



NOVA: Your Digital Assistant Companion

¹ Sanchit Kalsi, ² Stuti Kumar, ³ Pranit Zanwar, ⁴ Himanshu Pandey, ⁵ Prof. Swapnaja Hiray

¹ Department of Information Technology,

¹Pune Institute of Computer Technology, Pune, Maharashtra, India

Abstract: An intelligent digital assistant refers to a software agent that executes tasks or provides services based on private commands or inquiries. The term "chatbot" may also be used to refer to virtual assistants, whether they are accessed through online chat or not. However, some online chat programs are only used for entertainment purposes. Certain virtual assistants are capable of understanding human speech and replying via synthesized voices. With voice commands, users can inquire about their assistant, manage home automation devices and media playback, as well as handle basic tasks like email, to-do lists, and calendars.

Index Terms - Digital assistant, Chatbot, Automation, Integration

I. INTRODUCTION

NOVA (Neoteric Organized Virtual Assistant) is an artificial intelligence-powered digital assistant that supports users with a variety of tasks and automates typical procedures. The system includes a budget manager, a schedule manager, and article summarizer.

Natural language understanding and machine learning technologies allow NOVA to successfully grasp and interpret user requests. Furthermore, the system learns from user interactions and gradually becomes more customized and intelligent.

What NOVA seeks is the automation of repetitive and often banal operations that consume a substantial amount of time, the automation of which would not only save this important resource but also provide potential for better utilization.

Overall, NOVA offers a comprehensive digital assistant solution for people looking to automate typical tasks and optimize their daily routines. NOVA has the potential to grow even smarter and more effective in its role as a personal assistant as AI technology advances.

II. LITERATURE SURVEY

[1] According to Mekni, M., conversational agents are natural language interaction interfaces that use AI to replicate human interactions, and his paper provides a platform to assist universities in providing continuous and instant assistance to their student, staff, and faculty communities.[2] A Velmurugan et al proposed that mobile applications provide a full view of personal and group spending, removing the need for sticky notes, spreadsheets, and errors in data processing.[3] Ami Doshi invented Donna, an artificial intelligence-based personal assistant that can be utilised by even the most inexperienced users to organise their daily work and upcoming agendas. To make it more user-friendly, it is automated and includes a task manager, chatbot, and text-to-speech capability. [4] Aliv Faizal Muhammad created a 100% accurate English conversation chatbot using speech recognition and artificial intelligence technologies, with the Dialogflow platform serving as the artificial intelligence engine. It is anticipated that it will assist pupils in improving their speaking abilities.[5] According to Siddharth Konak, chatbots built with Google Dialogflow are an efficient and cost-effective way for businesses and organisations to create personalised and engaging interactions with customers.[6] Michael Fellmann worked on an intelligent to-do list that can aid with personal duties and time management by collecting and resubmitting tasks automatically, delivering context-sensitive reminders, and recording activity to generate insights.[7] Chinnapa Reddy Kanakanti proposed a project that aimed to implement an android-based chatbot to assist with Organization basic processes, using google tools such as Dialogflow that uses Natural language processing NLP, Actions on Google and Google Cloud Platform that expose artificial intelligence and Machine Learning methods such as natural language understanding.[8] Kannadasan R proposed a model that is handled by Dialogflow, which helps in achieving an end-to-end bot without the user being worried about the algorithm that should be used to train this bot. Using technologies like Dialog flow, Node.js in this proposed model, an effort is made to make better bots with better functionality and continuation in the conversation.

