Automated Literature Review Generation using NLP Techniques & Retrieval Augmented Generation utilizing LLM
Group B-13

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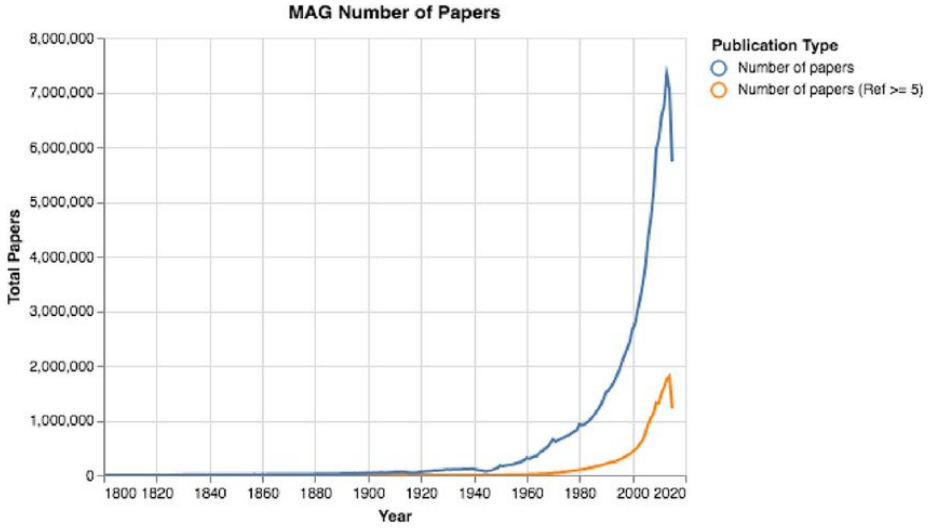
Outline of Presentation

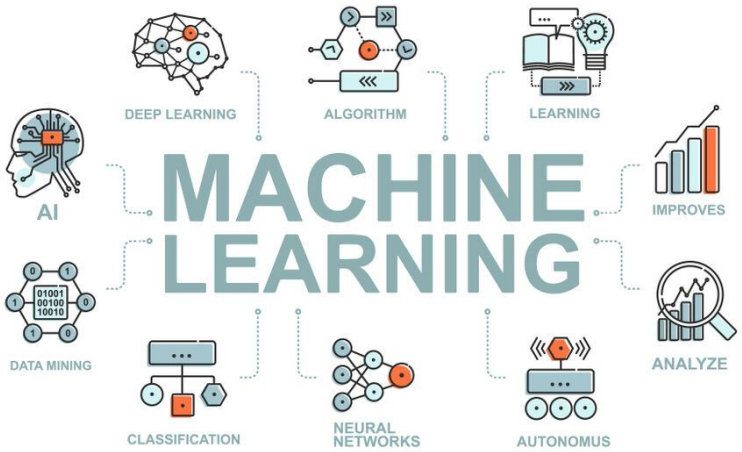
- Introduction
- Related Work
- Problem Statement
- Objectives
- Methodology
- Results
- Impact
- Conclusion

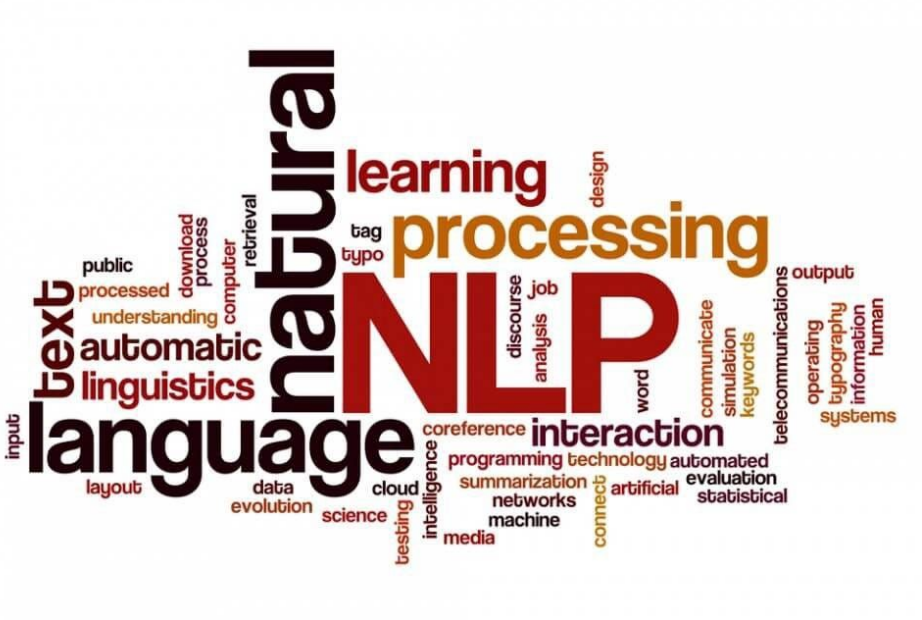
Introduction

- The number of research papers are increasing exponentially
- Now there are more than 2 million research papers having more than 5 references



Introduction





Related Work

Reference	Paper Name	Methodology	Result	Limitations
[1]	A roadmap towards the automatic composition of systematic literature reviews	Proposed a framework for automate systematic literature reviews possibility of automating Systematic Literature Reviews.	Presented an action plan that can serve as a reference for AI researchers	Lack of practical assessment in different areas of knowledge
[2]	Can We Automate Scientific Reviewing	Explores the use of machine learning techniques, natural language generation, multi-document summarization, and multi-objective optimization for automating scientific reviewing.	The models used in this research are not yet fully capable of automating Literature Reviews and it requires human reviewers.	Limited discussion on the practical implementation and validation of the proposed techniques
[3]	Tool Support for Systematic Literature Reviews Analyzing Existing Solutions and the Potential for Automation	Discusses the preparation stage of a systematic review, synthesizing data, re-checking literature, meta-analysis, and writing up the review.	The results from the feature analysis showed that there are existing tools that support certain features but an overall support is still limited.	Limited discussion on the challenges faced in implementing the proposed framework

Related Work

Reference	Paper Name	Methodology	Result	Limitations
[4]	Machine learning techniques for the automation of literature reviews and systematic reviews in EFSA	Focuses on the use of machine learning techniques for the automation of literature reviews and systematic reviews	Pros and Cons of different MLTs are discussed and the process of automating the Literature review is elaborately discussed.	Lack of detailed analysis on the limitations of the automation procedures presented
[5]	Towards an Integrative Approach for Automated Literature Reviews Using Machine Learning	An artifact based on the word2vec algorithm, LDA topic modeling, rapid automatic keyword extraction, and agglomerative hierarchical clustering.	The model is particularly suitable for capturing the topic of clusters without looking directly into each paper in detail.	Limited discussion on the practical application and validation of machine learning techniques in different domains. Lack of in-depth analysis on the limitations of the feature analysis conducted

Problem Statement

- Reviewing each paper is a **time-consuming** task that requires the expertise of subject matter specialists.
- Delivering top-notch reviews for the **increasing volume of papers** poses a significant challenge.
- Most studies are focused on the **process and possibility of automating literature reviews** using different Machine Learning Techniques only.

