



Deep Learning Topic - Chatbot

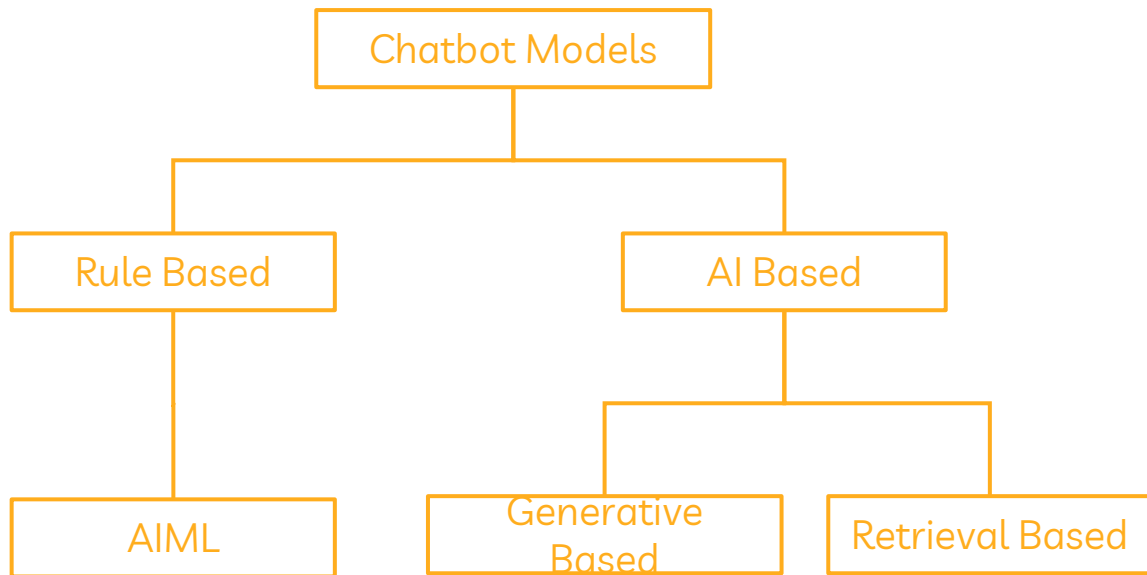
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Introduction

What is a Chatbot ?

A **chatbot** is a computer program that's designed to simulate human conversation. Users communicate with these tools using a chat interface or via voice, just like they would converse with another person.





