Conversational Chat-based News Assistant

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Abstract — **For the new age user, consuming news is a necessity and an important means to stay abreast of the latest developments in the world. This paper proposes a system that acts as a conversational assistant to separate the news from the noise by providing personalized news, alerts, recommendations etc. This approach is a new paradigm of giving the user the right & relevant content at the right time; compared to traditional methods of user spending hours searching for relevant articles/topics of interest and value.**

Index Terms—**Virtual assistant, Chatbot, web application, machine learning, natural language understanding.**

I. Introduction

We are living in an age of breaking news & information overload. Consuming news is an important priority for most people to stay informed about the world around us. It also helps us learn new things and have informed opinions about topics of interest. Nowadays, people use multiple devices like smartphones, laptops, tablets, workstations, smartwatches etc. on a daily basis for various tasks, reading news having a top priority. The consumption of news takes place by watching news broadcasts, reading news on web or in newspapers, viewing content shared by friends & family via YouTube videos, Facebook posts, tweets etc.

The technology revolution, driven by mobile devices like smartphones, tablets, voice assistants etc. has led to news being consumed at lightning speeds, and has increased the user base exponentially. Old media consumption sources like newspapers, radio have thus been disrupted. This led to rise of the digital news industry, where users nowadays prefer to consume news primarily on mobile devices via apps, news websites, smart assistants like Google Home, Amazon Echo etc.

This paradigm shift has led to a wider reach for audiences, but has also forced the news industry to reinvent themselves. Many of the traditional publications like newspapers, magazines have shut down, or have transformed themselves by launching products in digital space like apps, digital magazines, podcasts, or sharing content specifically tailored to reach huge audiences on Facebook, YouTube and Twitter etc.

Of late, digital assistants & messaging apps/services like WhatsApp, WeChat, iMessage etc. have emerged as the new platforms that are amassing huge users. Users are no longer looking to put in the time or effort to endlessly search for news articles of their interest on news websites, apps, social media etc. They expect smartphones and virtual assistants to curate & provide content automatically based on their profile, interests, location etc. With huge gains in natural language understanding, text & speech recognition due to rapid advances in machine learning, deep learning, this dream can has now become a reality.

This paper suggests a conversational chat-based news assistant that provides news alerts, recommendations based on the user's interests, while not distracting users with endless notifications on web/smartphones.

II. Current Solutions

In this section, we will evaluate existing systems, look at their shortcomings and ways to improve them.

The traditional methods of getting news consist of:

1. Getting news directly from websites, smartphone apps of news organizations like CNN, New York Times etc. Users can browse the various sections to get the content they want. There are often very few options for setting preferences like topics etc. Users can be inundated with the stream of push notifications from the smartphone apps of these organizations, with less control to limit the notifications to certain times of day or number of notifications received daily etc.
2. Getting news indirectly from curation services like Apple News, Flipboard. These services collect content from various publications. Users have option to select topics of interest, and are served content based on their preferences. Again, push notifications from these apps are difficult to manage.
3. Getting news from content shared on social media like Facebook posts, tweets etc. User has no control over such content shared by friends or news organizations. And most of such content is based on rumors, or use clickbait headlines to grab attention, there leading to increased website hits and hence more ad revenue.

Since most of these services are ad-sponsored, the advertisers get preference over the users' interests. Also these services have limited personalization. Many times, the user will not be able to get news about his locality, sorted by topics of interest, at particular times of day etc. Some services or apps may offer some of these features, but none of them offer a complete package that user desires.

III. Literature Review

Users are bombarded with news on devices by push alerts/notifications on smartphones & websites, content shared on social media and messaging apps like WhatsApp etc.

Unfortunately, the user, most often, has no control over these alerts, other than turning them on/off completely. Only practical option is to put the smartphone in "Do not disturb mode", but even this has its limitations. This avalanche of continuous alerts often leads to distraction from the primary task the user might be engaged in. This inevitably leads to anxiety to clear notifications, or read & respond to content shared on social media instantly. News organizations, social media companies, app developers have engineered their systems to promote instant gratification to users, thereby making users constantly checking their smartphones for news etc.

Another issue is that a large portion of the news articles are lacking in content, use clickbait headlines to grab user attention and encourage sharing the content among the user's friends and on social media etc. People & news organizations have begun to misuse this endless loop of sharing by spreading rumours, fake & unverified news, many times in the hope to attract more eyeballs, thereby gaining higher ad revenue from the increased user traffic.

