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# Pantomath: College Inquiry Chatbot

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**Abstract:** The 'Pantomath Chatbot' is a college inquiry chatbot which is built using Natural Language Processing (NLP) that analyses and understand user's message. This system is a website which provides an answer to the query of the user<sup>[1]</sup>. The user can chat using appropriate Standard English. The chatbot uses intent based analysis to answer the query. The system replies to the user as if a real person is interacting with the user. The user can query college-related activities such as date and timing of annual day, sports day, and other cultural activities, results, the location of a class or lab. Pantomath provides a text-based user interface, allowing the user to type questions and receive text as well as voice response.

**Keywords:** Chatbot, Natural Language Processing, Text-to-Speech, conversational agent, Dialog flow.

## I. INTRODUCTION

A chatbot is a technology which helps humans to converse with computers in their native language via a computer user interface. Chatbot programs are often designed to convincingly simulate how a human would behave as a conversational partner, thereby passing the Turing test. Chatbots are usually used in dialogue systems<sup>[2]</sup> for various practical reasons, for example, automated online assistants, giving them the ability to engage the customer.

Pantomath Chatbot is a native chatbot that will analyze and understand user's queries and reply appropriately. A native chatbot is a chatbot technology which interacts with users in the website browser. This system is a web service which will provide answers to the queries of the system user.

Artificial intelligence(AI) is the simulation of human intelligence processes by machines, especially computer systems. Natural Language Processing or NLP is a part of artificial intelligence that will be used to analyze the user's queries. Users won't have to go to the college office to make the inquiry. The user just has to register himself to the system. The user can ask college-related information such as fees, results, admissions, etc. This system also helps the user to be updated about the college activities.

The query will be answered on the basis of the knowledge base. The keywords will be fetched from the natural language processing algorithms and a relevant answer will be provided to the user. In case the answer is not available in the knowledge base or the question is irrelevant then the default message will be displayed.

## II. NATURAL LANGUAGE PROCESSING

Natural Language Processing (NLP) is the area of research and application that investigates and analyze how the computational techniques can be used to perceive and alter the user's human language text or speech inputs. Natural Language Processing (NLP) techniques can be used in various applications such as machine translations, natural language processing, multilingual and cross-language information retrieval (CLIR), speech recognition and Artificial Intelligent systems<sup>[3]</sup>. For this Chatbot, natural language processing of text input is done by dialog flow.

## III. TEXT-TO-SPEECH SYNTHESIS

A text-to-speech synthesizing system converts normal language text into speech. Speech can be created by joining parts of recorded speech that are stored in a database. A text-to-speech engine is composed of two parts: a front end and a back end. The front end converts raw text containing abbreviations and symbols. The back end then converts the linguistic representation into sound. Responsivevoice.js, a node.js package (npm) is used to add the text to speech functionality in the chatbot web service.

## IV. DIALOGFLOW

Dialog flow provides a natural language processing service, gives user new ways to interact and to build engaging voice and text-based conversational interfaces powered by artificial intelligence. It does all the heavy lifting of parsing user's text or voice and identifying user's intention. It uses machine learning to identify the user is chatting or talking. Machine learning is a field of computer science that gives computers being explicitly programmed and machine learning system improves with experience. Dialog flow allows chatbot development using the following components:

**Intents-** Intents are the intentions of the user. They represent a mapping between what the user says and what action must be taken. **Entities-** Entities extract parameters values directly from natural language inputs **Context-**Context allows relating two entities using parameters.

**Fulfillment-** It sets up a web hook that allows passing data from a matched intent on dialog flow into a website. Results can be formulated from the data.

## V. NODE.JS

Node.js is an open-source, cross-stage platform built on Google Chrome V8 JavaScript runtime engine for developing fast, scalable, and lightweight web applications. The runtime condition translates JavaScript with use of Google's V8 JavaScript motor. Node.js is highly scalable because it is capable of handling a large number of simultaneous connections with high output. Api.ai(dialog flow) package allows integrating agents from the Api.ai natural language processing service with a web application.

## VI. DESIGN

The user will ask a question on Pantomath web service chat window regarding office queries. The user query is passed to the Pantomath back-end web service implemented on node.js. The dialogflow package is used for processing the text query. The input is analyzed and parsed using natural language processing and intent based analysis and is matched with intents. The results and actionable data are passed to the backend server through a webhook. The node.js service will analyze the results and data and find out the appropriate answer. The final result will be returned to the user via the chat window. Along with that, the same result is pass to the text to speech system so that it will convert the text to synthesized speech. The synthesized speech will also be sent to the chat window. The user will be able to view the solution to the query in a text as well as hear in speech. Figure 1 shows Pantomath chatbot system architecture.