Retrieval Based Chatbot System

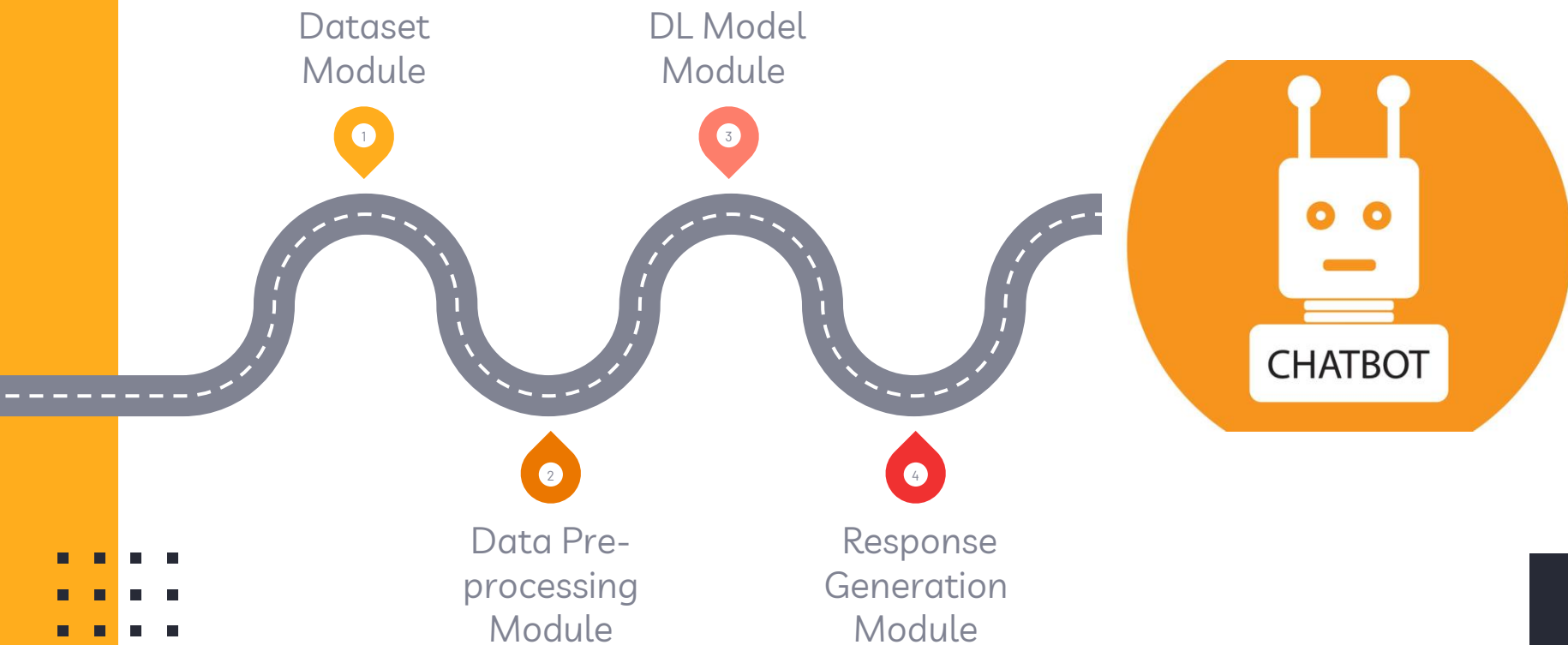
Retrieval Based Chatbot

Retrieval based bots are the most common types of chatbots that you see today. They work best for **goal-oriented** bots in customer support, lead generation and feedback. We can decide the tone of the bot, and design the experience, keeping in mind the customer's brand and reputation.

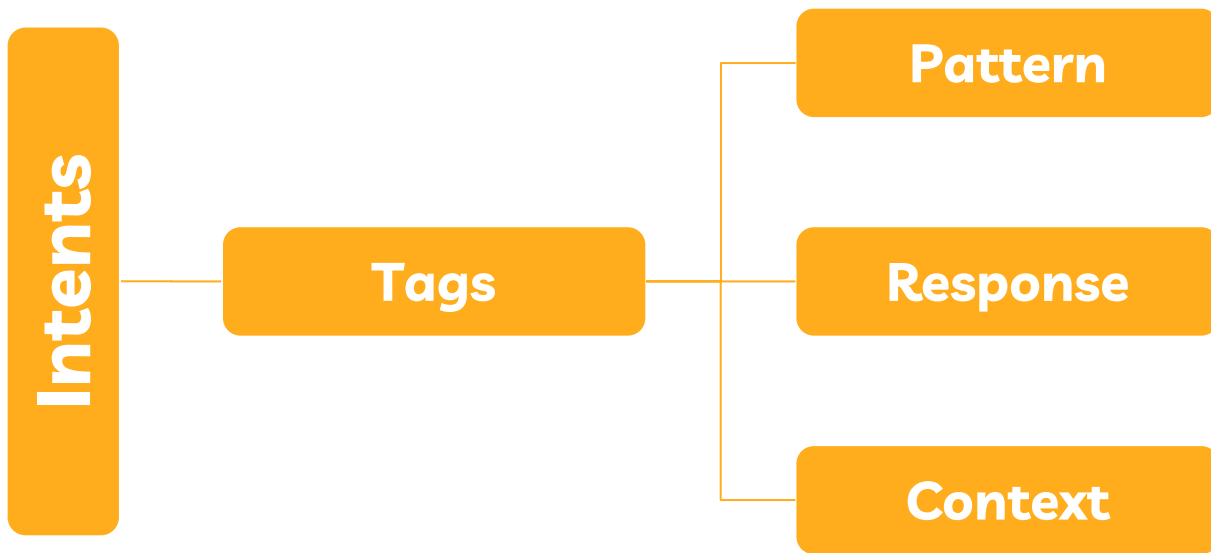
Retrieval based bots work on the principle of directed flows or graphs. The bot is trained to rank the best response from a finite set of predefined responses. The responses here are entered manually, or based on a knowledge base of pre-existing information.



