Proposal for Automating Academic Research Solution.

Our biotechnology company has developed a new medical device concept.

To scientifically prove its feasibility, a research team seeks an automated search solution to streamline the online academic research process.

This proposal outlines an end-to-end solution to improve the research workflow created by our technical team.

Source: Freepik

Bio Tech Pharm

Proposal for Automating Academic Research Solution.

Problem Statement

The current manual approach poses significant challenges and limitations:

- time-consuming
- susceptible to errors

Proposed Solution Overview

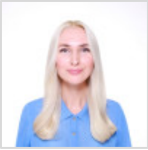
A comprehensive and integrated system to:

- automate research tasks,
- employ advanced algorithms, and
- improve overall efficiency, accuracy, and productivity.

Technical Team

Software Consultants:
Elena Mendes Edwards
Kazuma Hazebayashi

Agent Design Specialist:
Anastasia Rizzo



Agent Development Specialist:
Samuel Adeniyi

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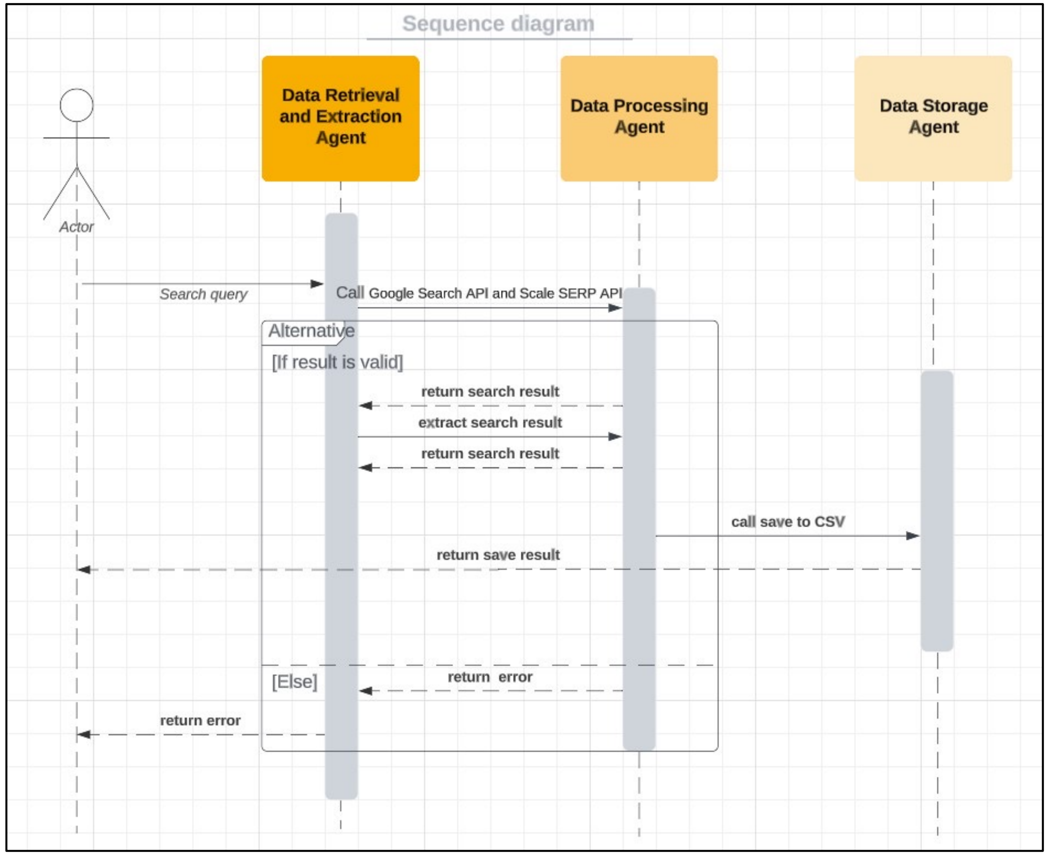
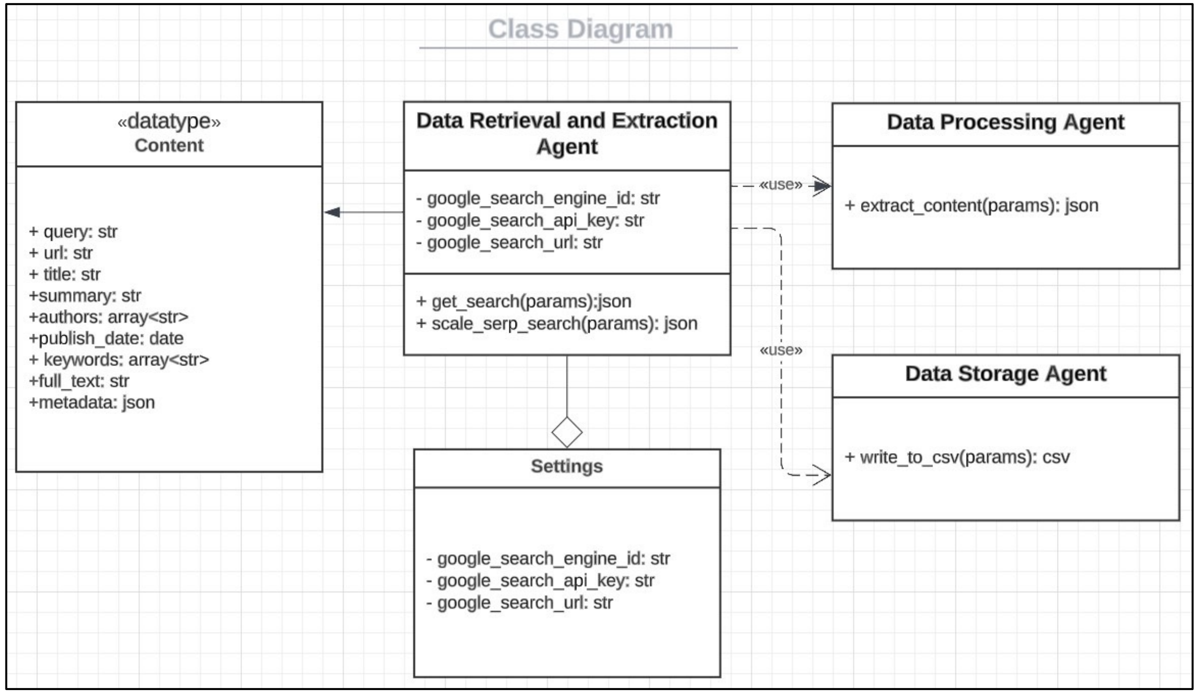
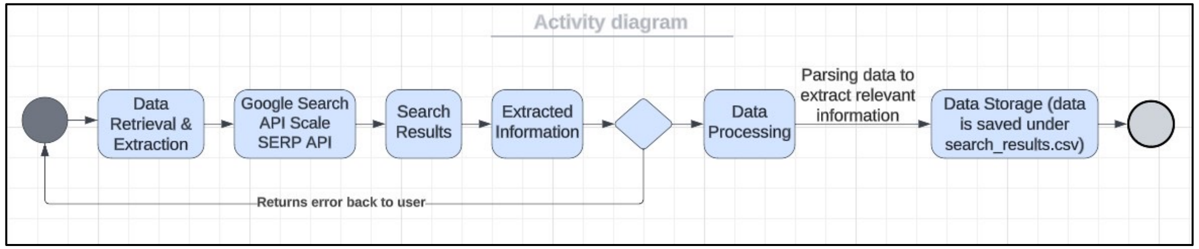
Solution Design