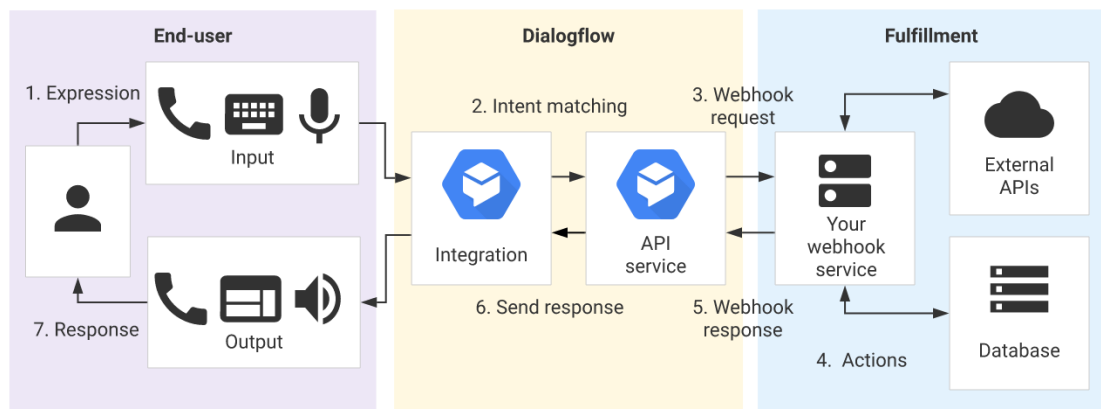
III. METHODOLOGY

1. Dialogflow:

- a. Dialogflow is a natural language understanding engine that sits in the middle of the stack, above a product or service, and facilitates an engaging discussion. It is an end-to-end tool with which a user can communicate by text, audio, or other modes.

- b. The Dialogflow agent translates an intent from a human utterance, then acts on it based on the phrases it has been trained with, and then responds to the user. If no matches are found, slot filling is used. A fallback intent aids in catching exceptions.

The following diagram can help you understand how Dialogflow works:



working of DialogFlow

- c. NOVA was created with Dialogflow. To deliver a personalised experience to the user, we have specified various intents for the agent.
- d. Dialogflow fulfilments are also used to provide integration services, such as those with Google Calendar.

2. ChatGPT:

- a. OpenAI's ChatGPT (Chat Generative Pre-trained Transformer) is an Artificial Intelligence chatbot. It is a neural network based on transformers that may generate human-like responses.
- b. ChatGPT was employed as a fallback mechanism in our project. ChatGPT will respond if the Dialogflow agent is unable to respond to the user's question.

3. Kommunicate:

- a. Kommunicate is a customer service automation platform that offers a chatbot experience that is similar to that of a human. It allows for the building of NLP-based chatbots as well as integration with other services and applications.
- b. Kommunicate was utilised to deploy our Dialogflow chatbot on our website.

4. BigQuery:

- a. BigQuery Google BigQuery is a PaaS service. It is a serverless data warehouse that supports ANSI SQL querying as well as machine learning.
- b. BigQuery is used to store data from user and NOVA interactions. This permits the development of analytics and insights.

5. Article Summarizer:

- a. This API extracts the body of news/articles from URLs and summarizes their content using GPT, making it a valuable tool for text mining.
- b. It also incorporates a powerful and flexible web scraping engine, ScrapeNinja.net, with high-quality rotating proxies to enhance its functionality.

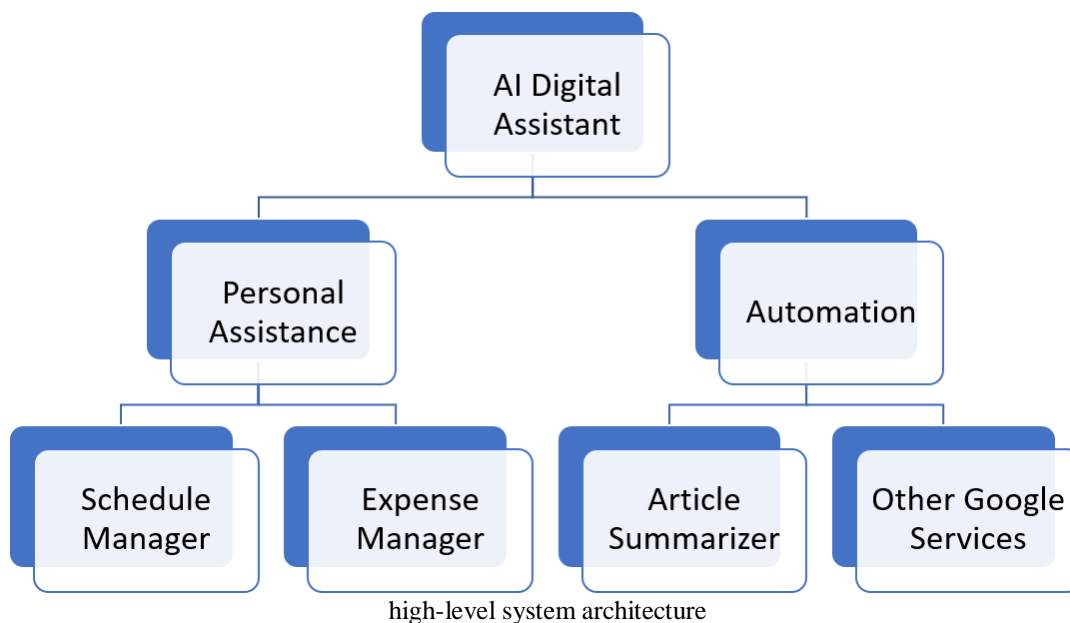
6. Tech Stack:

