CLASP

COVID-19 LITERATURE ANALYSIS AND SUMMARISATION PLATFORM

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1.INTRODUCTION

1.1 MOTIVATION

Since the advent of the pandemic, the number of research papers written about it, analysing its various aspects have shot up exponentially. As the world strives to create a vaccine, it is not possible to take into account every ounce of the data available, in its original, vast form. A lot of useful data remains unattended.

The wildfire-like spread of the coronavirus has raised millions of questions worldwide. Panic rises as the sources of data become more unreliable each passing day.

The fact that no technology in 2020 was able to accurately predict the global impact of this virus has led to its unprecedented spread and irrevocable damage to life and economy worldwide.

1.2 SOLUTION

A tool that summarises the sea of data available down to its most essential, key features is crucial. We can ensure that scientists have every fact to help develop the vaccine.

We provide a solution where the user can enter his/her query and have a research paper answer it, instead of a news tabloid or any other unverified source of data. This diffuses the surge in panic considerably.

We track the healthcare spend among other parameters and generate an alert in places where this becomes out of the ordinary. Our solution thus

alerts the scientists across the globe to any anomalous behaviour that may lead to the type of grave crisis we are facing today.

1.3 OVERVIEW

The project is a web application that connects the user to 3 key functionalities - text summariser, Q & A model, a search engine specifically for research papers on COVID-19, and an anomaly detection map.

The text summariser summarises the file and the result is rendered on screen for the user.

The text summarisation makes use of unsupervised learning and summarises the document by identifying the key points using TextRank which generates context.

The user can upload the file (screenshot, .doc, etc.) he wishes to summarise on our website.

To answer the user's query pertaining to the medical impacts of the coronavirus a Q&A model has been created. The user enters his/her query onto our website and we respond with the concise, appropriate answer to the query. Along with the answer, for further reference of the user the document that was referred to for the response is also rendered. This satisfies the need of the user when he wishes to look deeper into the response.

News about this pandemic is scattered all across the world wide web. Our platform provides a one stop solution for users across the globe to look at the medical and research updates on COVID-19. We compile the

most reliable sources of information from across the internet and display them one click away.

The anomaly detection lays out the status of the entire world in the form of a map. The locations showing abnormal behaviour with respect to parameters like GDP, money spent on healthcare, etc. are highlighted with a red spot. This alerts the users to the possible advent of incidents in those places.

1.4 SCOPE

- ➔Easy access to concise data which will catalyse the process of development of a vaccine.
- ➔Reduction of panic in the users worldwide by answering their questions using biologically correct context.
- ➔Prevention of future pandemics by alerting the appropriate personnel to anomalous changes.
- ➔Enable one click access to research news scattered across the internet on COVID-19.

1.5 FEATURES

- ➔Simple, responsive and engaging user interface.
- ➔Summarisation of lengthy research articles to their useful key points.
- ➔Easy availability of correct answers for questions on research on COVID-19.
- ➔One spot access to global research updates regarding the pandemic.
- ➔Clear visualisation of anomalous behaviour using anomaly map.
- ➔Application runs smoothly across all devices (Mobile phone, Desktop, Laptop etc.)

➔The login and register feature unlocks the ability of the user to view the previously searched queries, questions and generated summaries.

1.6 REFERENCES:

➔Unsupervised Text Summarization Using Sentence Embeddings :

This research paper explains the process of text summarization using unsupervised methods. It is done by clustering sentence embeddings trained to embed paraphrases near each other.

➔Application and analysis of text summarization for biomedical domain content :

In this research paper, the approach is to implement and analyse abstractive and extractive text summarization machine learning models for general language as well as biomedical domain-specific text. For abstractive text summarization, a sequence-to-sequence model that utilizes recurrent neural networks (RNNs) for biomedical text summarization. For extractive text summarization, a pretrained BERT model is used.

➔Supervised Machine Learning for Extractive Query Based Summarisation of Biomedical Data :

This paper explores the impact of several supervised machine learning approaches for extracting multi-document summaries for given queries. It compares classification and regression approaches for query-based extractive summarisation using data provided by the BioASQ Challenge.

➔Information Retrieval as Statistical Translation :

This paper proposes a new probabilistic approach to information retrieval based upon the ideas of statistical machine translation. The main approach is a statistical model on how a document can be translated into a query.

➔ 1 Statistical Language Modeling For Information Retrieval Xiaoyong Liu and W. Bruce Croft Center for Intelligent Information Ret :

This paper reviews research and applications in statistical language modelling for information retrieval (IR) that has emerged within the past several years as a new probabilistic framework for describing information retrieval processes.

➔Unsupervised Question Answering by Cloze Translation :

This research paper explores to what extent high quality training data is actually required for Extractive QA, and investigates the possibility of unsupervised Extractive QA. This problem is approached by first learning to generate context, question and answer triplets in an unsupervised manner, which we then use to synthesize Extractive QA training data automatically.