Activity diagram
Data Retrieval & Extraction
Google Search API Scale SERP API
Search Results
Extracted Information
Data Processing
Parsing data to extract relevant information
Data Storage (data is saved under search_results.csv)
Returns error back to user

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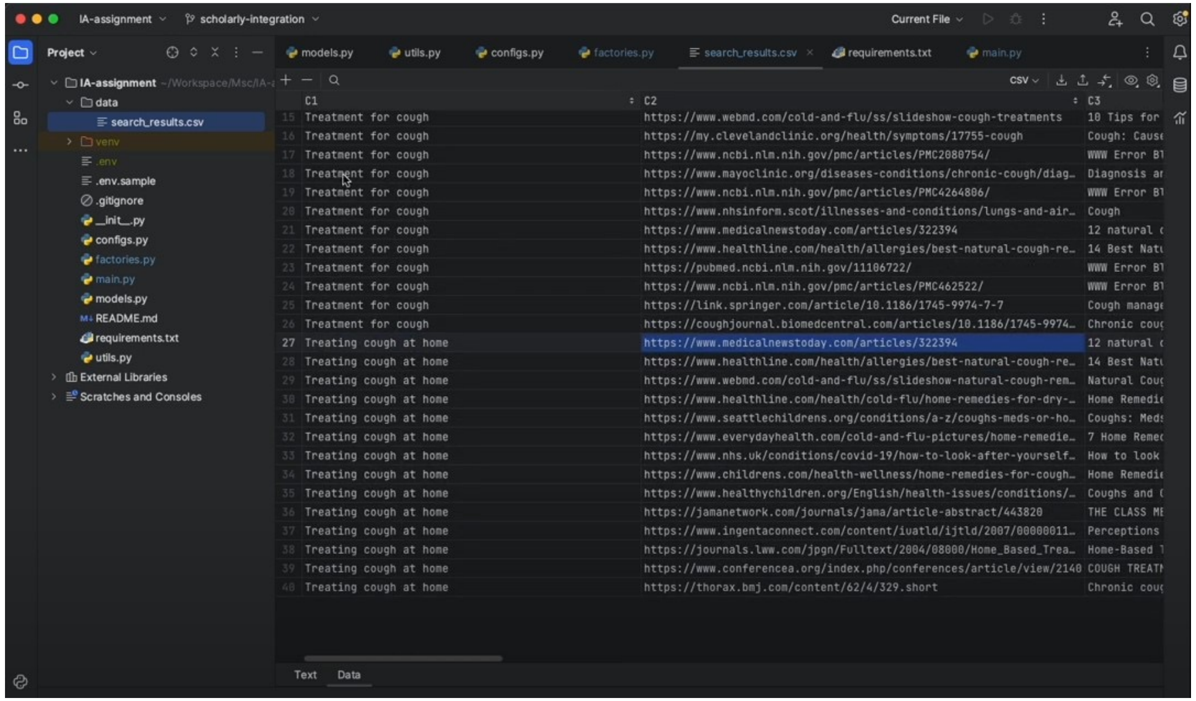
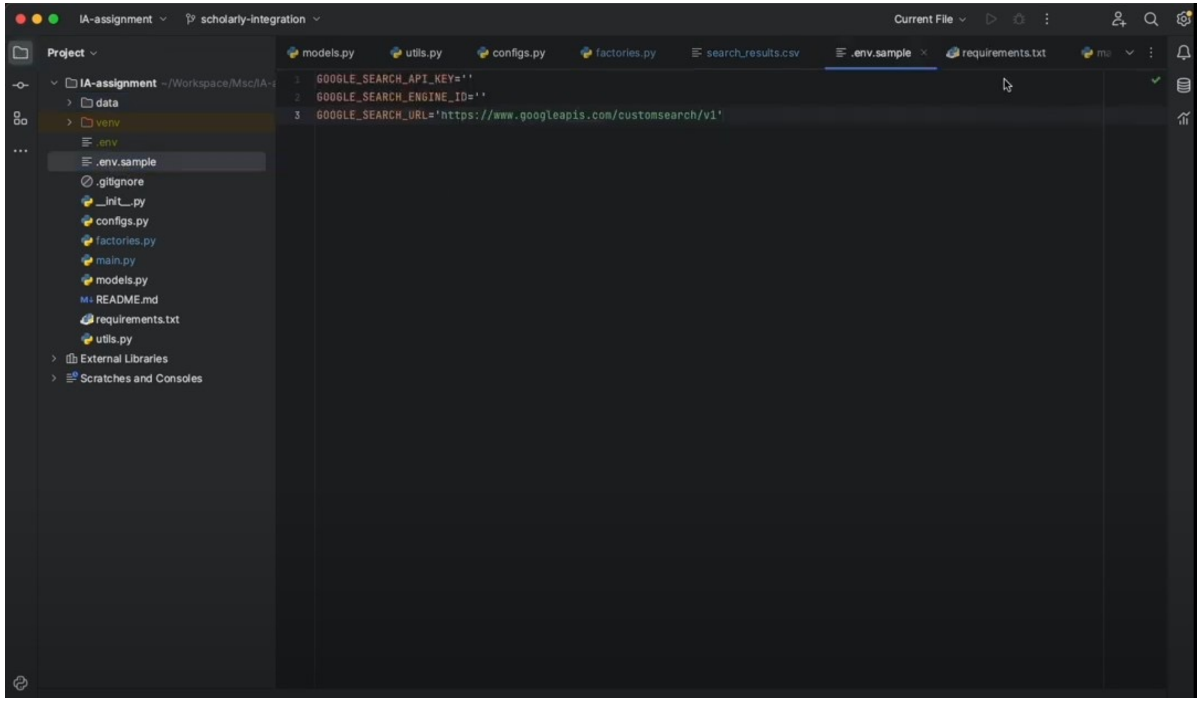
Solution Implementation

Picture 1.



C1	C2	C3
Treatment for cough	https://www.webmd.com/cold-and-flu/ss/slideshow-cough-treatments	10 Tips for
Treatment for cough	https://my.clevelandclinic.org/health/symptoms/17755-cough	Cough: Cause
Treatment for cough	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2080754/	WWW Error Bl
Treatment for cough	https://www.mayoclinic.org/diseases-conditions/chronic-cough/diag…	Diagnosis ar
Treatment for cough	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4264806/	WWW Error Bl
Treatment for cough	https://www.nhsinform.scot/illnesses-and-conditions/lungs-and-air…	Cough
Treatment for cough	https://www.medicalnewstoday.com/articles/322394	12 natural c
Treatment for cough	https://www.healthline.com/health/allergies/best-natural-cough-re…	14 Best Natu
Treatment for cough	https://pubmed.ncbi.nlm.nih.gov/11106722/	WWW Error Bl
Treatment for cough	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC462522/	WWW Error Bl
Treatment for cough	https://link.springer.com/article/10.1186/1745-9974-7-7	Cough manage