Objectives

- To develop a system to automatically generate the Literature Review segment of a research paper by using only PDF and DOI of the related papers as input.
- To compare results between various Natural Language Processing approaches such as:

    1. **Transformer** - SimpleT5 model
    2. **Frequency based approach -** spaCy Library
    3. **Large Language Model -** GPT-3.5-TURBO-0125

Dataset

Datasets: allenai / scitldr | like 20 | Dataset card | Viewer | Files and versions | Community 2

Subset (3): FullText · 3.23k rows

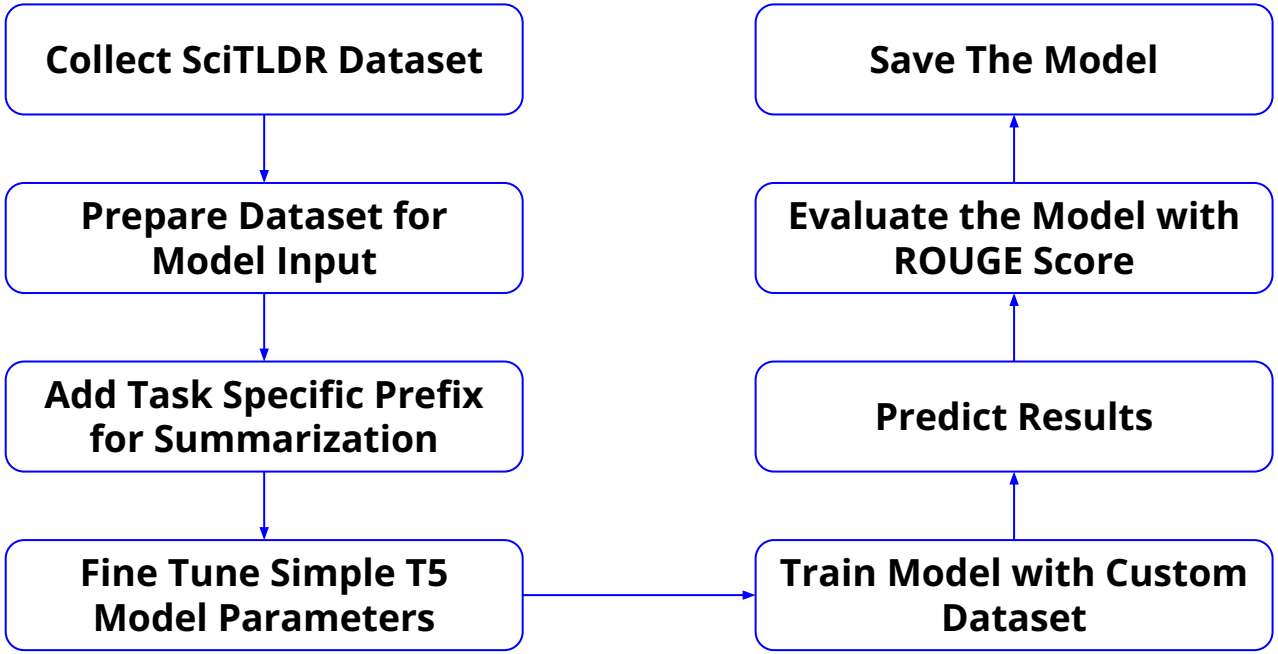
Split (3): train · 1.99k rows

Search this dataset

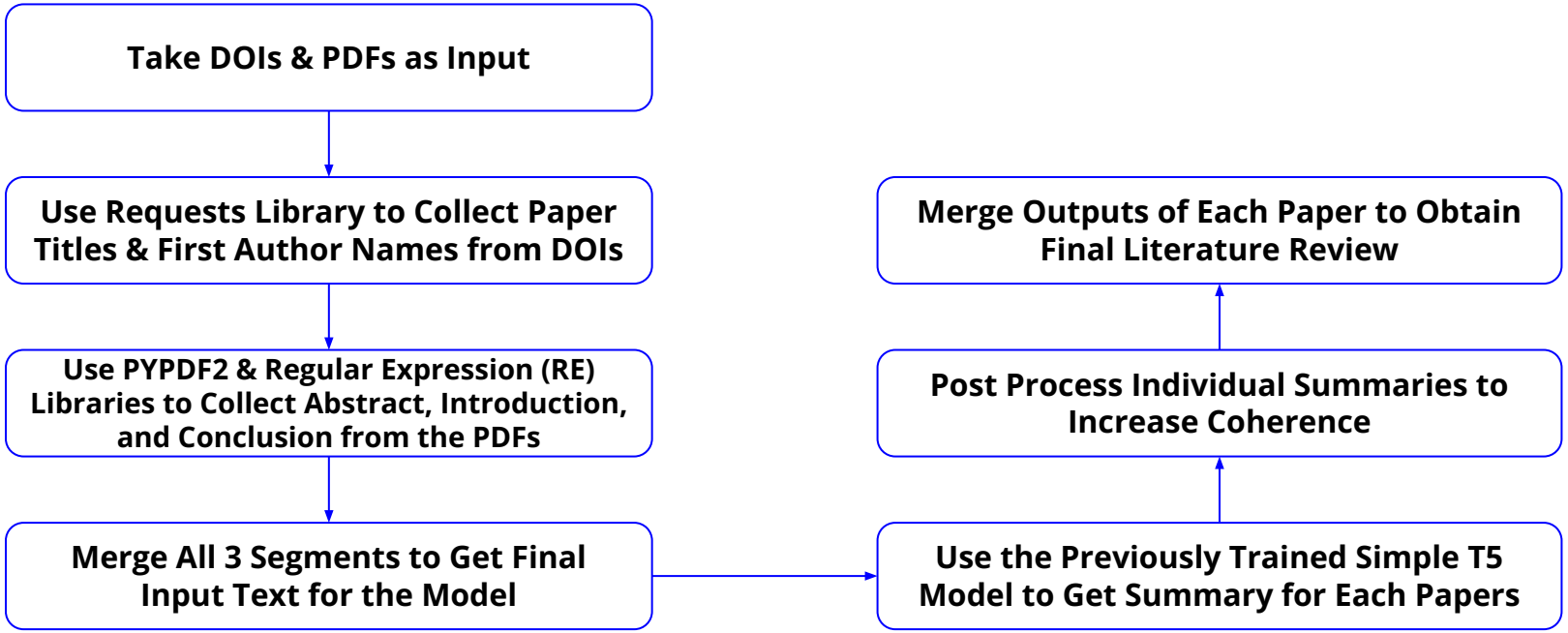
source sequence	source_labels sequence	rouge_scores sequence	paper_id string · *lengths* (9–11)	target sequence
["Due to the success of deep learning to solving a variety of challenging machine learning tasks,…	[0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…	[0.30188679695129395, 0.3720930218696594, 0.6037735939025879, 0.5714285373687744,…	SysEexbRb	["We provide necessary and sufficient analytical forms for the critical points o…
["The backpropagation (BP) algorithm is often thought to be biologically implausible in the…	[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…	[0, 0, 0.1304347813129425, 0.1428571343421936, 0, 0.11764705181121826,…	SygvZ209F7	["Biologically plausible learning algorithms, particularly sign-symmetry,…
["We introduce the 2-simplicial Transformer, an extension of the Transformer which includes a form…	[0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…	[0.3333333432674408, 0.8888888955116272, 0.11428570747375488, 0, 0.2692307531833648 7…	rkecJ6VFvr	["We introduce the 2-simplicial Transformer and show that this architectur…
["We present Tensor-Train RNN (TT-RNN), a novel family of neural sequence architectures for…	[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…	[0.06666666269302368, 0.06451612710952759, 0.060606054961681366, 0.13793103396892548,…	HJJ0w--0W	["Accurate forecasting over very long time horizons using tensor-train RNNs"]
["Recent efforts on combining deep models with probabilistic graphical models are promising in…	[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…	[0.277777761220932, 0.5714285373687744, 0.0952380895614624, 0.34285715222358704, 0,…	HyH9lbZAW	["We propose a variational message-passing algorithm for models that contain both the…