➔(PDF) A review on anomaly detection in disease outbreak detection :

Gives a brief description about detection of pandemic like anomalies using AI

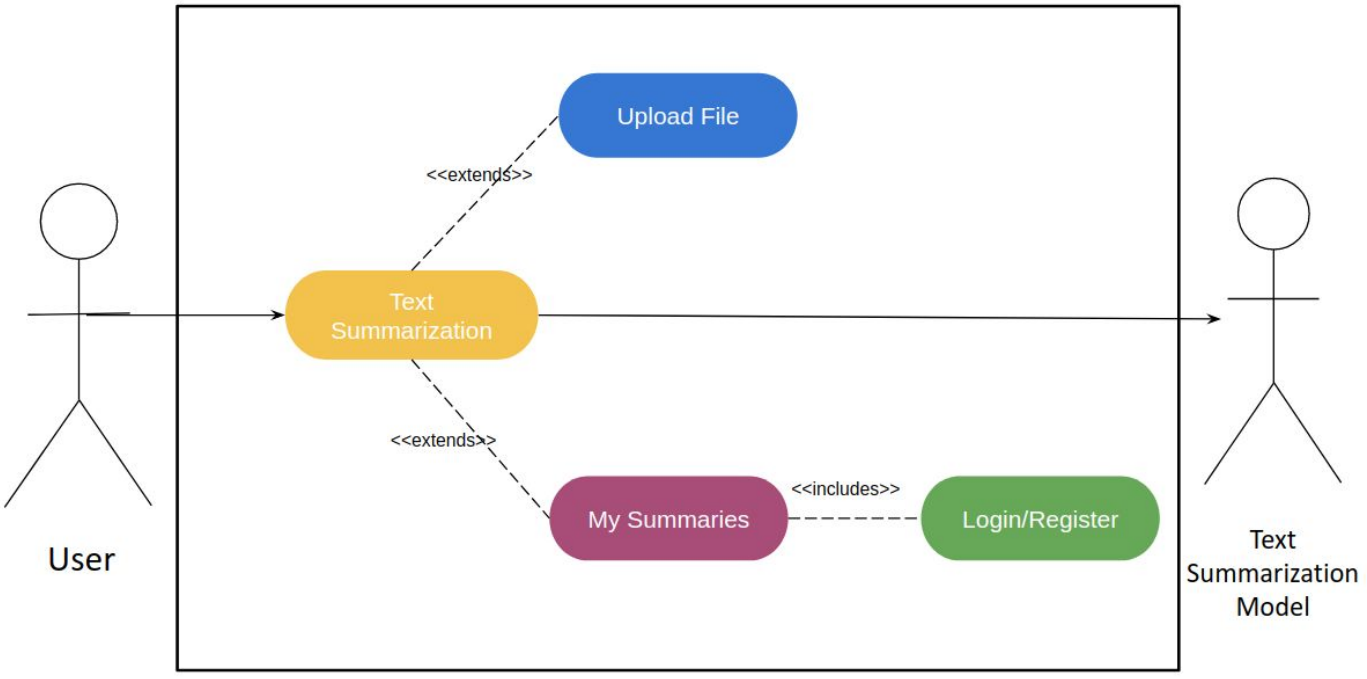
➔[1810.04805] BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding :

The paper explores the architecture of the current State Of The Art Language Representation Model - BERT

2. USE CASE

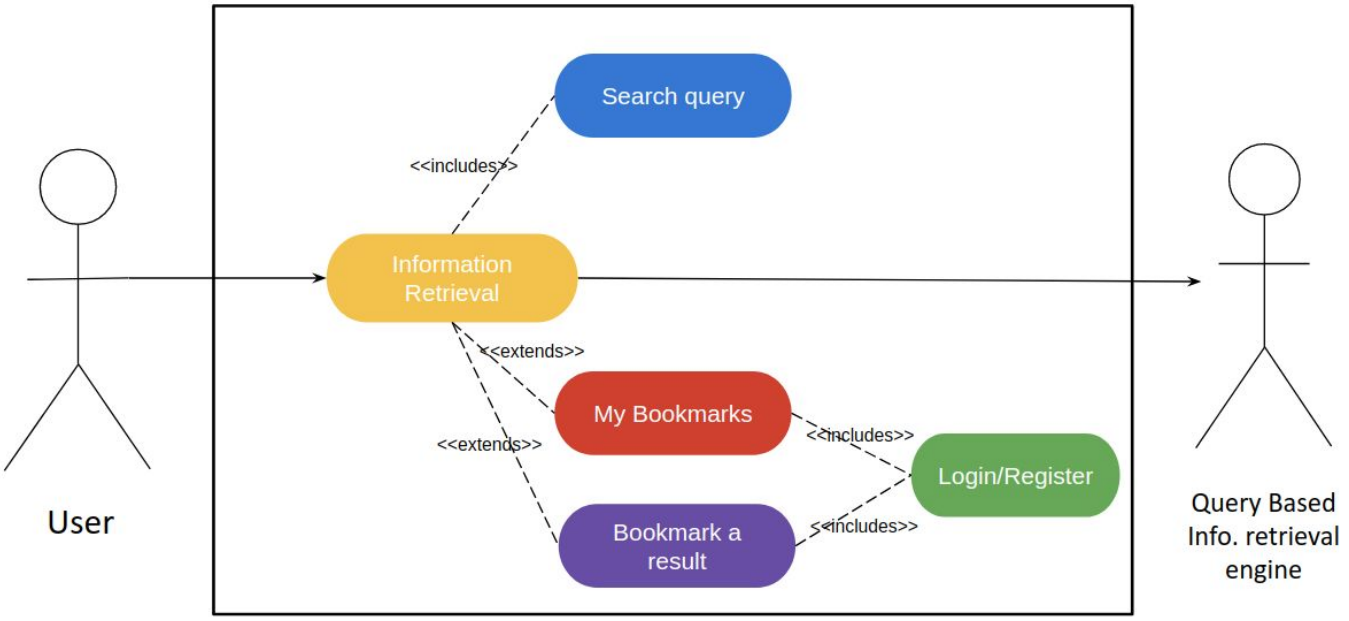
2.1 USER AND TEXT SUMMARIZATION

1. The user can upload any file of type .txt, .docx or an image file consisting of text to be summarized.
2. The summary of the paper and the link to navigate to it will be generated and displayed on screen. At this link, the user can view or download the summary in pdf format.
3. If the user is logged in, the summaries are stored automatically in the 'My summaries' section, where the user can view or delete these summaries.