Treatment for cough	https://coughjournal.biomedcentral.com/articles/10.1186/1745-9974…	Chronic coug
Treating cough at home	https://www.medicalnewstoday.com/articles/322394	12 natural c
Treating cough at home	https://www.healthline.com/health/allergies/best-natural-cough-re…	14 Best Natu
Treating cough at home	https://www.webmd.com/cold-and-flu/ss/slideshow-natural-cough-rem…	Natural Coug
Treating cough at home	https://www.healthline.com/health/cold-flu/home-remedies-for-dry-…	Home Remedie
Treating cough at home	https://www.seattlechildrens.org/conditions/a-z/coughs-meds-or-ho…	Coughs: Meds
Treating cough at home	https://www.everydayhealth.com/cold-and-flu-pictures/home-remedie…	7 Home Remec
Treating cough at home	https://www.nhs.uk/conditions/covid-19/how-to-look-after-yourself…	How to look
Treating cough at home	https://www.childrens.com/health-wellness/home-remedies-for-cough…	Home Remedie
Treating cough at home	https://www.healthychildren.org/English/health-issues/conditions/…	Coughs and (
Treating cough at home	https://jamanetwork.com/journals/jama/article-abstract/443820	THE CLASS ME
Treating cough at home	https://www.ingentaconnect.com/content/iuatld/ijtld/2007/00000011…	Perceptions
Treating cough at home	https://journals.lww.com/jpgn/Fulltext/2004/08000/Home_Based_Trea…	Home-Based T
Treating cough at home	https://www.conferencea.org/index.php/conferences/article/view/2140	COUGH TREATM
Treating cough at home	https://thorax.bmj.com/content/62/4/329.short	Chronic coug