Methodology I: Using Transformer: T5

Training of Transformer Model



Pipeline using Transformer Model



Transformer (CODE)

```
[ ]  model = SimpleT5()
     model.from_pretrained(model_type="t5", model_name="t5-base")
```

```
INFO:pytorch_lightning.utilities.seed:Global seed set to 42
Downloading: 100% 773k/773k [00:00<00:00, 1.90MB/s]
Downloading: 100% 1.32M/1.32M [00:00<00:00, 40.2MB/s]
Downloading: 100% 1.18k/1.18k [00:00<00:00, 98.2kB/s]
Downloading: 100% 850M/850M [00:10<00:00, 85.7MB/s]
```

```
[ ]  model.train(train_df=dftrain,
                 eval_df=dfval,
                 outputdir="/content/drive/MyDrive/Colab Notebooks",
                 batch_size=16, max_epochs=6,
                 source_max_token_len=512,
                 target_max_token_len=256,
                 use_gpu=True)
```

```
INFO:pytorch_lightning.utilities.distributed:GPU available: True, used: True
INFO:pytorch_lightning.utilities.distributed:TPU available: False, using: 0 TPU cores
INFO:pytorch_lightning.utilities.distributed:IPU available: False, using: 0 IPUs
INFO:pytorch_lightning.accelerators.gpu:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
WARNING:pytorch_lightning.loggers.tensorboard:Missing logger folder: /content/lightning_logs
INFO:pytorch_lightning.callbacks.model_summary:
  | Name  | Type                       | Params
-----------------------------------------------------
0 | model | T5ForConditionalGeneration | 222 M
-----------------------------------------------------
222 M     Trainable params
0         Non-trainable params
222 M     Total params
891.614   Total estimated model params size (MB)


/usr/local/lib/python3.10/dist-packages/pytorch_lightning/trainer/data_loading.py:132: UserWarning: The dataloader, val_dataloader 0, does not have many workers which may be a bottleneck. Consider increasing
  rank_zero_warn(
INFO:pytorch_lightning.utilities.seed:Global seed set to 42
/usr/local/lib/python3.10/dist-packages/pytorch_lightning/trainer/data_loading.py:132: UserWarning: The dataloader, train_dataloader, does not have many workers which may be a bottleneck. Consider increasing
  rank_zero_warn(
Epoch 5: 100% 164/164 [01:48<00:00, 1.50it/s, loss=1.35, v_num=0, train_loss_step=1.100, val_loss_step=2.790, val_loss_epoch
```

Results

Input Research Papers:

1. AI-IoT based Healthcare Prognosis Interactive System
2. An AI-Based Medical Chatbot Model for Infectious Disease Prediction
3. A wearable-based posture recognition system with AI-assisted approach for healthcare IoT
4. Present and Future of AI-IoT-Based Healthcare Services for Senior Citizens in Local Communities: A Review of a South Korean Government Digital Healthcare Initiatives
5. IoT Based AI and its Implementations in Industries

Results (continued)

```
[ ] serial=1
    first=main_function(serial,title1,first_author1,abstract1,introduction1,conclusion1)
    print(first)

    In the article presented by Reddy et al. [1], An AI-IoT Based Healthcare Prognosis Interactive System (HPIS) is proposed. The system provides around-the-clock virtual healthcare, reduce the workload of doctors and improve medication adherence.

[ ] serial=serial+1
    second=main_function(serial,title2,first_author2,abstract2,introduction2,conclusion2)
    second

    'In the article [2], Chakraborty et al. presented AI-Based Medical Chatbot Model for Infectious Disease Prediction help of arti cial intelligence and machine learning systems to interact with users through voice commands, communication, or text-based messages.
    '

[ ] serial=serial+1
    third=main_function(serial,title3,first_author3,abstract3,introduction3,conclusion3)
    third

    'In the article presented by Hong et al. [3], propose a collaborative AI-IoT-based solution, a wearable-based human posture recognition system, namely, WMHPR, which applies multi-posture recognition (MPR) and an online algorithm (Cascade-AdaBoostingCART) to id
    entify human posture more accurately. '

[ ] serial=serial+1
    fourth=main_function(serial,title4,first_author4,abstract4,introduction4,conclusion4)
    fourth

    'In the article presented by Kim et al. [4], This paper outlines the mid-to-long-term development strategies for this style of South Korean digital healthcare initiatives. '

[ ] serial=serial+1
    fifth=main_function(serial,title5,first_author5,abstract5,introduction5,conclusion5)
    print(fifth)

    In the article [5], El-Gendy et al. presented IoT-Based Industrial Automation. a general overview of IoT and AI integration worldwide. Presents an overview of IoT and AI integration in industrial automation and robotics. Discusses an application of IoT-Based I

    merged=first+second+third+fourth+fifth
    merged

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    [2], Chakraborty et al. presented AI-Based Medical Chatbot Model for Infectious Disease Prediction help of arti cial intelligence and machine learning systems to interact with users through voice commands, communication, or text-based messages. In the article
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    Automation. a general overview of IoT and AI integration worldwide. Presents an overview of IoT and AI integration in industrial automation and robotics. Discusses an application of IoT-Based Industrial Automation. —An overview of IoT and AI integration worldw
    ide. <'
```

Results (continued)

Final Output:

In the article presented by Reddy et al. [1], An AI-IoT Based Healthcare Prognosis Interactive System (HPIS) is proposed. The system provides around-the-clock virtual healthcare, reduce the workload of doctors and improve medication adherence. In the article [2], Chakraborty et al. presented AI-Based Medical Chatbot Model for Infectious Disease Prediction help of arti cial intelligence and machine learning systems to interact with users through voice commands, communication, or text-based messages. In the article presented by Hong et al. [3], propose a collaborative AI-IoT-based solution, a wearable-based human posture recognition system, namely, WMHPR, which applies multi-posture recognition (MPR) and an online algorithm (Cascade-AdaBoostingCART) to identify human posture more accurately. In the article presented by Kim et al. [4], This paper outlines the mid-to-long-term development strategies for this style of South Korean digital healthcare initiatives. In the article [5], El-Gendy et al. presented IoT-Based Industrial Automation. a general overview of IoT and AI integration worldwide. Presents an overview of IoT and AI integration in industrial automation and robotics. Discusses an application of IoT-Based Industrial Automation. —An overview of IoT and AI integration worldwide.