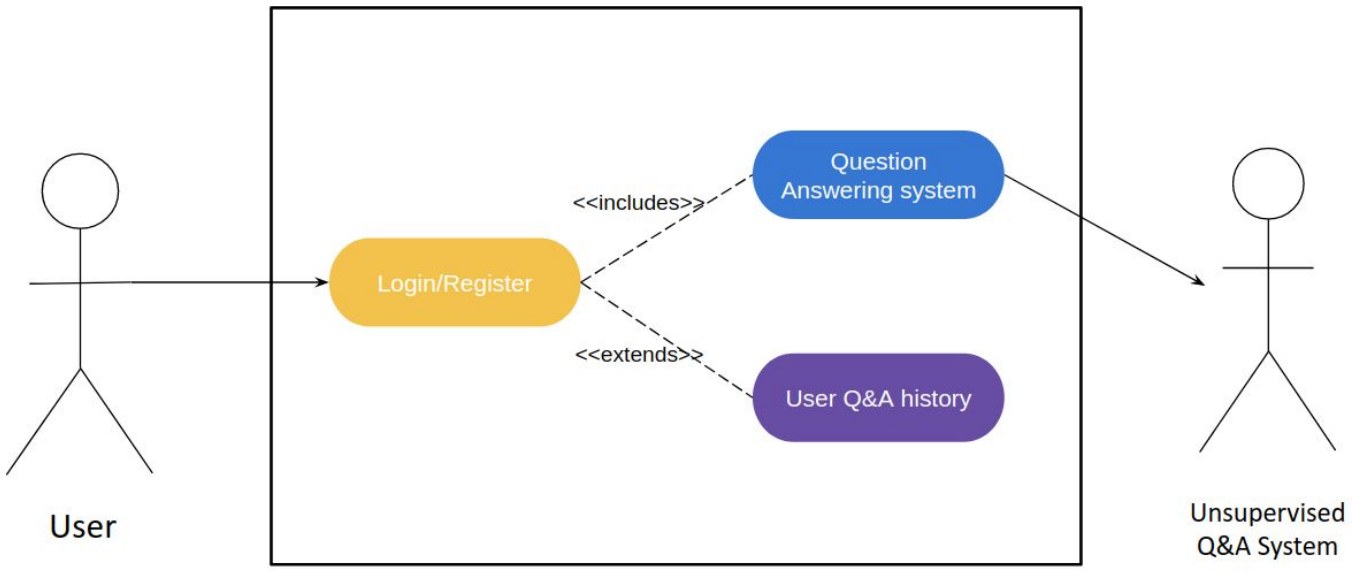
2.2 USER AND INFORMATION RETRIEVAL

1. The user can search for a research paper by its title or its author's name.
2. A list of 20 results is generated with results relevant to the user's query. The user can open any of these by clicking on the title or the body of the result card.
3. The user can also bookmark these results by logging in or signing up, and view or delete these bookmarks in the 'My Bookmarks' section.



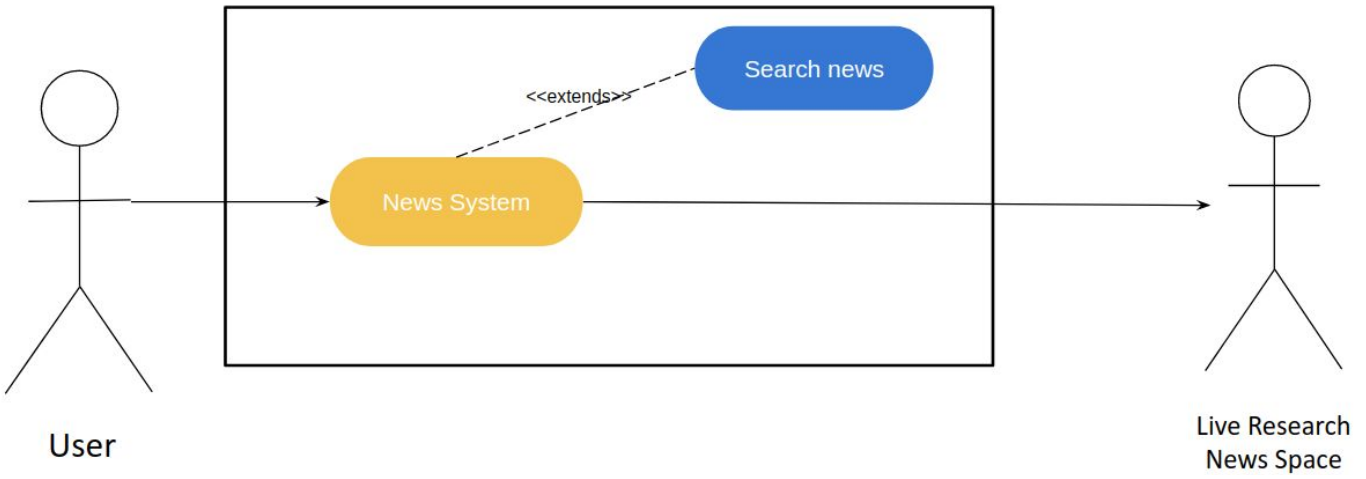
2.3 USER AND Q & A MODEL

1. Users have to login or sign up to use this feature.
2. Users can input a question and an answer will be given along with the paragraph from where the answer was extracted as well as the title of the research paper consisting of that paragraph.
3. All the data is stored in the database for future reference and can be accessed in the My Questions section of the website.



