}')
```

6.1.5 Chatbot.py

```
import random
import json

import torch

from model import NeuralNet
from nltk_utils import bag_of_words, tokenize

device = torch.device('cuda' if torch.cuda.is_available() else 'cpu')

with open('intents.json', 'r') as json_data:
    intents = json.load(json_data)

FILE = "data.pth"
data = torch.load(FILE)

input_size = data["input_size"]
hidden_size = data["hidden_size"]
output_size = data["output_size"]
all_words = data['all_words']
tags = data['tags']
model_state = data["model_state"]

model = NeuralNet(input_size, hidden_size, output_size).to(device)
model.load_state_dict(model_state)
model.eval()

bot_name = "Luffy"

def get_response(msg):
    sentence = tokenize(msg)
    X = bag_of_words(sentence, all_words)
    X = X.reshape(1, X.shape[0])
    X = torch.from_numpy(X).to(device)
```

```

output = model(X)
_, predicted = torch.max(output, dim=1)

tag = tags[predicted.item()]

probs = torch.softmax(output, dim=1)
prob = probs[0][predicted.item()]
if prob.item() > 0.75:
    for intent in intents['intents']:
        if tag == intent["tag"]:
            return random.choice(intent['responses'])

return "I do not understand..."

if __name__ == "__main__":
    print("Let's chat! (type 'quit' to exit)")
    while True:
        # sentence = "do you use credit cards?"
        sentence = input("You: ")
        if sentence == "quit":
            break

    resp = get_response(sentence)
    print(resp)

```

6.1.6 App.py

```
from flask import Flask, render_template, request, jsonify
```

```
from chatbot import get_response
```

```
app = Flask(__name__)
```

```
@app.get("/")
```

```
def index_get():
```

```
    return render_template("base.html")
```

```
@app.post("/predict")
```

```
def predict():
```

```
    text = request.get_json().get("message")
```

```
    # TODO: check if text is valid
```

```
    response = get_response(text)
```

```
    message = {"answer": response}
```

```
    return jsonify(message)
```

```
if __name__ == "__main__":
```

```
    app.run(debug=True)
```


6.1.7 Wsgi.py

```
from app import app
```

```
from waitress import serve
```

```
if __name__ == '__main__':
```

```
    serve(app, host='127.0.0.1', port=5000)
```

```
#Run "waitress-serve --listen=127.0.0.1:5000 app:app"
```

```
#Search as "http://127.0.0.1:5000/" on Browser
```

6.2 Front-end

6.2.1 App.js

```
class Chatbox {
  constructor() {
    this.args = {
      openButton: document.querySelector('.chatbox_button'),
      chatBox: document.querySelector('.chatbox_support'),
      sendButton: document.querySelector('.send_button')
    }

    this.state = false;
    this.messages = [];
  }

  display() {
    const {openButton, chatBox, sendButton} = this.args;

    openButton.addEventListener('click', () => this.toggleState(chatBox))

    sendButton.addEventListener('click', () => this.onSendButton(chatBox))

    const node = chatBox.querySelector('input');
    node.addEventListener("keyup", ({key}) => {
      if (key === "Enter") {
        this.onSendButton(chatBox)
      }
    })
  }

  toggleState(chatbox) {
    this.state = !this.state;

    // show or hides the box
    if(this.state) {
      chatbox.classList.add('chatbox--active')
```

```

    } else {
        chatbox.classList.remove('chatbox--active')
    }
}

onSendButton(chatbox) {
    var textField = chatbox.querySelector('input');
    let text1 = textField.value
    if (text1 === "") {
        return;
    }

    let msg1 = { name: "User", message: text1 }
    this.messages.push(msg1);

    fetch('http://127.0.0.1:5000/predict', {
        method: 'POST',
        body: JSON.stringify({ message: text1 }),
        mode: 'cors',
        headers: {
            'Content-Type': 'application/json'
        },
    })
    .then(r => r.json())
    .then(r => {
        let msg2 = { name: "Luffy", message: r.answer };
        this.messages.push(msg2);
        this.updateChatText(chatbox)
        textField.value = ""

    }).catch((error) => {
        console.error('Error:', error);
        this.updateChatText(chatbox)
        textField.value = ""
    });
}

```