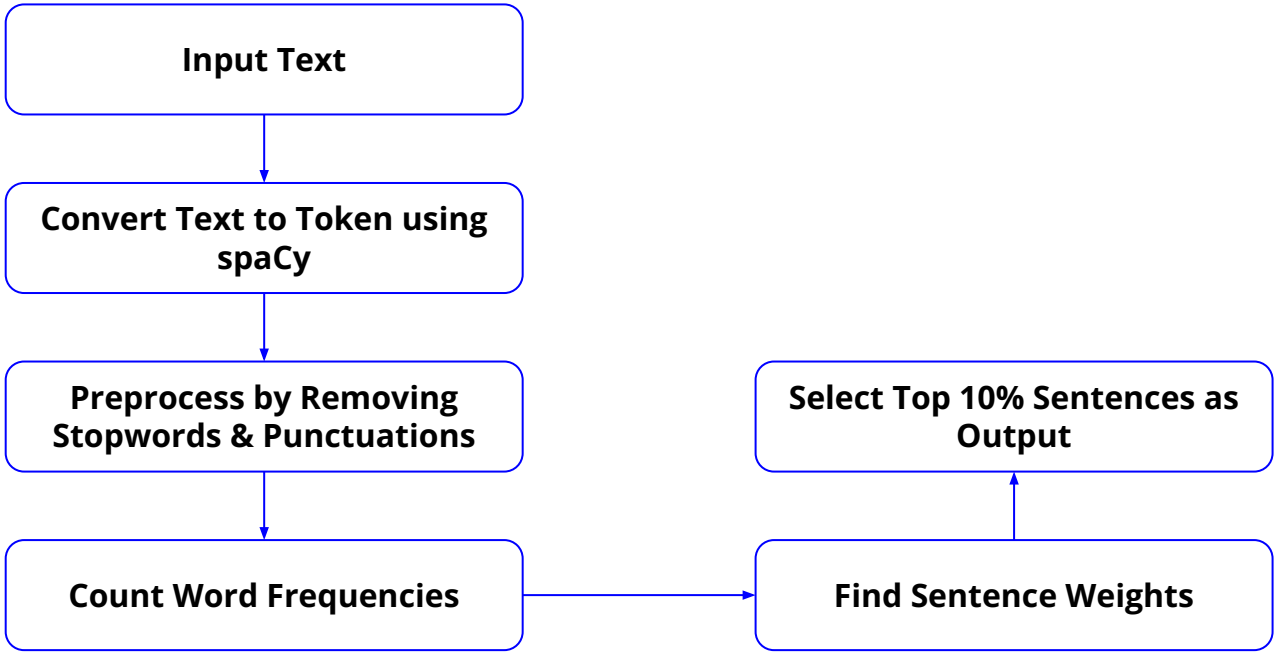
Evaluation on Test Dataset

ROUGE-1	0.268
ROUGE-2	0.115
ROUGE-L	0.204
ROUGE-L SUM	0.204

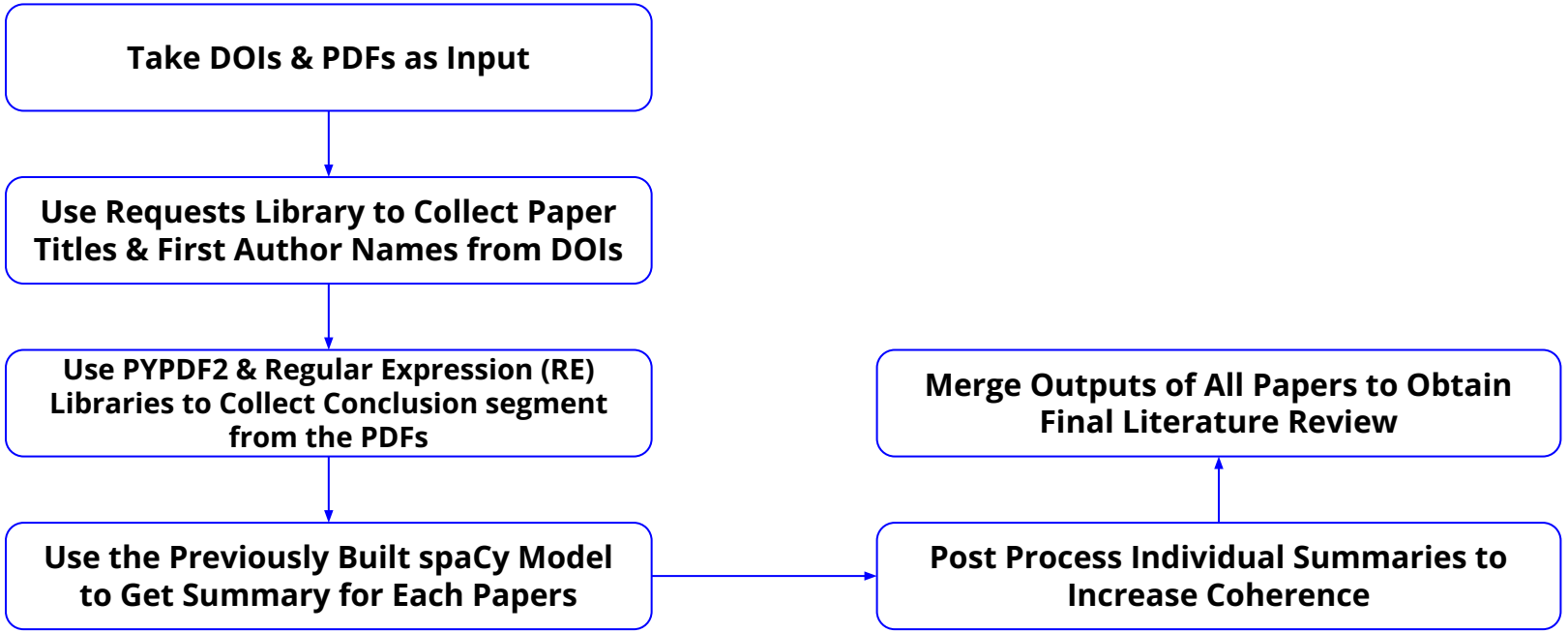
Note: ROUGE-1 score of 0.25 or higher is considered acceptable for scientific papers.