Modules



Dataset Module



DATASET

```
{
  "intents": [
    {
      "tag": "greeting",
      "patterns": ["Hi", "How are you", "Is anyone there?", "Hello", "Good day", "Hey"],
      "responses": ["Hello, thanks for visiting", "Good to see you again", "Hi there, how can I help?"],
      "context_set": ""
    },
    {
      "tag": "goodbye",
      "patterns": ["Bye", "See you later", "Goodbye", "okay bye", "exit"],
      "responses": ["See you later, thanks for visiting", "Have a nice day", "Bye! Come back again soon."]
    },
    {
      "tag": "about",
      "patterns": ["Who are you", "What are you", "What is your name ", "what should I call you", "what's your name?"],
      "responses": ["I am JARVIS", "My name is JARVIS and I am your virtual assistant"]
    }
  ]
}
```

Data Pre-Processing Module



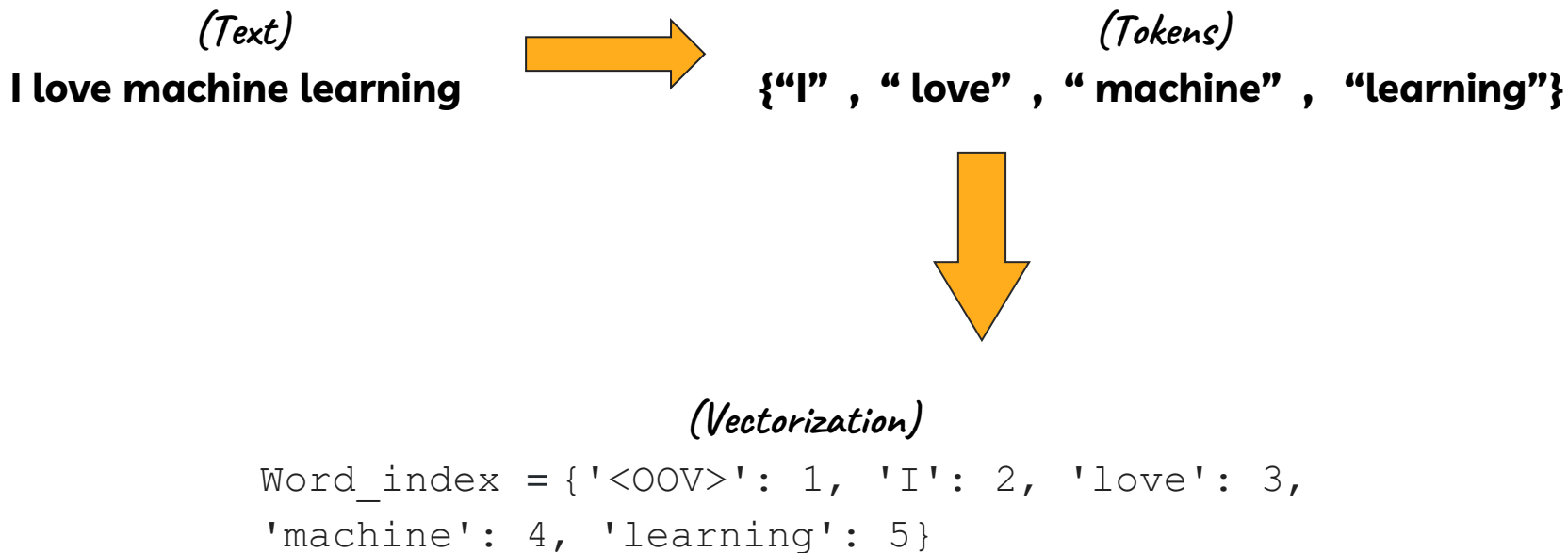
LabelEncoder

Tag (Nominal Scale)
greeting
goodbye
about
help
menu



Tag (Label Encoding)
0
1
2
3
4

Vectorization using Tokenizer



pad_sequences

Method

(Vectorization)

```
Word_index = {'<OOV>': 1, 'I': 2,  
'love': 3, 'machine': 4, 'learning': 5,  
'maths': 6, 'food': 7, 'to': 8, 'eat':  
9 }
```

(Sequence)

```
Sequences = [[2, 3, 4, 5],  
[2, 3, 6], [2, 3, 7], [2, 3,  
8, 9, 7]]
```

(Padded Sequences)

Padded Sequences:

```
[ [ 0  2  3  4  5]  
[ 0  0  2  3  6]  
[ 0  0  2  3  7]  
[ 2  3  8  9  7]]
```

I love machine learning
I love maths
I love food
I love to eat food



Deep Learning Model Module

Model: "sequential_3"