- a. NOVA is built using **ReactJS** as the frontend framework, providing an efficient and scalable user interface.
- b. On the backend, **NodeJS** is used, providing a powerful and robust runtime environment to handle various server-side operations.
- c. Additionally, NOVA's database is hosted on **BigData**, a cloud-based data warehouse platform that allows for efficient data storage and retrieval.
- d. The use of these technologies provides NOVA with a strong foundation for delivering reliable, fast, and responsive performance, making it an efficient and effective digital assistant for its users.

IV. SYSTEM ARCHITECTURE

The functionality of NOVA can be divided into 2 major modules:

1. Personal Assistance
2. Automation



Each module governs tasks related to a different service domain.

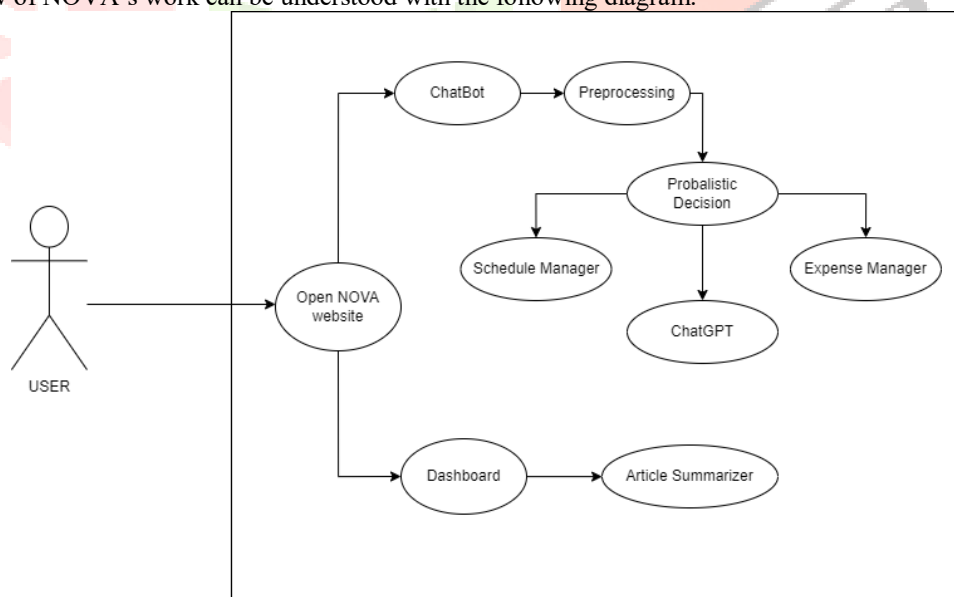
1. Personal Assistance:

- a. As the name implies, the personal assistance module seeks to provide assistance on a personal basis. Various schedulers are assigned the task of catering to various needs, such as
 - i. A meeting scheduler.
 - ii. A planner for events such as excursions, vacations, lunches, outings, and so forth.
 - iii. A class planner for students.
 - iv. A doctor's appointment scheduler.
- b. The user's Google Calendar is updated with the scheduled events.

