Project Progress Presentation

CHAT BOT

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Project Objective:

To create a working model of Conversational Chatbot for business purposes. Further to create a service-to-service chatbot, using IoT for real time information responses.

Introduction:

A Chatbot is an intelligent piece of software that is capable of communicating and performing actions similar to a human. Chatbots are used a lot in customer interaction, marketing on social network sites and instantly messaging the client.There are hundreds if not thousands of chatbot solutions in the market. Most companies have chatbot enabled to handle customer services.Yet, most chatbots are not even close to intelligent but need human interference or can't perform without being acknowledged as bots.With advancement of technology, we aim to create conversational AI chatbot, that feel like human and even be able to replace human beings.

What Have We Achieved

1. We have created a integrable chatbot service,which can providing answer to **dynamic questions**
2. It requires minimal effort to integrate the chatbot service in any website
3. Our aim is to successfully and resourcefully respond to any question that is asked

How it Works

1. An AWS EC2 service provides, API platform that can be access from anywhere
2. Our frontend module calls API to fetch replies to the user’s message
3. No changes in the website code is required, only one import is required to run the chatbot service a website

Our Workflow

Our approach to solve any problem has been multifaceted. The project has been broken into small problems, to create **n tier architecture**. The various tiers are listed below:

NLP MODEL

1. To understand the format of data, i.e. information to be learned by the NLP model
   a. Tokenizers
   b. Stemmers
2. Data preprocessing methods
   a. Word Embedding
   b. Bag Of Word
3. Create model, that provides acceptable performance, with less computational time and resources
   a. LSTMs
   b. Neural Networks

DEVOPS

1. Communication protocols
   a. Websocket
   b. Rest
2. Server architecture
   a. AWS Lambda
   b. AWS API Gateway
   c. AWS EC2
3. Individual api
   a. flask
4. Deployment strategy
   a. Heroku
   b. Pythonanywhere
   c. AWS
5. Robustness and Failover

CLIENT

1. Create frontend
2. Work on User Interface and user experience problems
3. To call api
   a. AJAX
   b. CURL
   c. FETCH
4. Make the module callable with just one line of code
5. Host the client side website