Layer (type)	Output Shape	Param #
=====		
embedding_3 (Embedding)	(None, 20, 20)	20000

global_average_pooling1d_3 ((None, 20)	0

dense_9 (Dense)	(None, 20)	420

dense_10 (Dense)	(None, 20)	420

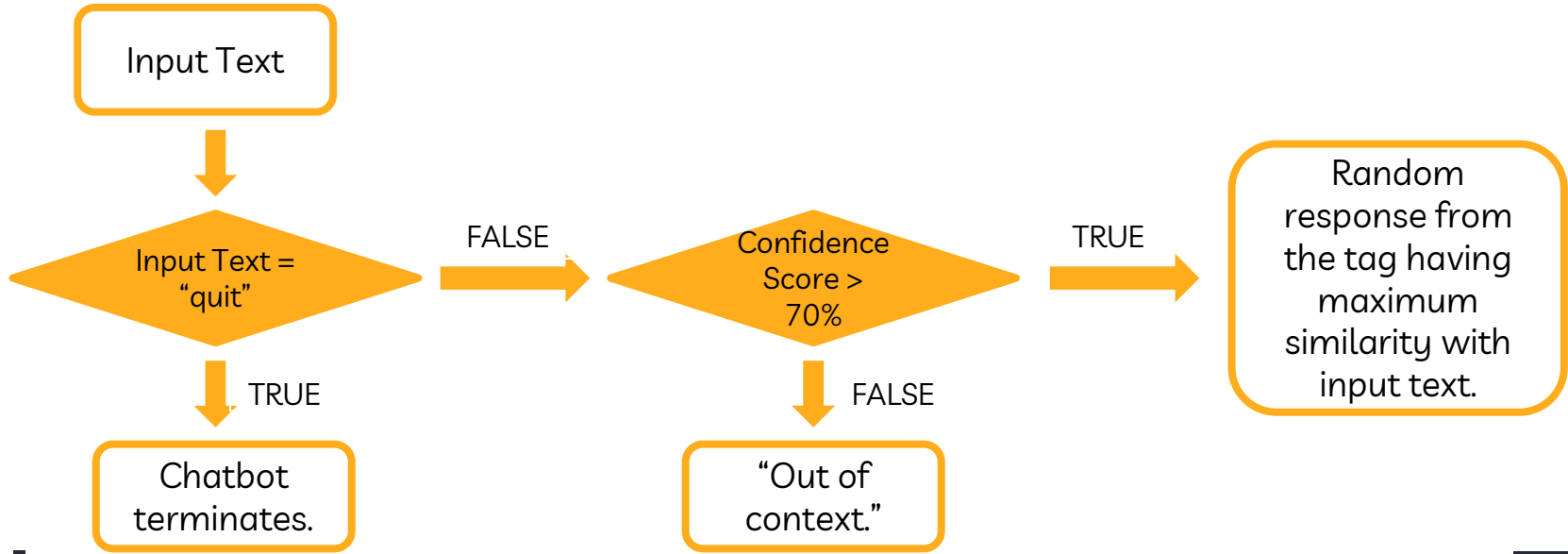
dense_11 (Dense)	(None, 20)	420
=====		

Total params: 21,260

Trainable params: 21,260

Non-trainable params: 0

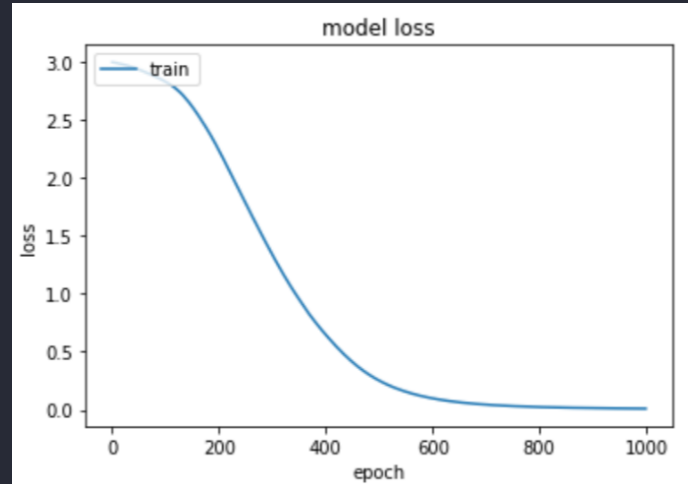
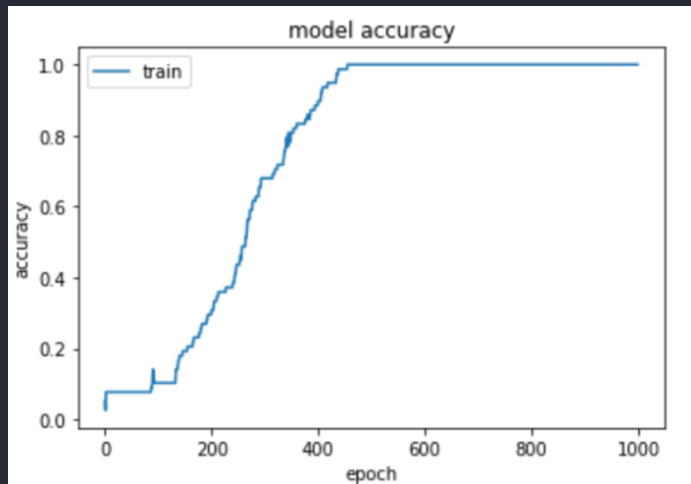
Response Generation Module