To solve these pertinent issues, we are proposing a conversational news web app that provides daily briefing, news alerts, recommendations, trending stories etc. Users can interact with the chatbot via text input or voice commands.

What is a Chatbot?

A chatbot is a service, powered by rules and sometimes artificial intelligence, which you can interact with via a chat interface. The service could be any number of things, ranging from functional to fun, and it could live in any major chat product (Facebook Messenger, Slack, Telegram, Text Messages, etc.).

Why use Chatbots?

In recent times, we have seen that the average user has started to show "app fatigue". According to a 2015 survey by Millard Brown Digital, 43% of the smartphone users in US used four to six apps per day. Smartphone users have been replacing most of my apps with their web equivalent version. This is to make space for digital content such as photos & videos. Users are tired of downloading a single purpose, brand specific apps. These kind of apps are easily replaced by their websites.

There is, however, one category of apps that are an exception to this rule. These apps belong to Messaging category. Many users have WhatsApp, Facebook Messenger, Skype, Snapchat, Instagram and Slack installed and actively use them. They are their gateway to connecting with family and work.

People are now spending more time in messaging apps than in social media and that is a huge turning point. Messaging apps are the platforms of the future and bots will be how their users access all sorts of services.

There are two types of Chatbots:-

1. Chatbot that functions based on rules:

This bot is very limited. It can only respond to very specific commands. If you say the wrong thing, it doesn't know what you mean. This bot is only as smart as it is programmed to be.

2. Chatbot that functions using machine learning:

This bot has an artificial brain AKA artificial intelligence. You don't have to be ridiculously specific when you are talking to it. It understands language, not just commands. This bot continuously gets smarter as it learns from conversations it has with people.

Advantages of Chatbots:

1. Bots are created with a purpose. A store will likely want to create a bot that helps you purchase something, where someone like Comcast might create a bot that can answer customer support questions.
2. Chatbots with advanced AI provide website visitors with a "self-service" option, thereby increasing customer handling volume for companies.
3. Chatbots can be made available for 24x7 customer support, query handling. Achieving the same with employees can result in significant costs.
4. Leads to increased productivity as employees will be freed from routine tasks, and can spend more time on customer service, thereby increasing customer satisfaction at significantly less cost.

IV. PROJECT REQUIREMENTS

A. Functional Requirements:

- To create a web-based application with a conversational UI
- To have both text and voice input capabilities
- To implement Natural Language Understanding for understanding user inputs & queries
- To display content like web links, videos, images inline in the application
- To have options for the user to select preferences like topics of interest, setting alerts at specific times.
- To provide daily briefings of news summary in morning, evening etc. based on user preference

B. Technical Requirements:

- Cross-browser support both on desktop & smartphones.
- Ability to access hardware of device for voice input

V. PROPOSED SYSTEM

The proposed system will consist of a web application with integrated chatbot that can be accessed by any web browser both on desktop and smartphones.

Once the web app is opened in the browser the user is greeted with a welcome message. The user can then start conversing with the chatbot via text or voice input. Based on the user input, the system generates query responses giving text, images, web links that will satisfy the user query.

Users also get an option to register with the system using unique user ID & password. This will help to save user session data and preferences, chat history etc. Next time when the user

logs in, he/she can continue the conversation from the previous history.

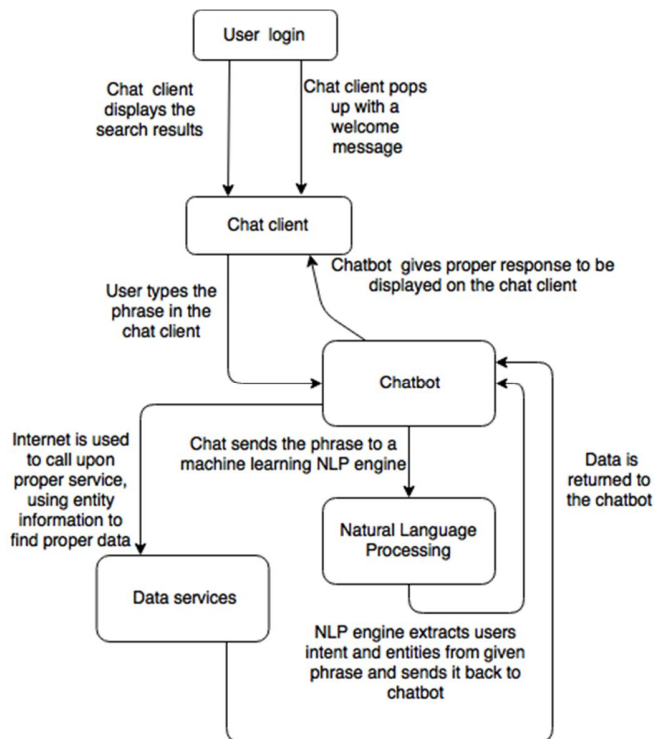This is the process flow of our system:

Fig 1. Process Flow Diagram

A. ARCHITECTURE

The Design Pattern will be Single Page Application.

1. Front end:

The front end of the web app will designed using Bootstrap front end framework. The web page will be displayed using HTML5 & CSS3 elements.

HTML (Hyper Text Markup Language) is a markup language used for structuring and presenting content on the World Wide Web. HTML5 is the latest version.

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language. CSS3 is the latest version.

2. Business logic:

The business logic of the application will be coded in Python language and deployed using Django framework.

Django is an open-source web framework, written in Python, which follows the model-view-template architectural pattern. Django is fast, secure and highly scalable.

3. Machine Learning:

One of the functions of our project is to understand the user queries. For this we will be using Natural Language Processing and other machine learning models.

All the machine learning models will be deployed using Keras as the front end and Tensor Flow as the backend.

Keras is a high-level neural networks API, written in Python and capable of running on top of TensorFlow, CNTK, or Theano. It was developed with a focus on enabling fast experimentation and for being able to go from idea to result with the least possible delay.

TensorFlow is an open-source software library for dataflow programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks.

4. Back end:

For storage of data in the web application, we would be using MySql, which is an open-source relational database management system.
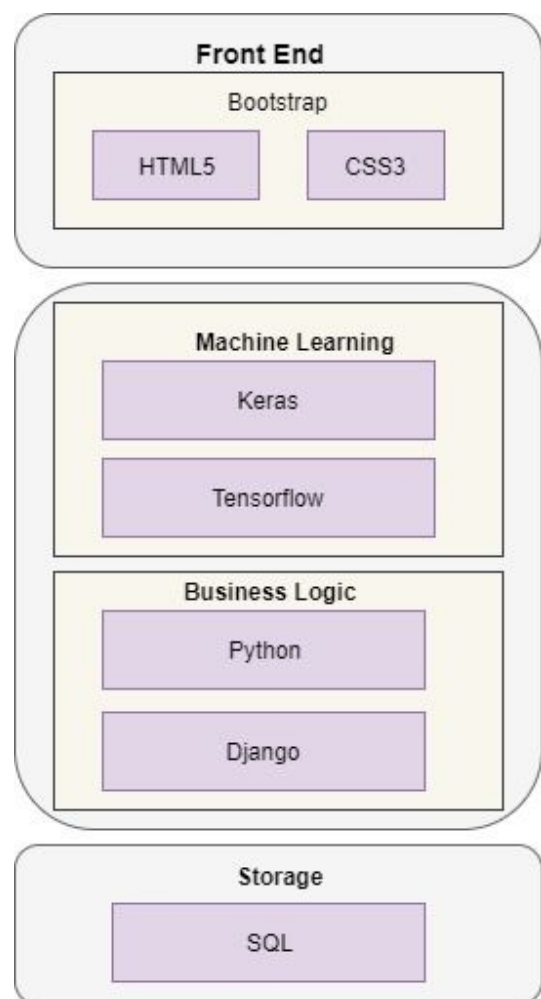