```

    }

    updateChatText(chatbox) {
        var html = "";
        this.messages.slice().reverse().forEach(function(item, index) {
            if (item.name === "Luffy")
            {
                html += '<div class="messages_item messages_item--visitor">' + item.message + '</div>'
            }
            else
            {
                html += '<div class="messages_item messages_item--operator">' + item.message + '</div>'
            }
        });

        const chatmessage = chatbox.querySelector('.chatbox_messages');
        chatmessage.innerHTML = html;
    }
}

const chatbox = new Chatbox();
chatbox.display();

```

6.2.2 Style.css

```
* {  
  box-sizing: border-box;  
  margin: 0;  
  padding: 0;  
}  
  
body {  
  font-family: 'Nunito', sans-serif;  
  font-weight: 400;  
  font-size: 100%;  
  background: #F1F1F1;  
}  
  
*, html {  
  --primaryGradient: linear-gradient(93.12deg, #00BFFF 0.52%, #00BFFF 100%);  
  --secondaryGradient: linear-gradient(93.12deg, #00BFFF 0.52%, #00BFFF 100%);  
  --primaryBoxShadow: 0px 10px 15px rgba(0, 0, 0, 0.1);  
  --secondaryBoxShadow: 0px -10px 15px rgba(0, 0, 0, 0.1);  
  --primary: #00BFFF;  
}  
  
/* CHATBOX  
===== */  
.chatbox {  
  position: absolute;  
  bottom: 30px;  
  right: 30px;  
}  
  
/* CONTENT IS CLOSE */  
.chatbox_support {  
  display: flex;  
  flex-direction: column;  
  background: #eee;
```

```
width: 1000px;
height: 500px;
z-index: -123456;
opacity: 0;
transition: all .5s ease-in-out;
}
```

```
/* CONTENT ISOPEN */
```

```
.chatbox--active {
  transform: translateY(-40px);
  z-index: 123456;
  opacity: 1;
}
```

```
/* BUTTON */
```

```
.chatbox_button {
  text-align: right;
}
```

```
.send_button {
  padding: 30px;
  background: transparent;
  border: none;
  outline: none;
  cursor: pointer;
}
```

```
/* HEADER */
```

```
.chatbox_header {
  position: sticky;
  top: 0;
  background: orange;
}
```

```
/* MESSAGES */
.chatbox_messages {
    margin-top: auto;
    display: flex;
    overflow-y: scroll;
    flex-direction: column-reverse;
}

.messages_item {
    background: orange;
    max-width: 60.6%;
    width: fit-content;
}

.messages_item--operator {
    margin-left: auto;
}

.messages_item--visitor {
    margin-right: auto;
}

/* FOOTER */
.chatbox_footer {
    position: sticky;
    bottom: 0;
}

.chatbox_support {
    background: #f9f9f9;
    height: 500px;
    width: 1000px;
    box-shadow: 0px 0px 15px rgba(0, 0, 0, 0.1);
    border-top-left-radius: 20px;
    border-top-right-radius: 20px;
}
```

```

}

/* HEADER */
.chatbox_header {
    background: var(--primaryGradient);
    display: flex;
    flex-direction: row;
    align-items: center;
    justify-content: center;
    padding: 15px 20px;
    border-top-left-radius: 20px;
    border-top-right-radius: 20px;
    box-shadow: var(--primaryBoxShadow);
}

.chatbox_image--header {
    margin-right: 10px;
}

.chatbox_heading--header {
    font-size: 1.2rem;
    color: white;
}

.chatbox_description--header {
    font-size: .9rem;
    color: white;
}

/* Messages */
.chatbox_messages {
    padding: 0 20px;
}

.messages__item{

```



```

margin-top: 10px;
background: #E0E0E0;
padding: 8px 12px;
max-width: 70%;
}

.messages_item--visitor,
.messages_item--typing {
border-top-left-radius: 20px;
border-top-right-radius: 20px;
border-bottom-right-radius: 20px;
}

.messages_item--operator {
border-top-left-radius: 20px;
border-top-right-radius: 20px;
border-bottom-left-radius: 20px;
background: var(--primary);
color: white;
}

/* FOOTER */
.chatbox_footer {
display: flex;
flex-direction: row;
align-items: center;
justify-content: space-between;
padding: 20px 20px;
background: var(--secondaryGradient);
box-shadow: var(--secondaryBoxShadow);
border-bottom-right-radius: 10px;
border-bottom-left-radius: 10px;
margin-top: 20px;
}

```