Picture 2.



```
GOOGLE_SEARCH_API_KEY=''
GOOGLE_SEARCH_ENGINE_ID=''
GOOGLE_SEARCH_URL='https://www.googleapis.com/customsearch/v1'
```

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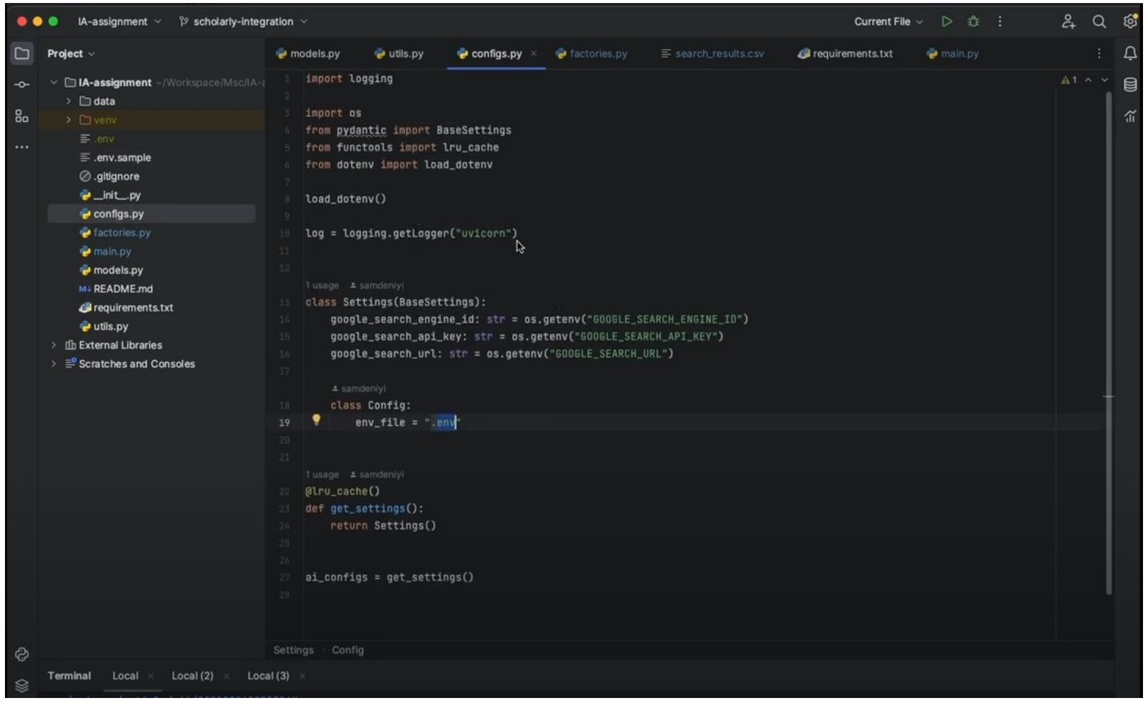
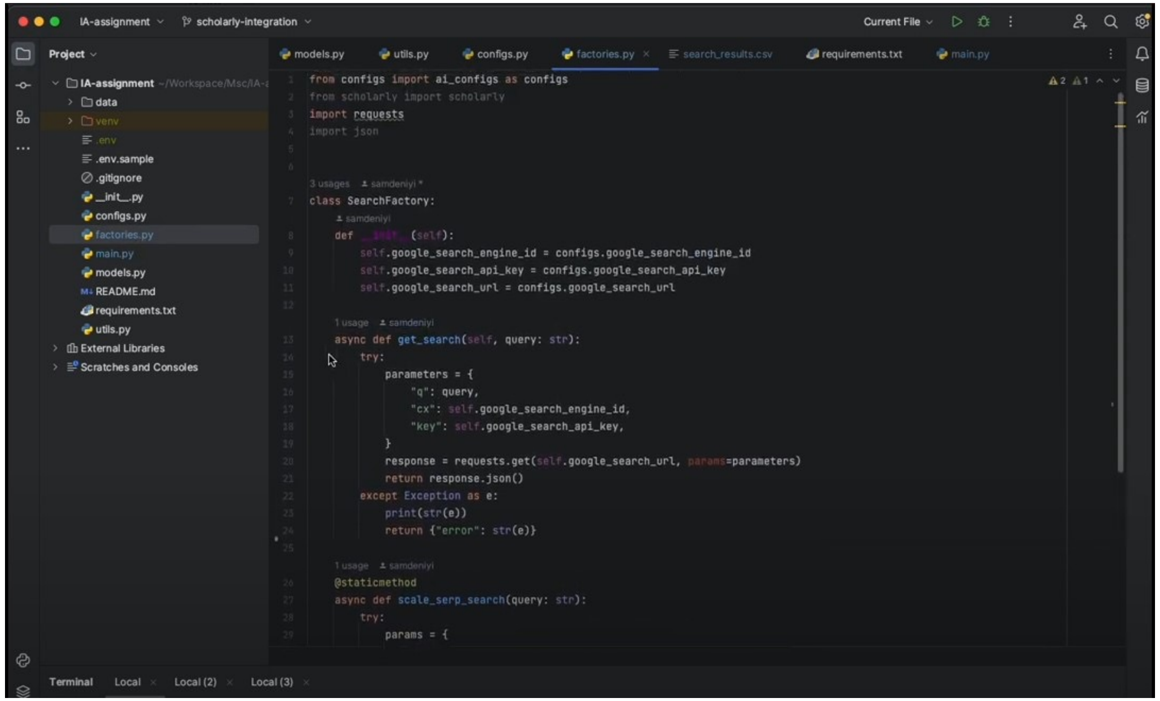
Solution Implementation