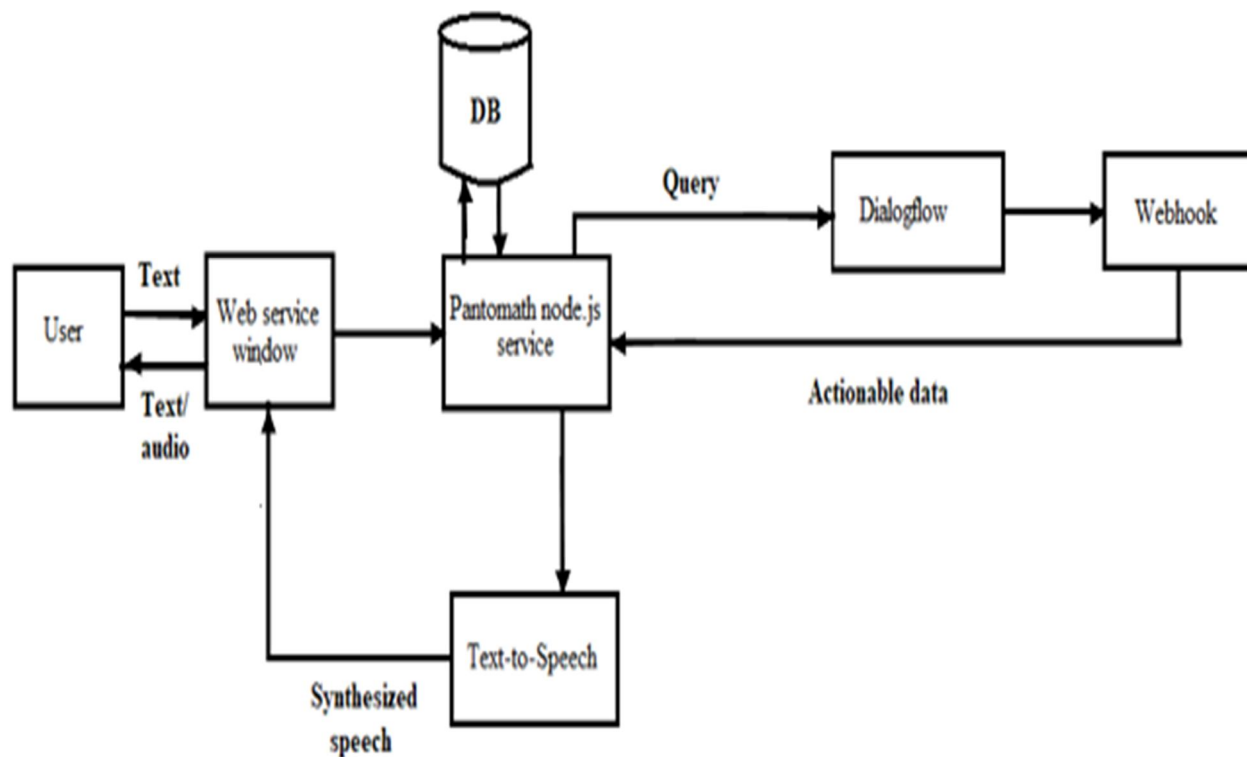


Fig 1: Pantomath System Architecture

The user's text input is split into separate words for tagging the parts-of-speech labels with respect to their positions and neighbors in the input text. In the next phase, with the help of different types of grammar, the individually tagged words are chunked to develop phrases. In the chunking operation phase, the important keywords are taken out from the phrases by removing the unwanted words. The backend service is provided with keywords retrieved from the natural language text processing. The output is the response, which will be shown to the user<sup>[4]</sup>.

## VII. TEST RESULTS

TABLE I  
TEST RESULTS FOR THE PROPOSED SYSTEM

Intent ID	Intent Name	Questions/ sentences Asked	Reply (if matched with intent id then true else false)
0df2f4b3-a79f-468e-a6b6-a969de577c0a	Results	May I know results of be	True
b0ceb50c-b262-44ec-b4d8-8270de6c5d55	Fees	I want information about be fees	True
f900e826-cdc7-4521-9637-c164448a7d43	Welcome	Hi	True
1a8dccb3-d48e-438c-b9df-1bc28d564301	default_response	Sirius Black	True
1a8dccb3-d48e-438c-b9df-1bc28d564301	time_table	It time table	True1
5fcb8dd1-ac8b-4075-a536-23d65e83929d	exam_table	Time table for sem 8	False
350be520-cb40-4b7c-b3d0-4ec8777047cd	rail_pass	Concession for railway	True
83250be8-5ba9-47ae-b96b-215dcf4acb1d	kt	I want to apply for re evaluation of papers	False
0be656fa-259a-454e-9cd7-246a25bcb44f	layout	Where is the principal office	True
"8edad0e3-d7f9-48d1-9062-d4f40db9c71d	workshop	I want to know about the ongoing workshops in the college	False



### VIII. CONCLUSIONS

In this paper, the chatbot technology is developed using various web technologies in the front end for a good user interface and node.js, dialogflow, responsivevoice.js in the back end. This intelligent chatbot is capable of handling various college queries in the native language. The Pantomath chatbot is accessible through the web browsers. Node.js runtime environment has been used to process the server side and client side requests. In the future, adding speech recognition abilities to the current system will enable people with reading disabilities to take advantage of this system. This chatbot can further be implemented for mobile environment and integrate into applications for android or ios

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