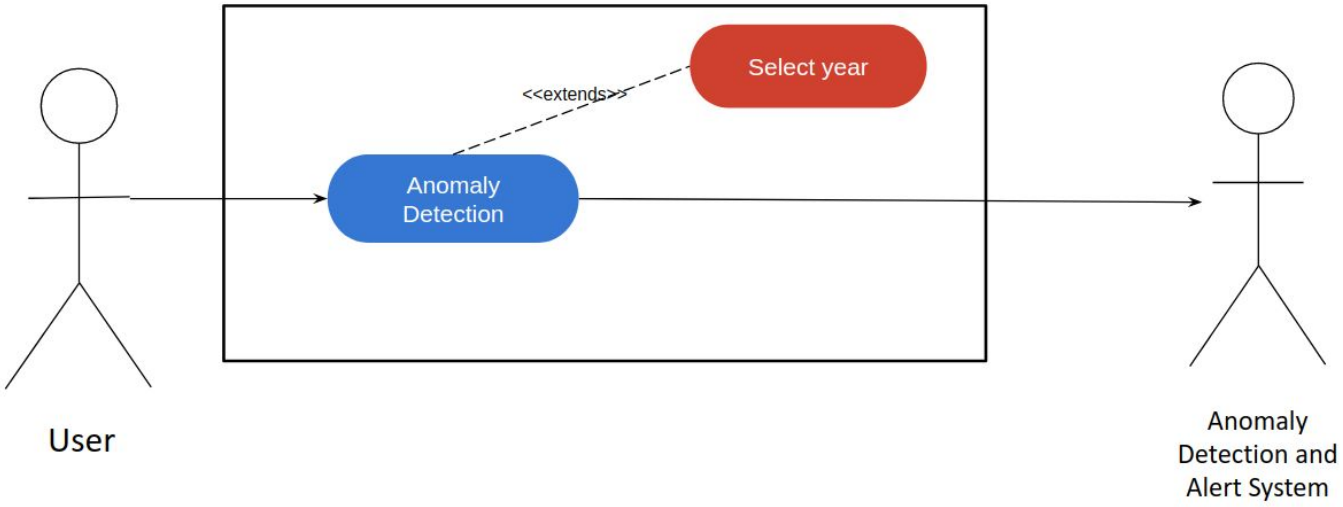
2.4 USER AND NEWS SYSTEM

1. This is the homepage of the website where real time news headlines are displayed.
2. Users can click on the headline to access the entire news articles.
3. An option to search a query to get specific news articles is also provided.