Picture 3.



```python
import logging

import os
from pydantic import BaseSettings
from functools import lru_cache
from dotenv import load_dotenv

load_dotenv()

log = logging.getLogger("uvicorn")


class Settings(BaseSettings):
    google_search_engine_id: str = os.getenv("GOOGLE_SEARCH_ENGINE_ID")
    google_search_api_key: str = os.getenv("GOOGLE_SEARCH_API_KEY")
    google_search_url: str = os.getenv("GOOGLE_SEARCH_URL")

    class Config:
        env_file = ".env"


@lru_cache()
def get_settings():
    return Settings()


ai_configs = get_settings()
```

Picture 4.



```python
from configs import ai_configs as configs
from scholarly import scholarly
import requests
import json


class SearchFactory:
    def __init__(self):
        self.google_search_engine_id = configs.google_search_engine_id
        self.google_search_api_key = configs.google_search_api_key
        self.google_search_url = configs.google_search_url

    async def get_search(self, query: str):
        try:
            parameters = {
                "q": query,
                "cx": self.google_search_engine_id,
                "key": self.google_search_api_key,
            }
            response = requests.get(self.google_search_url, params=parameters)
            return response.json()
        except Exception as e:
            print(str(e))
            return {"error": str(e)}

    @staticmethod
    async def scale_serp_search(query: str):
        try:
            params = {
```