RESULT

1. The Performance of our model and its accuracy can be manually calculated by giving some inputs and checking the responses.
2. It produces good output for most of the input, and for the queries not predefined it gives an out-of-context message.
3. So, to improve our model efficiency we should keep on updating our data and re-train our model again and again.
4. Concept of precision at n concept is used and it produced an accuracy of 95%. Out of 20 queries, 19 were answered correctly.
5. We can also increase the accuracy by increasing the data.

Model Accuracy and Loss Curve at 1000 epochs.



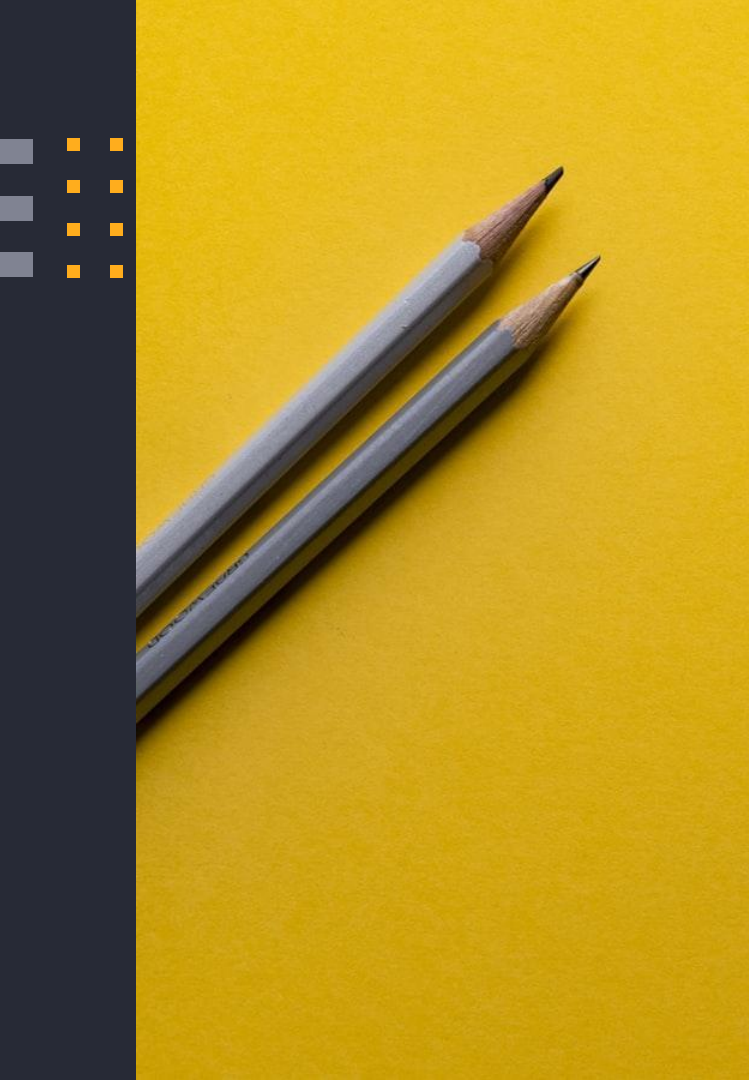
CONCLUSION

1. We have used a Deep Learning Model to implement a retrieval based chatbot for the Restaurant Management domain and the system does good in this domain.
2. By considering the results, we can say that it is better to set epochs at value greater than 600 and less than 1000 for better results.
3. We have analyzed how to increase the accuracy of the system.
4. Manual updation of the dataset is carried out to make model more efficient.

FUTURE WORK



1. Integrate with website
1. Apply different NLP techniques like
 - NER (Name Entity Recognition) an easily find out any entity that appeared in user chat messages and use it for further conversations.
 - And we can add a Sentiment Analysis model to identify different sentiment tones behind user messages and it will exactly give some additional colors to your chatbot.
1. We can implement a mix of retrieval and generative based chatbot so that the bot can generate answers apart from predefined responses.



ThankYou 😊