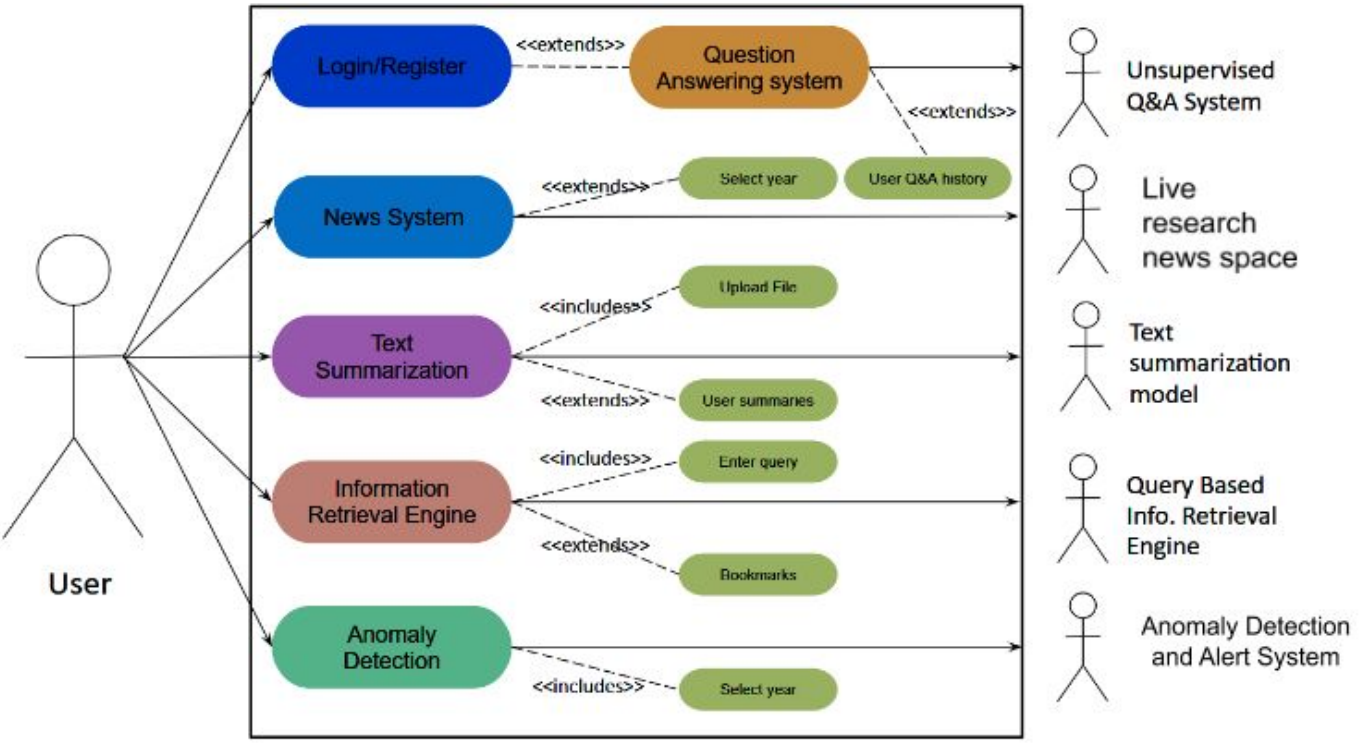


2.5 USER AND ANOMALY DETECTION

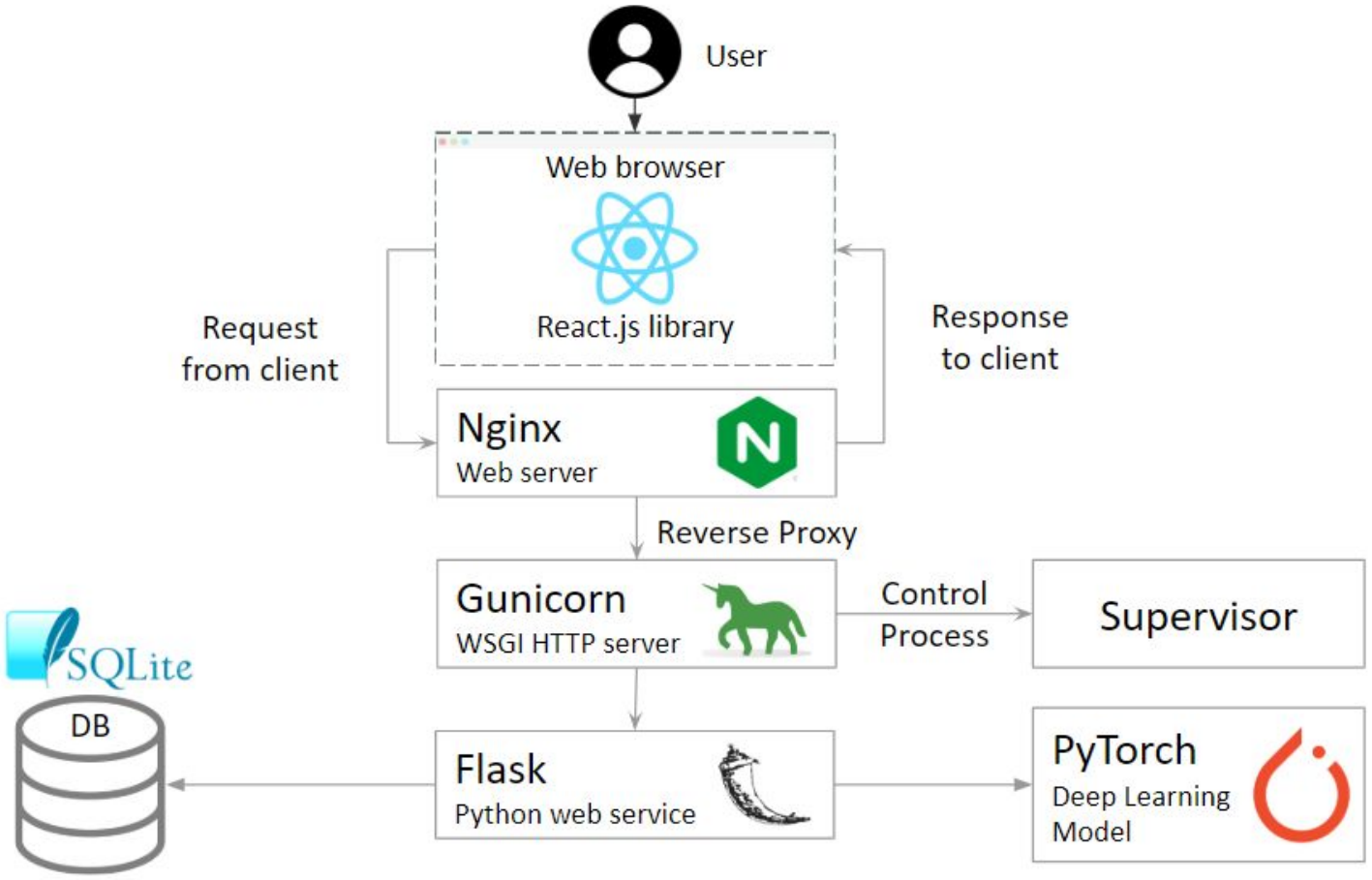
1. Anomaly detection makes use of statistical trend analysis for more than 180 countries all around the world to detect abnormal behaviour with respect to parameters like GDP and Total Amount of Health Care Spend.
2. Users can get a visual representation on the world map for this feature.
3. Additionally, users can select a year in which they want to analyse anomalies