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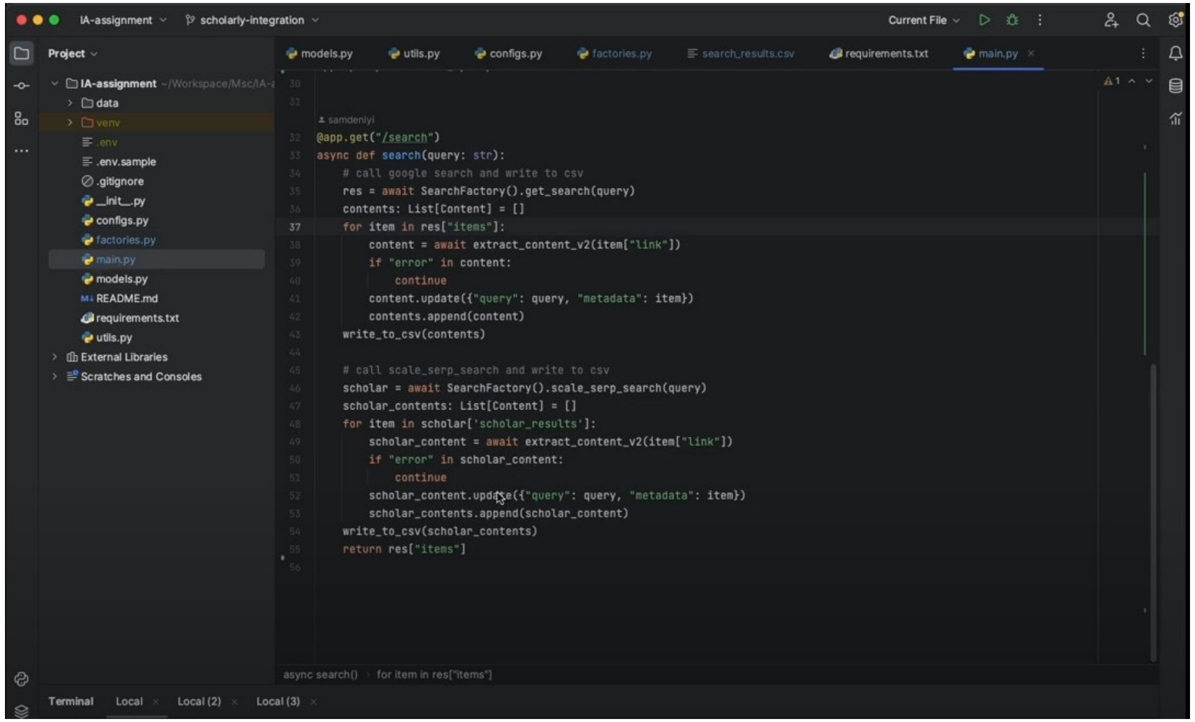
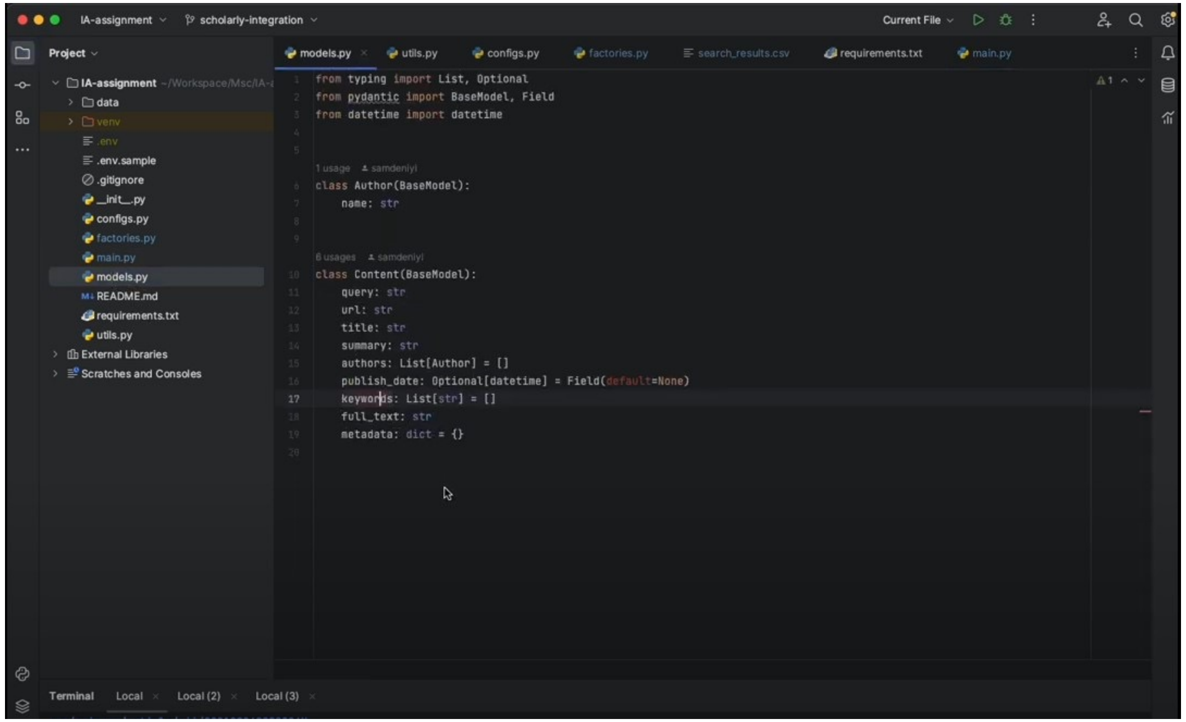
Solution Implementation

Picture 5.



```python
@app.get("/search")
async def search(query: str):
    # call google search and write to csv
    res = await SearchFactory().get_search(query)
    contents: List[Content] = []
    for item in res["items"]:
        content = await extract_content_v2(item["link"])
        if "error" in content:
            continue
        content.update({"query": query, "metadata": item})
        contents.append(content)
    write_to_csv(contents)

    # call scale_serp_search and write to csv
    scholar = await SearchFactory().scale_serp_search(query)
    scholar_contents: List[Content] = []
    for item in scholar['scholar_results']:
        scholar_content = await extract_content_v2(item["link"])
        if "error" in scholar_content:
            continue
        scholar_content.update({"query": query, "metadata": item})
        scholar_contents.append(scholar_content)
    write_to_csv(scholar_contents)
    return res["items"]
```

Picture 6.