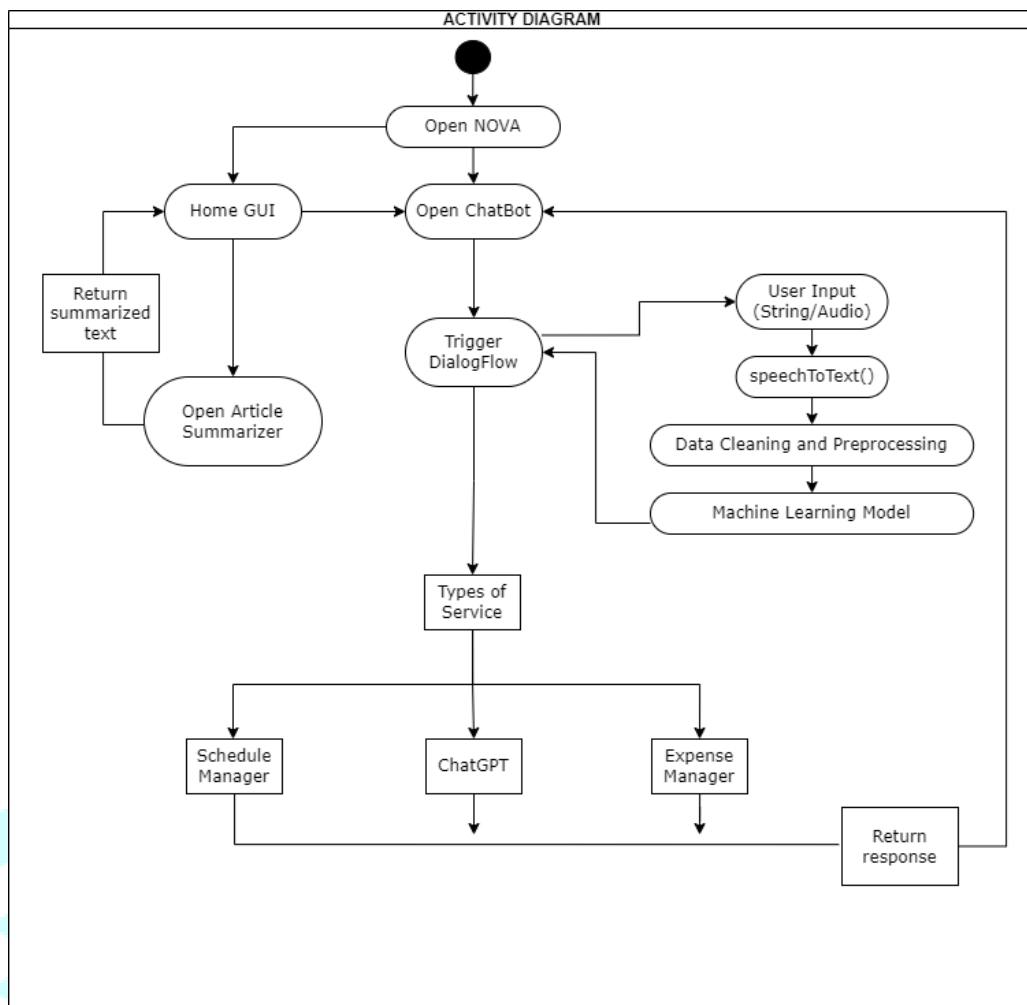
2. Automation:

- a. Our goal is to automate various services. This includes,
 - i. Summarize any article from various websites.
 - ii. Google services such as Calendar, Gmail, and so on.

The overall flow of NOVA's work can be understood with the following diagram.



UML diagram of the application



activity diagram

V. IMPLEMENTATION

At the core of NOVA sits a Dialogflow Agent, trained on various intents to provide a personalized experience to the user. Different entities and contexts are used to provide seamless conversation.

Deployment and Integration

NOVA is deployed as a web app which can be accessed on both desktop and mobile devices. From the web app frontend, an API call is sent to Kommunicate using React. Kommunicate uses its own internal mechanism to make an API call to invoke the DialogFlow agent.

The Dialogflow agent makes use of fulfillments to make API calls to Google Cloud Platform (GCP), Google Calendar and BigQuery.

All the invocations are specified in Node.js.

Scheduler

The various schedulers such as class, event, appointment, meeting etc enable NOVA to provide personalized scheduler manager services. With simple keyword extraction, NOVA can recognize the user's intent and invoke the necessary scheduler.

The scheduled events are added to a Google Calendar linked with the user's Google Account. A new event is only added if no prior events are occupying the time slot. The event details are simultaneously reflected in a BigQuery table.

A concept called 'Priority' is used to prioritize events and decide precedence. A 'high priority' event can override an existing calendar entry of a 'low priority' event.