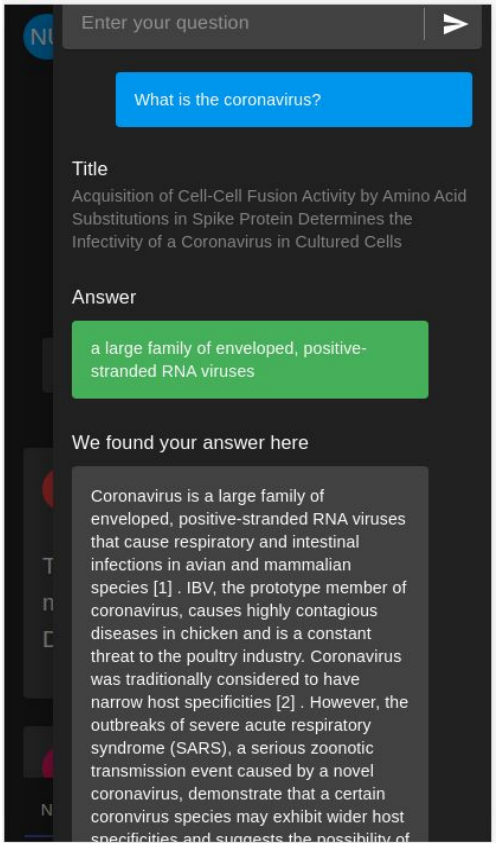
2.6 COMPLETE USE CASE

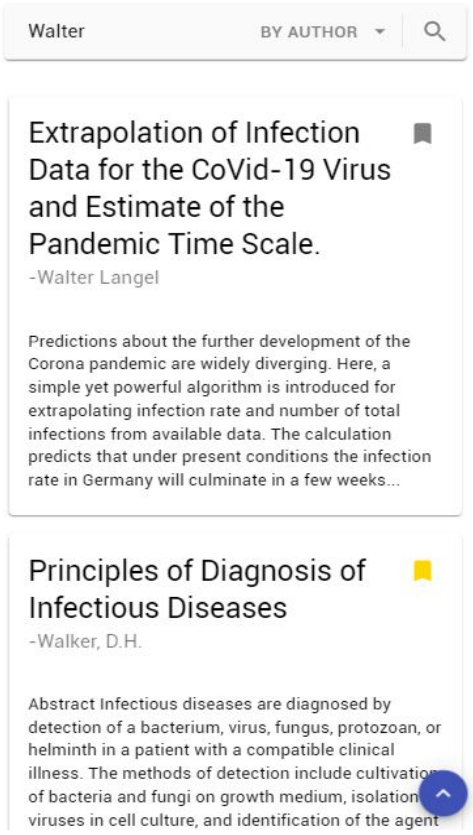


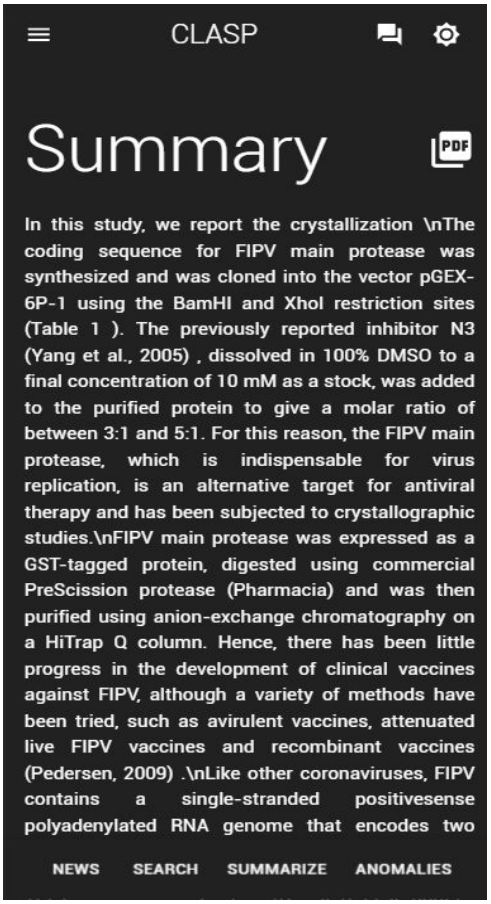
3. DATA FLOW

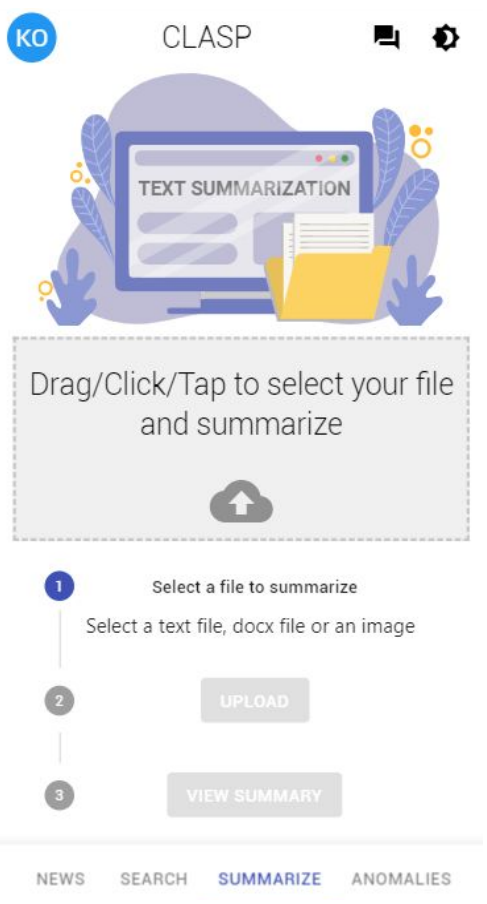

User
Web browser
React.js library
Request
from client
Response
to client
Nginx
Web server
Reverse Proxy
Gunicorn
WSGI HTTP server
Control
Process
Supervisor
SQLite
DB
Flask
Python web service
PyTorch
Deep Learning
Model

4. USER INTERFACE









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My Bookmarks

Search

Title	Author	Actions
The past and present of malaria diagnosis	Walker, John	
Discoveries in Molecular Genetics with the Adenovirus 12 System: Integration of Viral DNA and Epigenetic Consequences	Doerfler, Walter	
Human Adenovirus Type 12: Crossing Species Barriers to Immortalize the Viral Genome	Doerfler, Walter	
7 Lung Infections	McCullough, Ann E.; Leslie, Kevin O.	
Gene Modulation for Treating Liver Fibrosis	Cheng, Kun; Mahato, Ram I.	
Gene therapy for cystic fibrosis lung disease	Sumner-Jones, Stephanie G.; Gill, Deborah R.; Hyde, Stephen C.	
Virology	Boland, G. J.	
Viral Infections of the Lung	Zaki, Sherif R.; Paddock, Christopher D.	