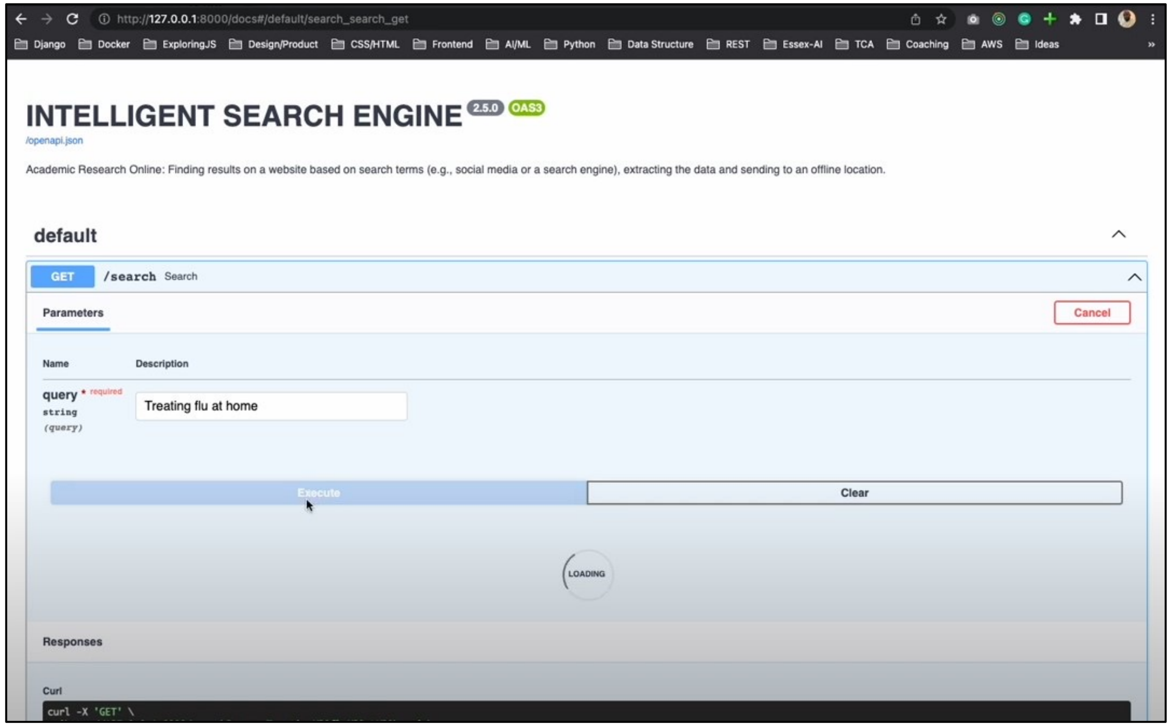


```python
from typing import List, Optional
from pydantic import BaseModel, Field
from datetime import datetime


class Author(BaseModel):
    name: str


class Content(BaseModel):
    query: str
    url: str
    title: str
    summary: str
    authors: List[Author] = []
    publish_date: Optional[datetime] = Field(default=None)
    keywords: List[str] = []
    full_text: str
    metadata: dict = {}
```

Proposal for Automating Academic Research Solution.

Solution Implementation

Picture 7.



INTELLIGENT SEARCH ENGINE 2.5.0 OAS3

/openapi.json

Academic Research Online: Finding results on a website based on search terms (e.g., social media or a search engine), extracting the data and sending to an offline location.

default

GET /search Search

Parameters

Cancel

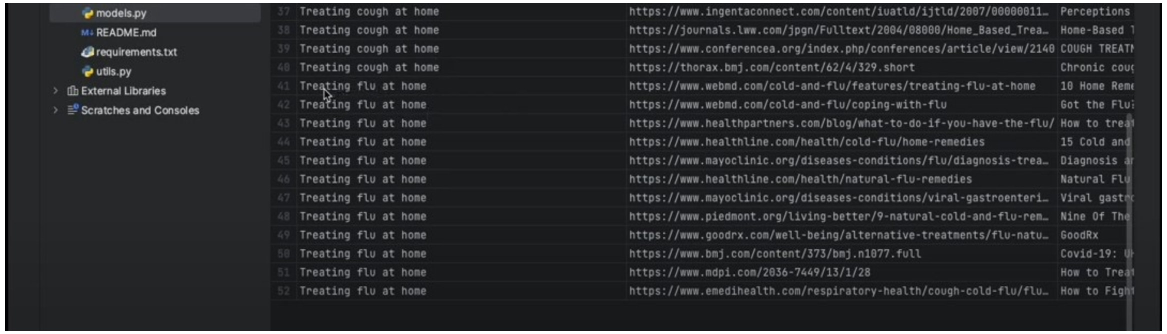
Name	Description
query * required string (query)	Treating flu at home

Responses

Curl

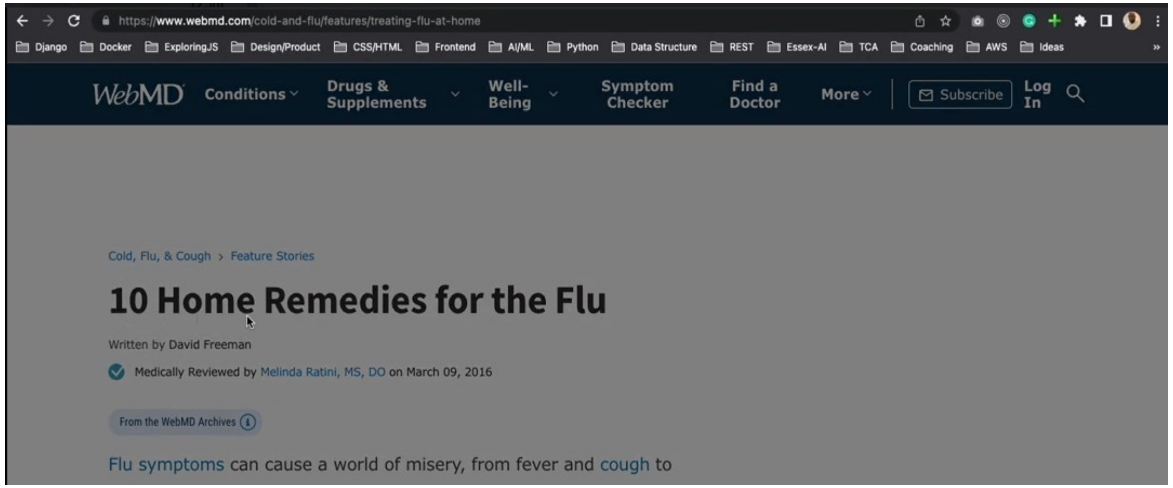
```
curl -X 'GET' \
```

Picture 8.