Methodology II: Using Frequency Based Approach: spaCy

Building spaCy Model



Pipeline using spaCy



spaCy (CODE)

```
[ ]  def predict(text):
       import spacy
       nlp = spacy.load('en_core_web_sm')
       doc = nlp(text)
       from spacy.lang.en.stop_words import STOP_WORDS
       stopwords = list(STOP_WORDS)
       from string import punctuation
       punctuation = punctuation + '\n'

       wordfreq = {}
       for word in doc:
         if word.text.lower() not in stopwords:
           if word.text.lower() not in punctuation:
             if word.text not in wordfreq.keys():
               wordfreq[word.text] = 1
             else:
               wordfreq[word.text] += 1
       for word in wordfreq.keys():
         wordfreq[word] = wordfreq[word]/max(wordfreq.values())

       senttokens = [i for i in doc.sents]

       sentweight = {}
       for sent in senttokens:
         for word in sent:
           if word.text.lower() in wordfreq.keys():
             if sent not in sentweight.keys():
               sentweight[sent] = wordfreq[word.text.lower()]
             else:
               sentweight[sent] += wordfreq[word.text.lower()]

       from heapq import nlargest
       sizee=int(len(senttokens)*0.1)
       summ=nlargest(sizee, sentweight, key=sentweight.get)

       spacy_res = [word.text for word in summ]

       spacy_result = ' '.join(spacy_res)
       return spacy_result
```

Results

Input Research Papers:

1. AI-IoT based Healthcare Prognosis Interactive System
2. An AI-Based Medical Chatbot Model for Infectious Disease Prediction
3. A wearable-based posture recognition system with AI-assisted approach for healthcare IoT
4. Present and Future of AI-IoT-Based Healthcare Services for Senior Citizens in Local Communities: A Review of a South Korean Government Digital Healthcare Initiatives
5. IoT Based AI and its Implementations in Industries