CLASP NEWS SEARCH SUMMARIZE ANOMALIES

Search for news

A AS 3 minutes ago
Coronavirus India live updates: cases, deaths and news, today

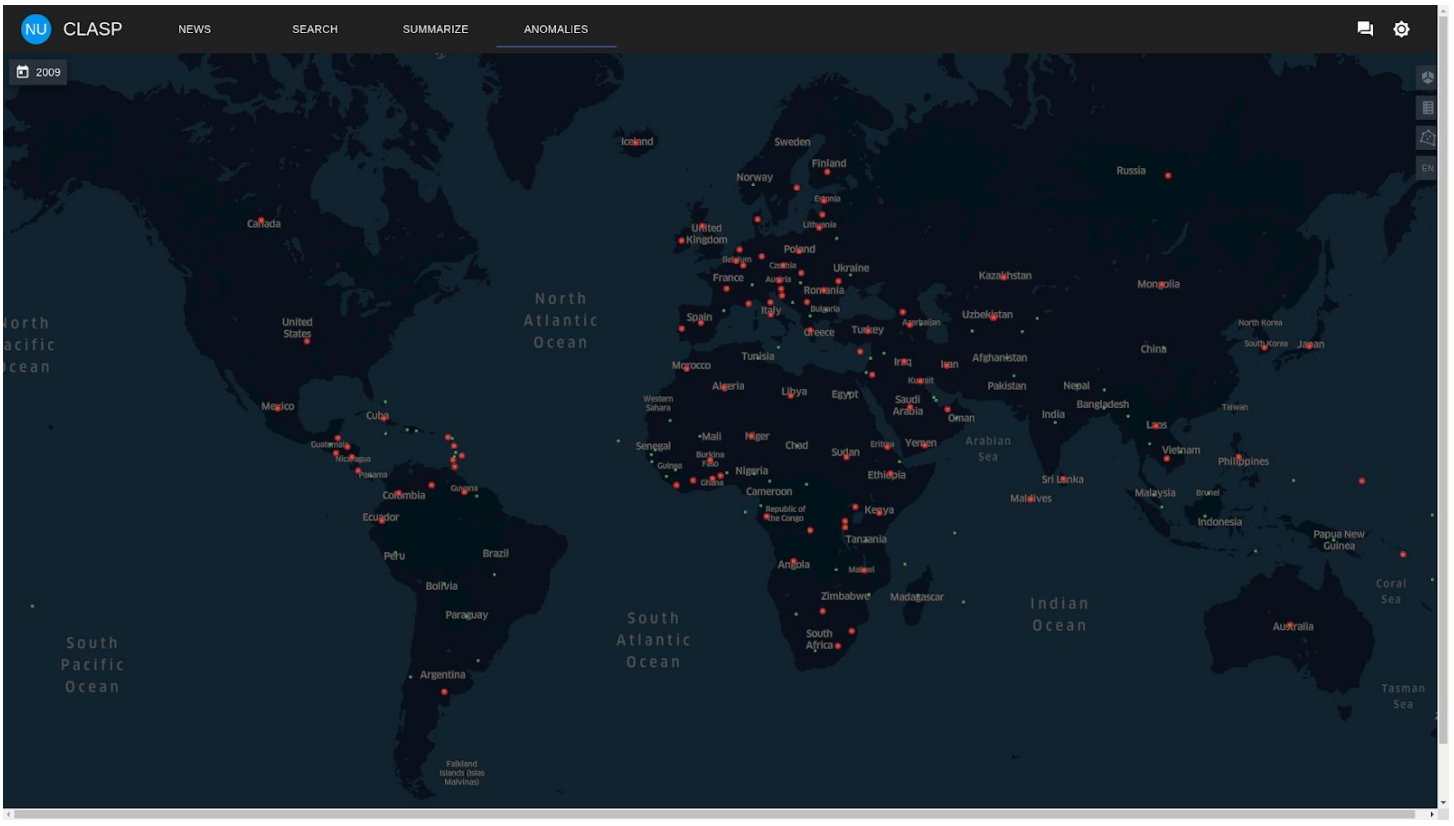
ToI Times of India 10 minutes ago
SOPs revised for flights to bring Indians home

ToI Times of India 10 minutes ago
After wreaking havoc in Rajastan and MP, locusts attack UP

ToI Times of India 38 minutes ago
Domestic flights from today: Only asymtomatic passengers can fly, govt says

AJE Al Jazeera English 55 minutes ago
Chile's hospitals under strain as cases near 70,000: Live updates