Technology Stack

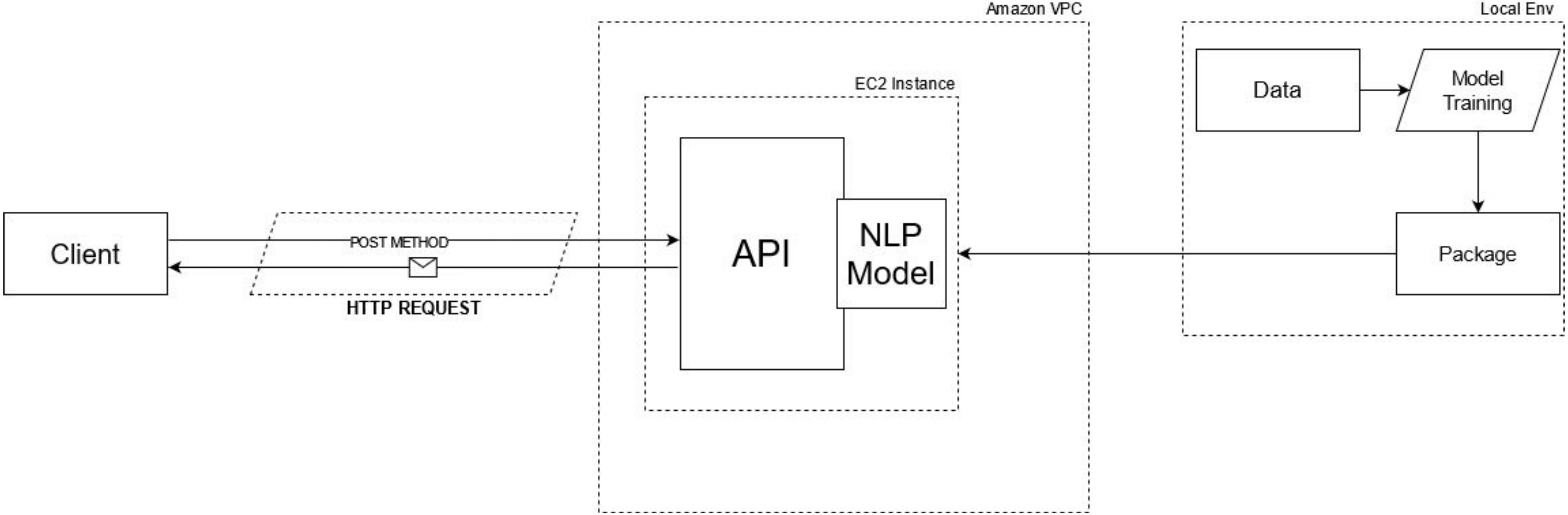
Server Side

1. Cloud Computing (Amazon Web Services)
   a. Amazon EC2
   b. Amazon S3
2. TCP IP, Http Server
3. Natural Language Processing
   a. Neural Networks
   b. LSTM Networks
   c. Bag Of Word Model
   d. Word Embedding
4. Python Frameworks
   a. Flask
   b. Tensorflow and Keras
   c. NLTK
   d. Spacy

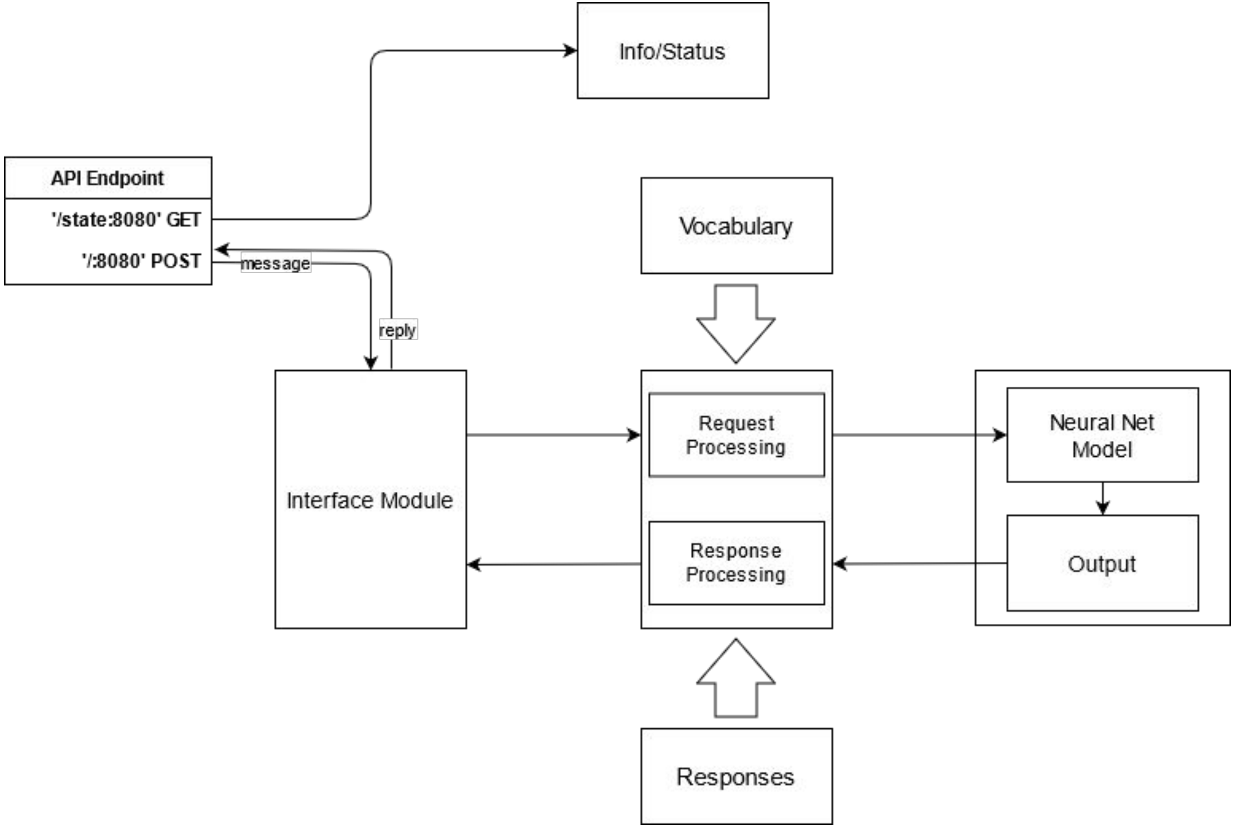
Client Side

1. Web Client
   a. Php
   b. Java Script
   c. AJAX
   d. CURL
   e. REST API
   f. Socket
2. Frontend
   a. HTML, CSS
   b. BootStrap