Results (continued)

```
serial=1
first=main_function(serial,title1,first_author1,abstract1,introduction1,conclusion1)
first
```

```
'In the article presented by Reddy et al. [1], The system can handle personalised medical requests, book appointments with doctors, provide patients a preliminary diagnosis and acts as a symptom checker thus providing the user with an enhanced quality and quantitative outlook. '
```

```
serial=serial+1
second=main_function(serial,title2,first_author2,abstract2,introduction2,conclusion2)
second
```

```
'In the article presented by Chakraborty et al. [2], This bot offers medical-related information like doctor's contact details, address of nearby hospitals, contact details for getting an oxygen cylinder, about the disease its symptoms, its prevalence, diagnosis, and its treatment procedures.
'
```

```
serial=serial+1
third=main_function(serial,title3,first_author3,abstract3,introduction3,conclusion3)
third
```

```
'In the article presented by Hong et al. [3], The main points are needed to consider as follows: 1) How to maintain and improve the accuracy and efficiency of recognition algorithms if they reduce the number of sensors (e.g., FSR) while considering the hardware cost. '
```

```
serial=serial+1
fourth=main_function(serial,title4,first_author4,abstract4,introduction4,conclusion4)
fourth
```

```
'In the article presented by Kim et al. [4], In the local community, a mixed service approach combining face-to-face and non-face-to-face services can increase the participation and utilization rates of public health management services and, furthermore, provide high-quality services by collab
orating with the welfare sector.'
```

```
serial=serial+1
fifth=main_function(serial,title5,first_author5,abstract5,introduction5,conclusion5)
fifth
```

```
'In the article presented by El-Gendy et al. [5], IoT enables the successful management of the facility management, monitoring production flow, inventory control, logistics, supply chain management and robotic operations in industrial / robotic automation. '
```

```
merged=first+second+third+fourth+fifth
merged
```

```