```
.chatbox_footer input {  
    width: 80%;  
    border: none;  
    padding: 10px 10px;  
    border-radius: 30px;  
    text-align: left;  
}
```

```
.chatbox_send--footer {  
    color: white;  
}
```

```
.chatbox_button button,  
.chatbox_button button:focus,  
.chatbox_button button:visited {  
    padding: 10px;  
    background: white;  
    border: none;  
    outline: none;  
    border-top-left-radius: 50px;  
    border-top-right-radius: 50px;  
    border-bottom-left-radius: 50px;  
    box-shadow: 0px 10px 15px rgba(0, 0, 0, 0.1);  
    cursor: pointer;  
}
```

6.2.3 Base.html

```
<!DOCTYPE html>

<html lang="en">

<link rel="stylesheet" href="{{ url_for('static', filename='style.css') }}">

<head>

    <meta charset="UTF-8">

    <title>Chatbot</title>

</head>

<body>

<div class="container">

    <div class="chatbox">

        <div class="chatbox_support">

            <div class="chatbox_header">

                <div class="chatbox_content--header">

                    <h4 class="chatbox_heading--header">Chatbot</h4>

                    <p class="chatbox_description--header">Hi. My name is Luffy. How can I help you?</p>

                </div>

            </div>

            <div class="chatbox_messages">

                <div></div>

            </div>

            <div class="chatbox_footer">

                <input type="text" placeholder="Write a message...">

                <button class="chatbox_send--footer send_button">Send</button>

            </div>

        </div>

        <div class="chatbox_button">

            <button></button>

        </div>

    </div>

</div>

<script>

    $SCRIPT_ROOT = "{{ request.script_root|tojson }}";
```

</script>

<script type="text/javascript" src="{{ url_for('static', filename='app.js') }}"></script>

</body>

</html>

7. Drawbacks and Limitations

This project is undertaken with careful analysis to meet the given criteria of this major project. Corrective measures have been taken. But our insufficiency of knowledge, skill and experience, this major project definitely has its own limitations and drawbacks. It definitely cannot have a wide scope as found in other big projects undertaken. It is primarily a compilation of only what information we thought would be relevant to satisfy the basic requirements of the project.

First and foremost, due to the lack of contextual understanding, the chatbot may not have the contextual understanding of historical events, which can result in inappropriate or inaccurate responses, its dependence on data quality, which is and can be of great affect to the accuracy of the results of the chatbot and its limited ability to handle complex questions due to its inability to have critical thinking.

So due to the problems included above, it is impossible to include all the important criteria for creating a normal Chatbot system. So, there are some features already planned to be implemented but then cancelled due to limited time and knowledge.

8. Future Enhancement and Planning

As this project is carried out in a limited time and limit skill, there are many areas in which it can be upgraded. The layout can be upgraded accordingly an also the addition of some features and programs so that the system can function more accuracy, with more human intervention.

As future plans, adding more intents and information to the chatbot would be very beneficial to the chatbot and its users which would lead to more vast and wider areas of conversation, and then the chatbot's natural language processing capabilities can be improved by using more advanced techniques such as sentiment analysis, entity recognition, and part-of-speech tagging which would help the chatbot better understand user intent and provide more accurate responses and upgrading of the security system are some of the future plannings to be carried out.

9. CONCLUSION

This major project work is the compilations of our ideas, views and thoughts. In doing this major project and in the development of our thoughts and ideas Group 1 of 6th Semester BCA , we have benefited a great deal from our interaction with our teachers and friends. We extend our sincere thanks to them.

We are deeply conscious of the fact that this project would neither have been undertaken nor pursued and completed but for the tremendous support that we received from Mr. H. Lalruatkima, our project guide and K. Lalmuanpuia Head of Department, who not only give us their full support but provide us with all kinds of necessities that we required in the project we are working. We would also like to place and record our sincere thanks and gratitude to our Principal, Mr. Vuansanga Vanchhawng, for extending his full support and consent to this project undertaken.

This major project is done and presented in such a way that it can be understandable. Our firm conviction emboldened us to embark upon this major project work. This is a very painstaking work, however, we tried our best to satisfy the needs of this major project. With much efforts this major project has come into being even though we are conscious of our limited knowledge and skill. But it would be our request that this major project we have undertaken, be dealt with much consideration and acknowledgement.