Fig 2. Architecture

B. UML ACTIVITY DIAGRAMS

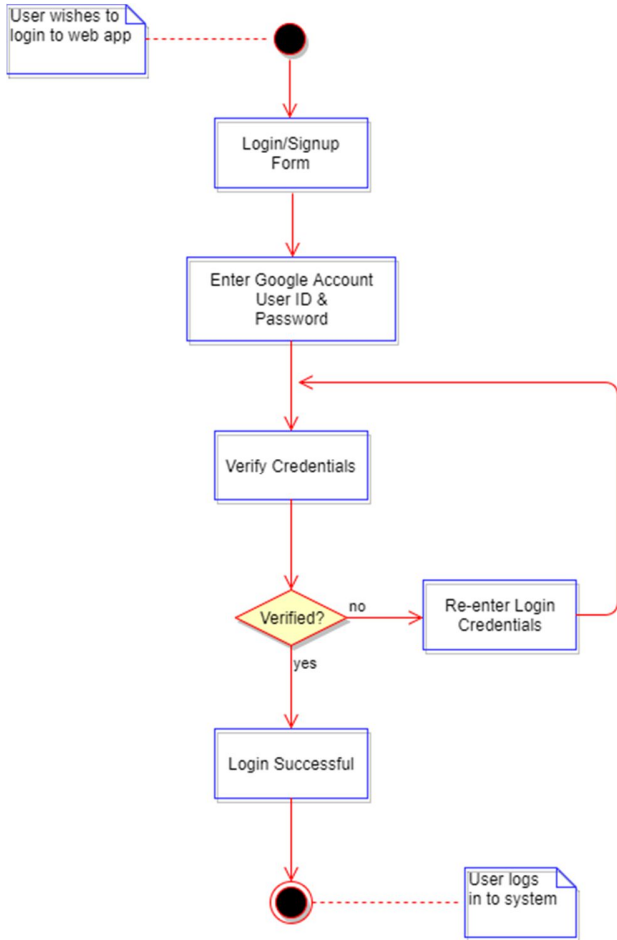Here is the UML activity diagram for the login process of the web app:

Fig 3. UML Login Activity Diagram

Here is the UML activity diagram of the chatbot:
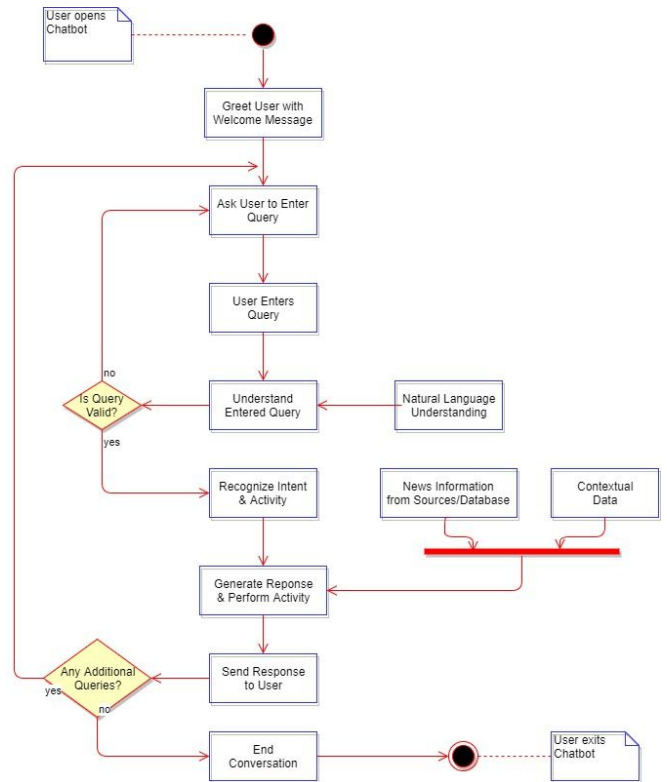
Fig 4. UML Chatbot Activity Diagram

C. WIREFRAMES

For user login and authentication, we would be providing an option to login to the web application using a Google account. This would make it easier for the user to login, since most people have Google accounts. Also the user will not have to sign up for yet another account and there will be no hassle of remembering the login credentials just for this application.

For the chatbot, the user is welcome with a message on login and asked to enter a query. After the user enters the query, we use natural language processing to understand the user query. Then, the intent of user and activity to be performed are recognized. News data from web sources, context like location, query etc. are taken, relevant activity is performed and a response is generated to the user. If user has any additional queries, they are fulfilled and once no further queries remain, the conversation ends and user exits the chatbot.

The Fig. 5 shows a mockup of the design of the web app for desktop. There is a chat window in the bottom right to interact with the bot via text. User can chat with the bot as though they are chatting with a friend, and ask questions about what kind of news articles they would like to be shown. There are links to News Sections at the top for quick access. Options to change user settings and login are included in the Menu button at the top right corner.