'In the article presented by Reddy et al. [1], The system can handle personalised medical requests, book appointments with doctors, provide patients a preliminary diagnosis and acts as a symptom checker thus providing the user with an enhanced quality and quantitative outlook. In the article p
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```

Results (continued)

Final Output:

In the article presented by Reddy et al. [1], The system can handle personalised medical requests, book appointments with doctors, provide patients a preliminary diagnosis and acts as a symptom checker thus providing the user with an enhanced quality and quantitative outlook. In the article presented by Chakraborty et al. [2], This bot offers medical-related information like doctor's contact details, address of nearby hospitals, contact details for getting an oxygen cylinder, about the disease its symptoms, its prevalence, diagnosis, and its treatment procedures. In the article presented by Hong et al. [3], The main points are needed to consider as follows: 1) How to maintain and improve the accuracy and efficiency of recognition algorithms if they reduce the number of sensors (e.g., FSR) while considering the hardware cost. In the article presented by Kim et al. [4], In the local community, a mixed service approach combining face-to-face and non-face-to-face services can increase the participation and utilization rates of public health management services and, furthermore, provide high-quality services by collaborating with the welfare sector.In the article presented by El-Gendy et al. [5], IoT enables the successful management of the facility management, monitoring production flow, inventory control, logistics, supply chain management and robotic operations in industrial / robotic automation.

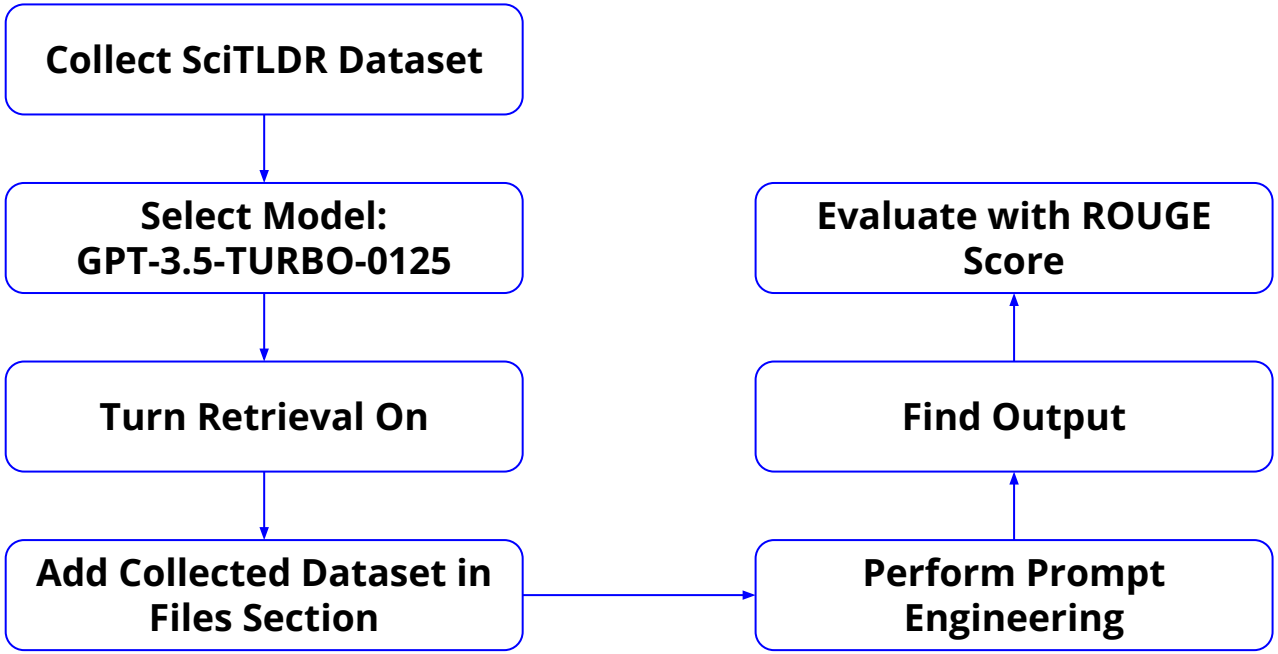
Evaluation on Test Dataset

ROUGE-1	0.257
ROUGE-2	0.055
ROUGE-L	0.144
ROUGE-L SUM	0.146

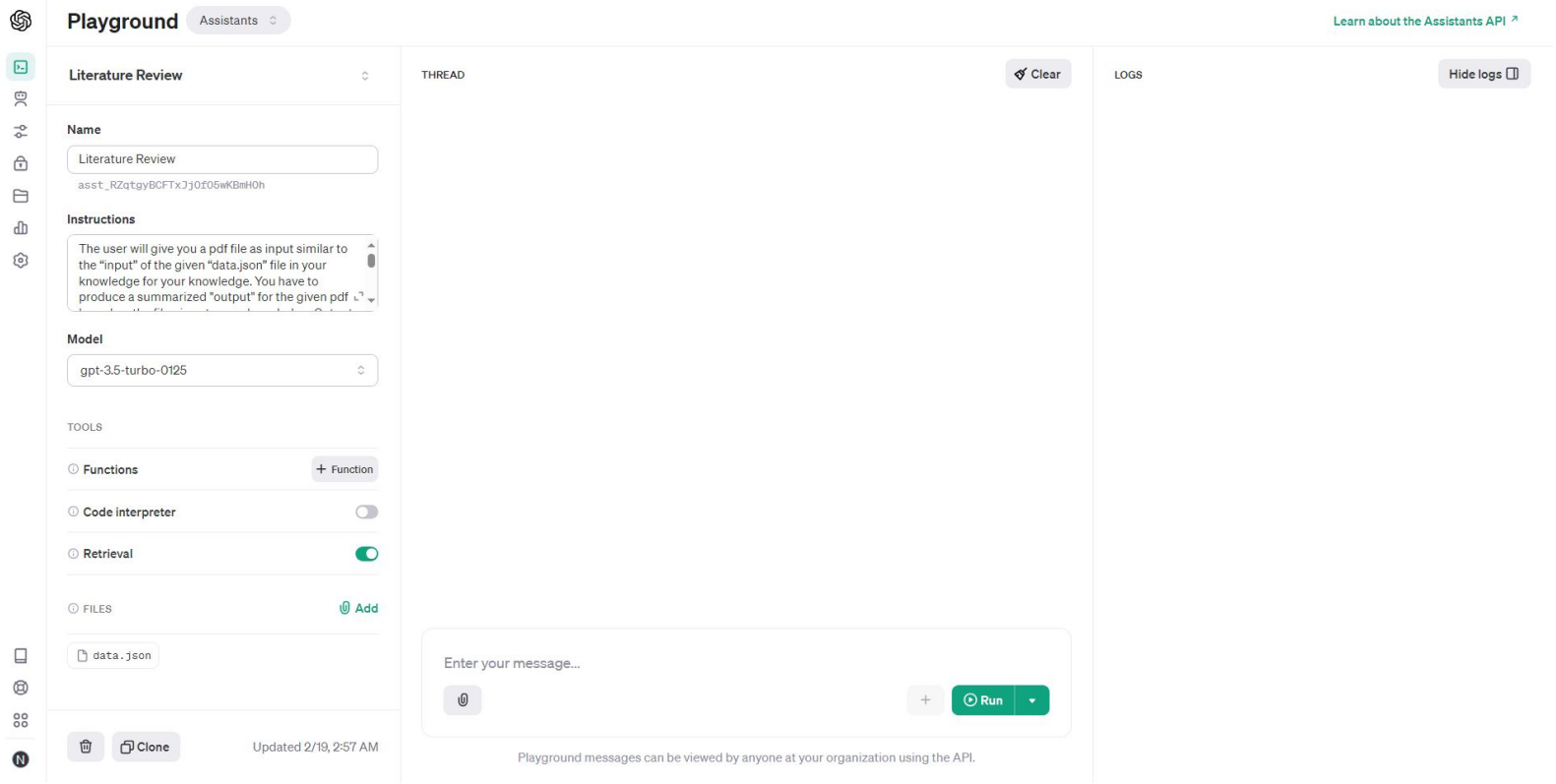
Note: ROUGE-1 score of 0.25 or higher is considered acceptable for scientific papers.

Methodology III: Using Large Language Model: GPT-3.5-TURBO-0125

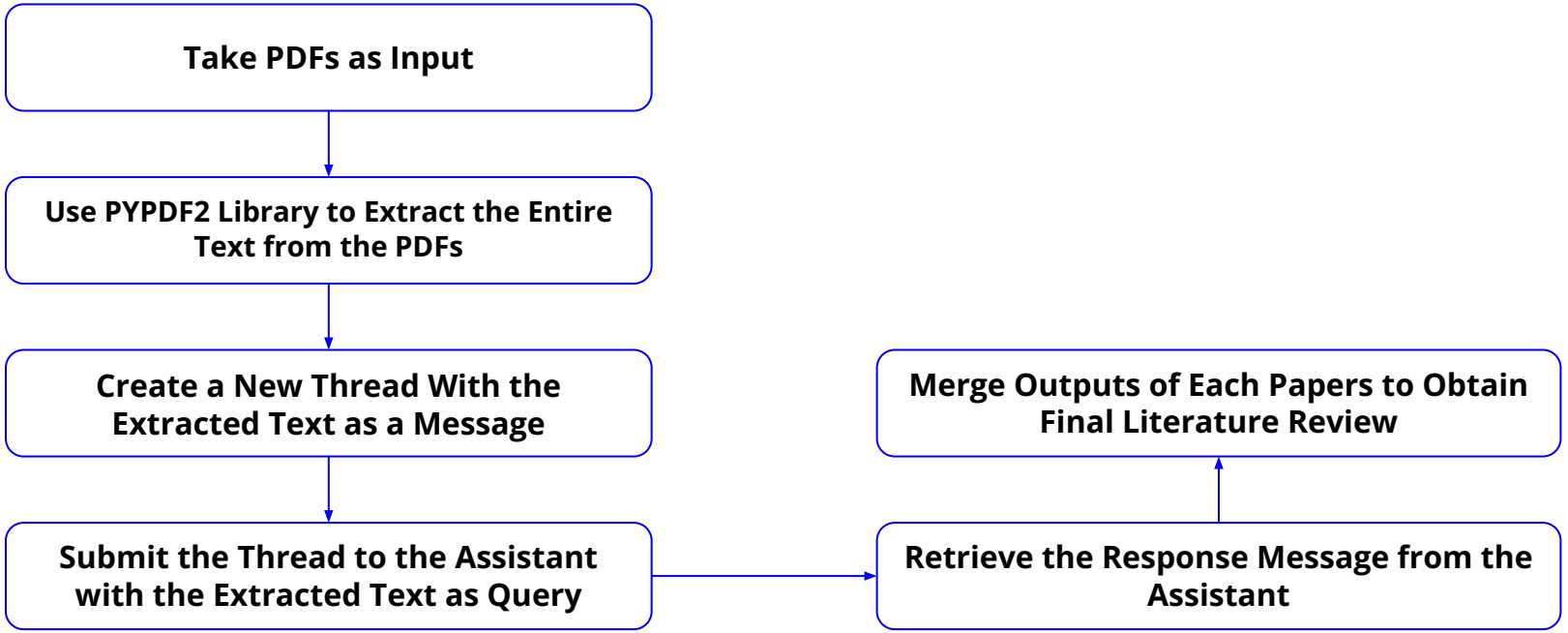
Creation of Custom OpenAI Assistant



Creation of Custom OpenAI Assistant



Pipeline using LLM

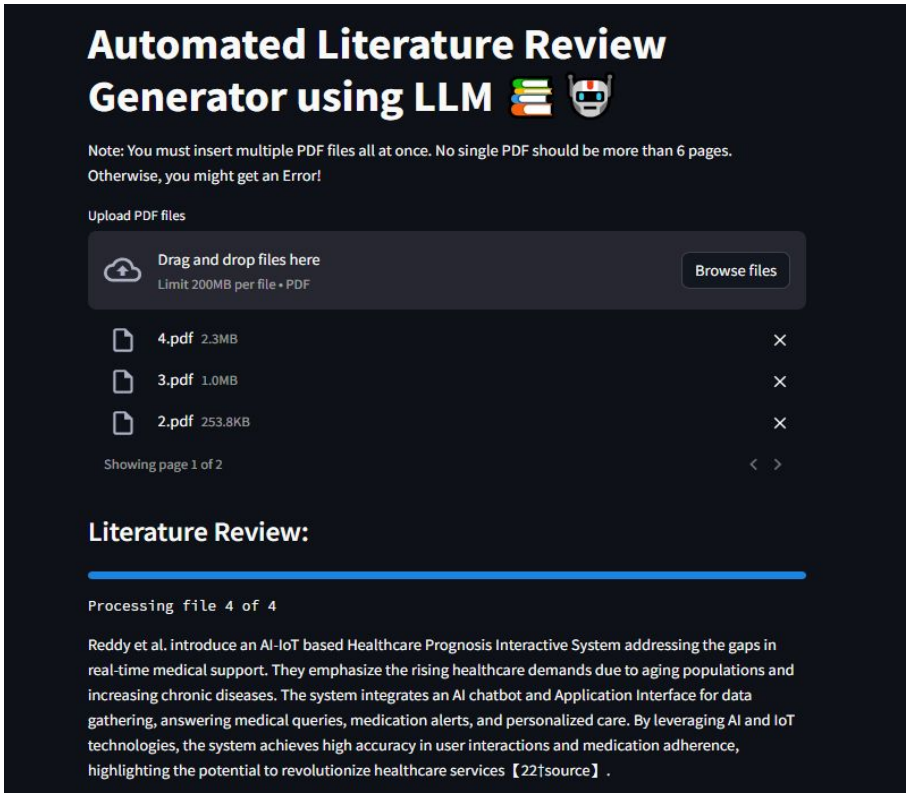


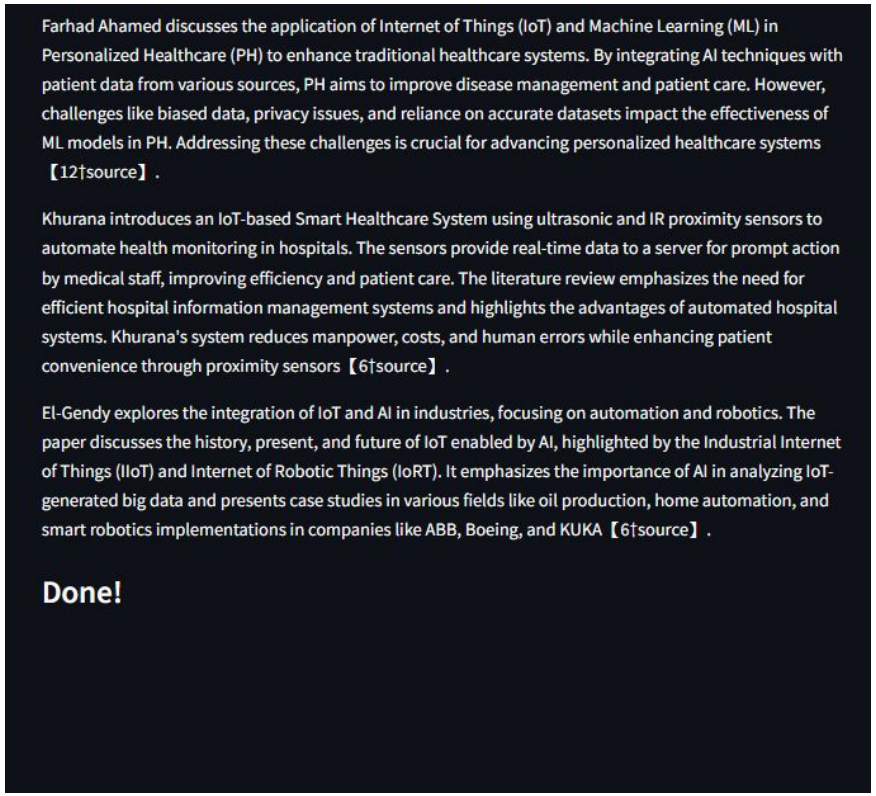
LLM (CODE)