Another concept called 'Duration' is used to set event durations. By default an event is scheduled for +1hr at the aforementioned time by the user. This is the case if the user does not explicitly set the event end time. If the user specifies an event end time, the same will be reflected in the schedule.

Expense Manager

The Expense Manager collects information about user's expenses, stores them and returns insights after the user makes a query.

A distinction is made between monetary inflow (debit) and monetary outflow (credit). The inflow module is invoked when the user receives funds and the outflow module is invoked when the user makes a purchase.

Expenses are divided into several broad categories such as transportation, utilities, rent, groceries, medical, household, recreation, miscellaneous etc.

The user is prompted about the transaction type (debit/credit), the category of expense and the date of transaction. This data is then stored in a BigQuery table.

Queries and Fallback

When the user asks a question that the DialogFlow Agent cannot provide a response to, instead of a generic fallback response, the query is routed to ChatGPT.

ChatGPT addresses the query and the response provided is returned to the user.
The API call to ChatGPT is made via Node.js and Express.

Calendar Events

When the user schedules an appointment, the agent prompts the user to provide mandatory parameters like date, time and subject.

A calendar event is created after checking the availability of the time slot. In the absence of coinciding prior events, the new event is added to the calendar.

If the time specified by the user is already occupied by an event, the user is informed about the unavailability of a free time slot.

Google Cloud Platform

Integration with GCP services enables Dialogflow Agent to act dynamically such as make changes to calendar and fetch insights from BigQuery.

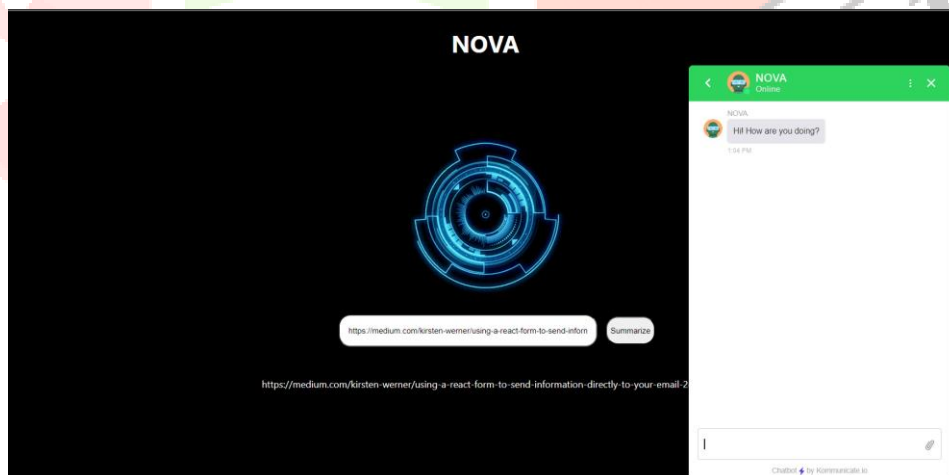
For instance, when scheduling events, when a user schedules an event, the scheduled event is reflected in the user's Google Calendar. The schedule details are stored in BigQuery and can be queried to provide insights to the user.

Article Summarizer

After pasting an article link in the field provided, an article summary is generated and displayed to the user on the same page

V. ACKNOWLEDGMENT

NOVA has been successfully deployed on a webapp. The UI is as such:



user interactive website for NOVA.

NOVA is able to navigate overlapping contexts and invoke appropriate schedulers.

In case of a fallback, ChatGPT is successfully invoked and the default DialogFlow fallback is not triggered.

Events are only added to the calendar if the time slot is free.

Article summarizer displays the summary on the same page without redirecting.

All data extracted from conversations with the agent is successfully logged onto BigQuery.

VI. CONCLUSION

Finally, NOVA is a revolutionary AI digital assistant that provides a variety of capabilities to aid users in automating and streamlining their daily operations. NOVA's task, calendar, email, and website automation managers are intended to make repetitive and mundane operations more efficient, saving users valuable time that may be spent elsewhere. NOVA's natural language understanding and machine learning capabilities enable it to learn from user interactions and gradually become more intelligent and personalised. The potential for NOVA to become increasingly more intelligent and successful as a personal assistant as AI technology evolves is amazing. Overall, NOVA provides a comprehensive solution for consumers seeking to simplify and boost their productivity.

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