It also shows a sample chat flow that a   user will have with the chatbot. The conversation flow and experience is just like chatting with a friend.
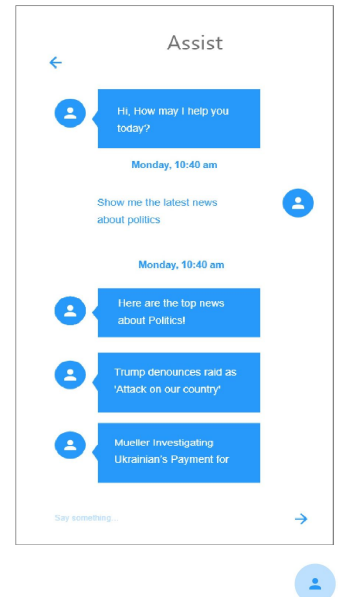
Fig 5. Webpage Wireframe

VI. FUTURE SCOPE

In future, we can enhance our project by adding the following features:

- Ability to provide suggestions based on Contextual Awareness of location, time of day, trending stories etc.
- Augmented Reality features like providing content like news, social media profiles etc. overlaid on the entities captured using smartphone camera
- Have a virtual 3D avatar for reading out the latest news

Scope:

A. Every Business Is Going to Have a Bot

Messaging apps are growing fast. Facebook Messenger for example is used by over 1 billion people every month and it is growing faster than Facebook.

If messaging apps become the number one way people communicate, then every business is going to need a way to engage on these platforms.

There are two ways businesses can talk to people on messaging apps:

1. The business sets up something similar to a call center where real people are chatting online all day long. This isn't cost effective and 99% of businesses can never do this.
2. The business uses a computer to talk to everyone. The computer can respond instantly, can communicate with any number of people simultaneously, and it's incredibly cost effective. These computers are called bots.

B. Bots Will Be Faster Than Websites and Mobile Apps

Bots aren't that smart yet. They don't understand everything you are saying, they can't teach themselves, and to be honest right now bots are more similar to lightweight apps than artificially intelligent personalities.

Imagine a world where the experience of talking to a business via a bot is at least just as good as using its website or mobile app. In this situation people will choose to talk to the bot rather than go to the website or use the mobile app.

Why people will choose to talk to the bot:

1. It can take seconds, or even up to a minute, to load a website. Bots load instantly. As long as two products are comparable in value, people will always use the one that loads fastest. In this case, that would be the bot.
2. Mobile apps need to be downloaded. They take up valuable real estate on your phone and they take time to download. Bots don't need to be downloaded. You just send them a message and you're using it.

C. Bots Will Be Easier to Use Than Any Other Technology Ever Created.

Every website and mobile app is designed with a visual interface. Buttons, text, images, and so on. Not every website and mobile app is designed the same. This means that users constantly have to learn new visual interfaces in order to use your favorite products.

Language is the most natural interface humans understand, and that's the interface that bots use. Instead of needing to constantly learn visual interfaces, bots will enable us to naturally use language, the first interface we were ever taught. In the near future bots will be able to understand users completely.

If users were going to plan a trip today they would go to a travel website. They would browse, find hotels, figure out which ones are in the right area, where the restaurants are, etc. They would have to mentally keep track of everything while figuring out what you want to do.

Now imagine that instead of scrolling through the website yourself, users could actually talk to the travel website via a bot, and it would understand everything you say perfectly. This is going to be one of the biggest shifts in how people interact with computers.

In the future, talking to a bot will be like talking to a real person who has instant access to entire databases of information and can process your thoughts and desires instantly.

VII. CONCLUSION

The authors have implemented a conversational news assistant that accepts voice & text as input; gives out responses in the form of speech, text, images, web links etc. The web application provides news alerts, recommendations of news, topics of likely interest & value to users, while increasing user engagement.

This system addresses the major shortcomings of current paradigms of news consumption, and provides a solution to solve the issues. It also provides an evaluation of the effectiveness of the paradigm of using conversational speech/text virtual agents to augment existing content consumption/delivery, and hopefully replace current systems in the near future.

VIII. REFERENCES

[1] Matt Schlicht (2016, April 20). *The Complete Beginner's Guide to Chatbots*. Retrieved from https://chatbotsmagazine.com/