```python
import streamlit as st
from PyPDF2 import PdfReader
from io import BytesIO

def summarize_llm(text):
    import time
    from openai import OpenAI

    ASSISTANT_ID = "asst_RZqtgyBCFTxJjOf05wKBmHOh"
    client = OpenAI(api_key="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")

    #Create a thread with a message.
    thread = client.beta.threads.create(
        messages=[
            {
                "role": "user",
                #Update this with the query you want to use.
                "content": text,
            }
        ]
    )

    #Submit the thread to the assistant.
    run = client.beta.threads.runs.create(thread_id=thread.id, assistant_id=ASSISTANT_ID)
    print(f"👉 Run Created: {run.id}")

    #Wait for run to complete.
    while run.status != "completed":
        run = client.beta.threads.runs.retrieve(thread_id=thread.id, run_id=run.id)
        print(f"🏃 Run Status: {run.status}")
        time.sleep(1)
    else:
        print(f"🏁 Run Completed!")

    #Get the latest message from the thread.
    message_response = client.beta.threads.messages.list(thread_id=thread.id)
    messages = message_response.data

    #Return the latest message.
    latest_message = messages[0]
    return latest_message.content[0].text.value
```

```python
def extract_text_from_pdf(file):
    pdf_reader = PdfReader(file)
    text = ""
    for page in pdf_reader.pages:
        text += page.extract_text()
    return text


#Streamlit app
def main():
    st.title("Automated Literature Review Generator using LLM 📚🤖")
    st.write(
        "Note: You must insert multiple PDF files all at once. No single PDF should be more than 6 pages."
    )

    #Upload multiple PDF files
    uploaded_files = st.file_uploader(
        "Upload PDF files", type="pdf", accept_multiple_files=True
    )

    #Processing uploaded files and generating summaries
    if uploaded_files:
        st.subheader("Literature Review:")
        total_files = len(uploaded_files)
        progress_bar = st.progress(0)
        for i, uploaded_file in enumerate(uploaded_files):
            if i == 0:
                progress_text = st.empty()
            progress_text.text(f"Processing file {i+1} of {total_files}")

            text = extract_text_from_pdf(uploaded_file)

            summary = summarize_llm(text)
            st.write(summary)
            progress_bar.progress((i + 1) / total_files)
        st.subheader(f"Done!")

if __name__ == "__main__":
    main()
```

User Interface





Results

Input Research Papers:

1. AI-IoT based Healthcare Prognosis Interactive System
2. Applying Internet of Things and Machine-Learning for Personalized Healthcare: Issues and Challenges
3. Improving patients health-care using IoT
4. IoT Based AI and its Implementations in Industries

Results (continued)

Final Output:

Reddy et al. introduce an AI-IoT based Healthcare Prognosis Interactive System addressing the gaps in real-time medical support. They emphasize the rising healthcare demands due to aging populations and increasing chronic diseases. The system integrates an AI chatbot and Application Interface for data gathering, answering medical queries, medication alerts, and personalized care. By leveraging AI and IoT technologies, the system achieves high accuracy in user interactions and medication adherence, highlighting the potential to revolutionize healthcare services【22†source】.

Farhad Ahamed discusses the application of Internet of Things (IoT) and Machine Learning (ML) in Personalized Healthcare (PH) to enhance traditional healthcare systems. By integrating AI techniques with patient data from various sources, PH aims to improve disease management and patient care. However, challenges like biased data, privacy issues, and reliance on accurate datasets impact the effectiveness of ML models in PH. Addressing these challenges is crucial for advancing personalized healthcare systems【12†source】.

Results (continued)

Final Output (continued):

Khurana introduces an IoT-based Smart Healthcare System using ultrasonic and IR proximity sensors to automate health monitoring in hospitals. The sensors provide real-time data to a server for prompt action by medical staff, improving efficiency and patient care. The literature review emphasizes the need for efficient hospital information management systems and highlights the advantages of automated hospital systems. Khurana's system reduces manpower, costs, and human errors while enhancing patient convenience through proximity sensors【6†source】.

El-Gendy explores the integration of IoT and AI in industries, focusing on automation and robotics. The paper discusses the history, present, and future of IoT enabled by AI, highlighted by the Industrial Internet of Things (IIoT) and Internet of Robotic Things (IoRT). It emphasizes the importance of AI in analyzing IoT-generated big data and presents case studies in various fields like oil production, home automation, and smart robotics implementations in companies like ABB, Boeing, and KUKA【6†source】.

Evaluation on Test Dataset

ROUGE-1	0.364
ROUGE-2	0.123
ROUGE-L	0.181
ROUGE-L SUM	0.182

Note: ROUGE-1 score of 0.25 or higher is considered acceptable for scientific papers.

Comparison

	T5	spaCy	GPT-3.5-TURBO-0125
ROUGE-1	0.268	0.257	0.364
ROUGE-2	0.115	0.055	0.123
ROUGE-L	0.204	0.144	0.181
ROUGE-L SUM	0.204	0.146	0.182

Considered Environmental and Sustainability Goals

- **Efficient Resource Utilization**: Optimized cloud computing resources for model training and inference, reducing energy usage.
- **Reduced Reliance on Printing:** Potential to decrease reliance on printing and distributing physical research materials.
- **Thorough Literature Assessments:** Method can perform comprehensive literature assessments on environmental subjects, aiding in the discovery of vital insights and solutions for environmental conservation and sustainable practices.

Considered Social Impacts

- **Fairness and Non-Discrimination:** Ensured approach fairness, avoiding reinforcement of prejudices against marginalized or minority groups.
- **Careful Data Selection:** Meticulously selected training data to prevent the spread of damaging stereotypes or discriminatory language.
- **Accessibility Focus:** Considered system accessibility, aiming for user-friendliness across diverse academic backgrounds.
- **Democratization of Knowledge:** Automation of literature reviews could democratize knowledge distribution, enhancing access to scientific information and aiding the progress of global societies.

Considered Ethical Facts

1. Mitigating biases in NLP models for equitable literature evaluations.
2. Ensuring commitment to privacy and data protection regulations.
3. Ensuring transparency in the process of generating reviews.
4. Ensuring responsibility for automated system decisions.
5. Validating data integrity and ensuring accuracy.
6. Acquiring appropriate permissions for the usage of research papers.
7. Complying with copyright laws and fair use standards.
8. Providing understanding of algorithmic decision-making.
9. Performing ethical evaluations to tackle issues.

Conclusion

Achieved Outcome

1. The system is successful to generate Literature Review segment of a research paper automatically by using only PDF and DOI of the related papers as input.
2. Results of various Natural Language Processing techniques such as Transformer, Frequency based approach and Large Language Model are successfully obtained and compared.

Limitations

1. User must insert both DOIs and PDFs to get results from Transformer and spaCy models.
2. The Transformer model has token limits which limits the size of the output.
3. Only IEEE formatted PDFs can be used to find the important segments of a research paper (Abstract, Introduction, Conclusion) for the Transformer and Frequency based approach pipelines.
4. The Large Language Model based approach can process multiple PDFs of any size but the system that has been developed has some constraints such as PDF number and size.

Future Work

1. More functionality can be added to the Graphical User Interface such as model options, output size and etc.
2. More models such as Bert, Gemini, LLaMA can be utilized for finding better results.
3. The constraints of proposed system can be removed such as PDF size limit and PDF number limit.

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Demo Video

https://drive.google.com/file/d/1XJoue9Vx9BfAIOHaCSPgit6TsMsWRi8p/view?usp=sharing

Project Files

Link:
https://drive.google.com/drive/folders/1vydcZHSAYjkF33e0nJ4EW09okoNMgNWj?usp=sharing

THANK YOU