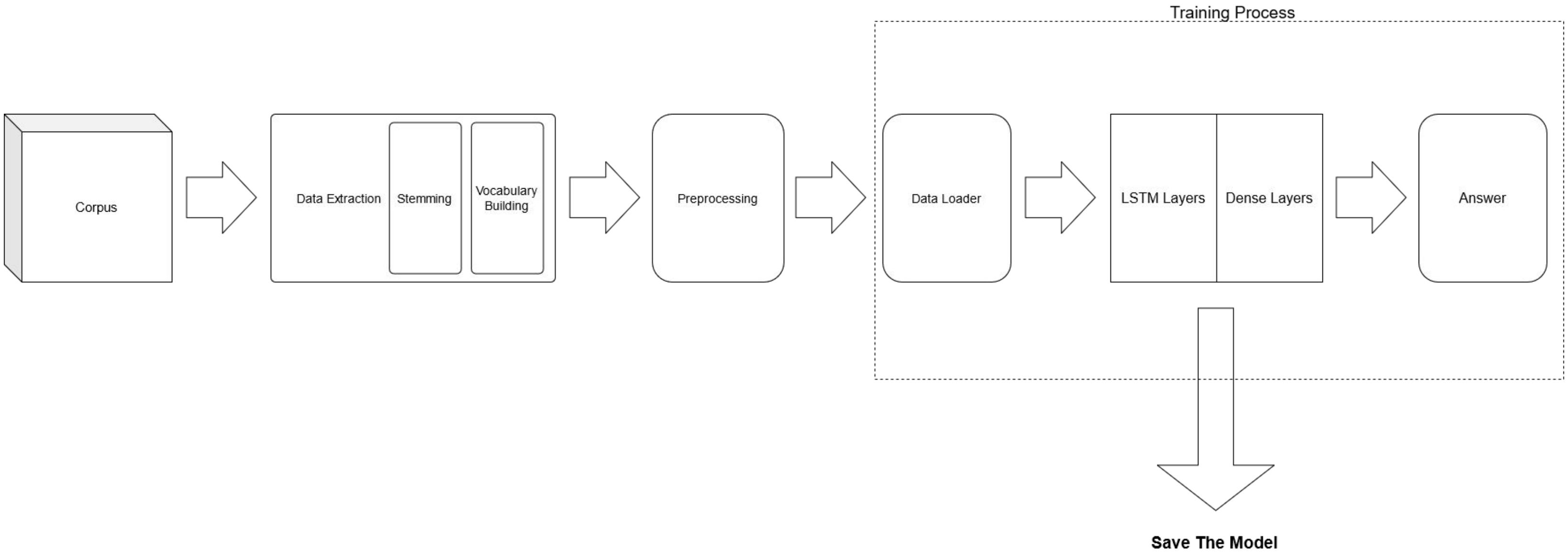
Project Architecture



API Flow


Info/Status
API Endpoint
'/state:8080' GET
'/:8080' POST
message
reply
Vocabulary
Interface Module
Request Processing
Response Processing
Neural Net Model
Output
Responses