IT India Today 1 hour ago
Coronavirus LIVE Updates: States release guidelines for resumption of domestic flights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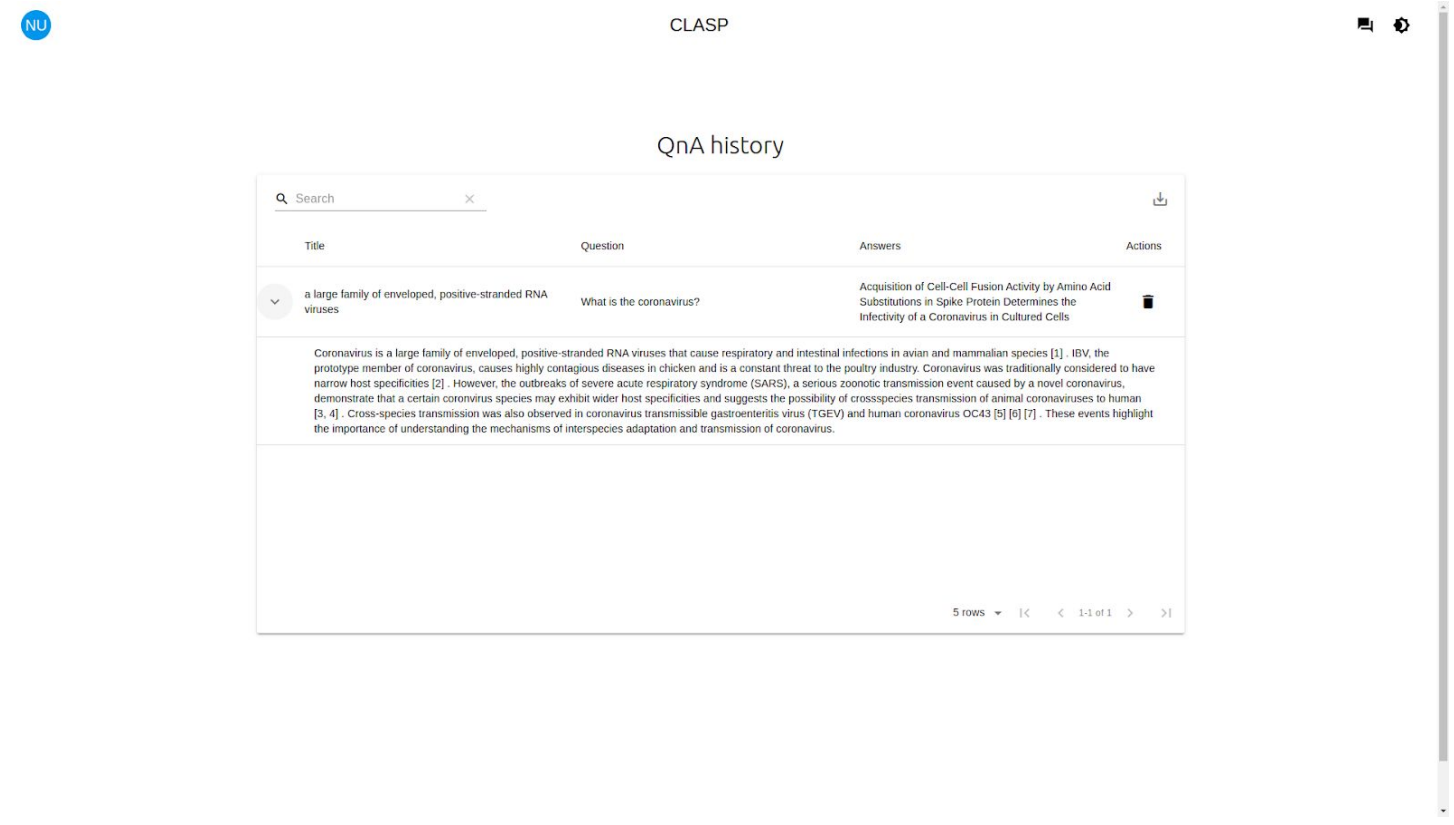
NEWS
SEARCH
SUMMARIZE
ANOMALIES
2009
Iceland
Sweden
Finland
Norway
Russia
Canada
United Kingdom
Poland
Ukraine
France
Kazakhstan
Mongolia
Romania
Spain
Italy
Uzbekistan
North Atlantic Ocean
United States
Greece
Turkey
China
North Korea
South Korea
Japan
Morocco
Tunisia
Afghanistan
Algeria
Libya
Egypt
Pakistan
Nepal
Saudi Arabia
Bangladesh
India
Taiwan
Laos
Mexico
Cuba
Oman
Mali
Niger
Chad
Sudan
Yemen
Arabian Sea
Vietnam
Philippines
Senegal
Nigeria
Ethiopia
Sri Lanka
Malaysia
Brunei
Cameroon
Maldives
Kenya
Indonesia
Colombia
Ecuador
Tanzania
Papua New Guinea
Peru
Brazil
Angola
Coral Sea
Bolivia
Zimbabwe
Madagascar
Indian Ocean
Paraguay
South Atlantic Ocean
South Africa
Australia
South Pacific Ocean
Argentina
Tasman Sea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QnA history
Search
Title
Question
Answers
Actions
a large family of enveloped, positive-stranded RNA viruses
What is the coronavirus?
Acquisition of Cell-Cell Fusion Activity by Amino Acid Substitutions in Spike Protein Determines the Infectivity of a Coronavirus in Cultured Cells
Coronavirus is a large family of enveloped, positive-stranded RNA viruses that cause respiratory and intestinal infections in avian and mammalian species [1] . IBV, the prototype member of coronavirus, causes highly contagious diseases in chicken and is a constant threat to the poultry industry. Coronavirus was traditionally considered to have narrow host specificities [2] . However, the outbreaks of severe acute respiratory syndrome (SARS), a serious zoonotic transmission event caused by a novel coronavirus, demonstrate that a certain coronvirus species may exhibit wider host specificities and suggests the possibility of crossspecies transmission of animal coronaviruses to human [3, 4] . Cross-species transmission was also observed in coronavirus transmissible gastroenteritis virus (TGEV) and human coronavirus OC43 [5] [6] [7] . These events highlight the importance of understanding the mechanisms of interspecies adaptation and transmission of coronavirus.
5 rows
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5. TECH STACK


PyTorch
TensorFlow
NLTK
spaCy
NGINX
Port of F5
gunicorn
kepler.gl
SQLite
Flask
React
Redux
tesseract.js
MATERIAL-UI
Azure