Data Preprocessing And Training

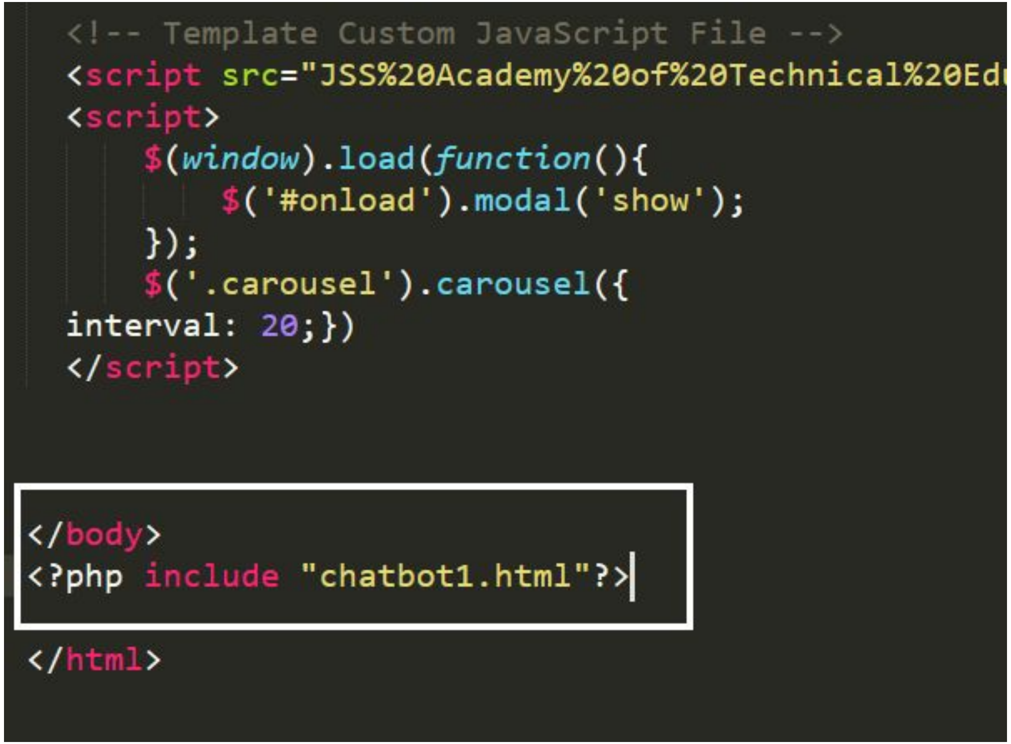


Deep Learning Model Architecture

1. **LSTM**; Width = 256, Shape = “Input Shape”
2. **Dense**; Width = 256, Activation = relu
3. **Dropout** = 0.2
4. **Dense**; Width = 256, Activation = relu
5. **Dropout** = 0.2
6. **Dense**; Width = “Output Shape”, Activation = softmax

Loss - Categorical Cross Entropy
Optimization - Stochastic Gradient Descent

Integration



```
  <!-- Template Custom JavaScript File -->
  <script src="JSS%20Academy%20of%20Technical%20Ed
  <script>
      $(window).load(function(){
          $('#onload').modal('show');
      });
      $('.carousel').carousel({
  interval: 20;})
  </script>


</body>
<?php include "chatbot1.html"?>

</html>
```

Features

1. **Loosely Coupled Architecture**

   We have created a microservice that can be accessed from endpoints. This makes it easy to debug errors and one system failure won't affect other systems

2. **Efficient NLP Model with low computation resources**

   Enables us to run our API inexpensively on third-party Services

3. **Extremely easy to Integrate**

   As the chatbot.html can be imported, into existing websites, it encapsulates all other complexity related to chatbot service

Challenge

1. Setting up Communication Protocols

2. Deployment Options

3. Problems required multiple domain knowledge

4. To create models that can work in real time, with less latency and low computational complexity

Future Prospects

Present version of chatbot has limitations and we haven’t achieved **our vision** of product **yet.** We intend to make multiple changes and upgrades in future:

1. Run multiple instances with added authentication under load balancers, with health checks, giving failover abilities.
2. To improve models with more efficient frameworks like spacy and pytorch.
3. Create more sophisticated NLP models to explore more possibility, like Question/Answering bot with no user input.

Service-to-Service Chatbot

1. We are on our way to create realtime information service-to-service chatbot, communicating to IoT systems remotely installed within the organizations.

2. Our approach is to create ‘No Database’ system directly connected to IoT devices, collecting realtime data.

3. This is an initiative to work with new paradigm technologies, where AI directly works with Electronic devices.

References

- Understanding bag-of-words model: a statistical framework by https://link.springer.com/article/10.1007%2Fs13042-010-0001-0

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- https://ieeexplore.ieee.org/abstract/document/8126057
- Jung, M., Hinds, P., 2018. Robots in the Wild: A Time for More Robust Theories of Human-Robot Interaction. ACM Trans. Hum.-Robot Interact. 7, 2:1–2:5.

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Thank You