Treating cough at home	https://www.ingentaconnect.com/content/iuatld/ijtld/2007/00000011…	Perceptions
Treating cough at home	https://journals.lww.com/jpgn/Fulltext/2004/08000/Home_Based_Trea…	Home-Based T
Treating cough at home	https://www.conferencea.org/index.php/conferences/article/view/2140	COUGH TREATM
Treating cough at home	https://thorax.bmj.com/content/62/4/329.short	Chronic coug
Treating flu at home	https://www.webmd.com/cold-and-flu/features/treating-flu-at-home	10 Home Reme
Treating flu at home	https://www.webmd.com/cold-and-flu/coping-with-flu	Got the Flu?
Treating flu at home	https://www.healthpartners.com/blog/what-to-do-if-you-have-the-flu/	How to treat
Treating flu at home	https://www.healthline.com/health/cold-flu/home-remedies	15 Cold and
Treating flu at home	https://www.mayoclinic.org/diseases-conditions/flu/diagnosis-trea…	Diagnosis ar
Treating flu at home	https://www.healthline.com/health/natural-flu-remedies	Natural Flu
Treating flu at home	https://www.mayoclinic.org/diseases-conditions/viral-gastroenteri…	Viral gastro
Treating flu at home	https://www.piedmont.org/living-better/9-natural-cold-and-flu-rem…	Nine Of The
Treating flu at home	https://www.goodrx.com/well-being/alternative-treatments/flu-natu…	GoodRx
Treating flu at home	https://www.bmj.com/content/373/bmj.n1077.full	Covid-19: U
Treating flu at home	https://www.mdpi.com/2036-7449/13/1/28	How to Treat
Treating flu at home	https://www.emedihealth.com/respiratory-health/cough-cold-flu/flu…	How to Fight

Picture 9.



Cold, Flu, & Cough › Feature Stories

10 Home Remedies for the Flu

Written by David Freeman

Medically Reviewed by Melinda Ratini, MS, DO on March 09, 2016

From the WebMD Archives

Flu symptoms can cause a world of misery, from fever and cough to

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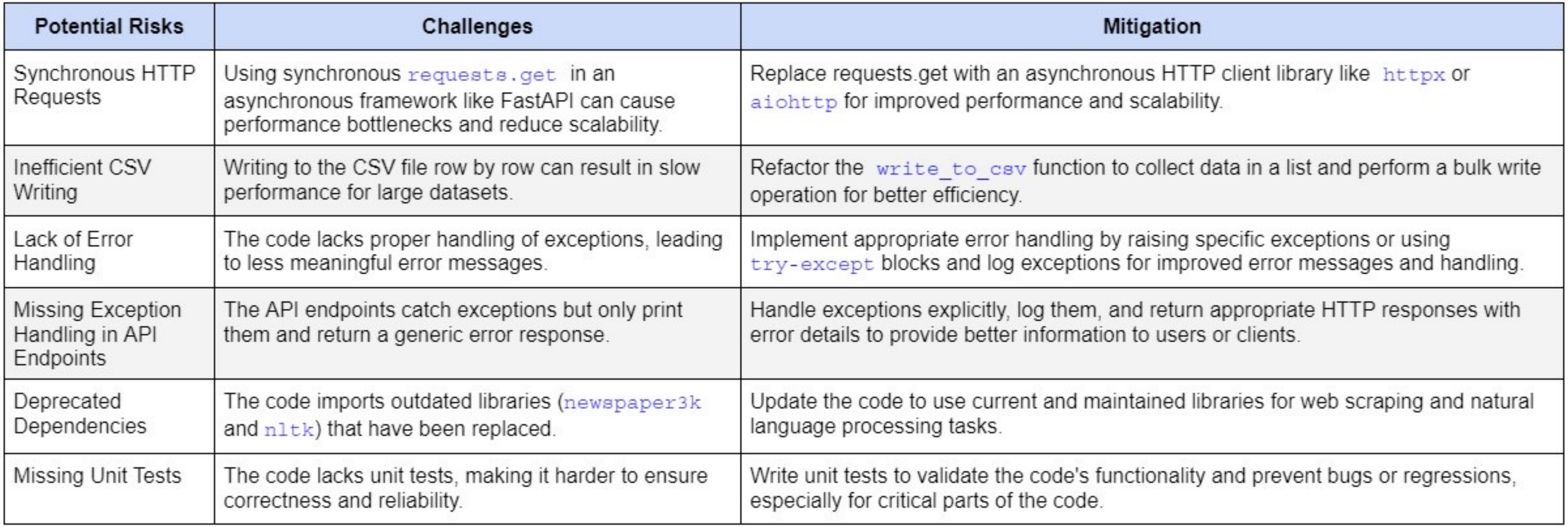
Risk Assessment



Potential Risks	Challenges	Mitigation
Synchronous HTTP Requests	Using synchronous `requests.get` in an asynchronous framework like FastAPI can cause performance bottlenecks and reduce scalability.	Replace requests.get with an asynchronous HTTP client library like `httpx` or `aiohttp` for improved performance and scalability.
Inefficient CSV Writing	Writing to the CSV file row by row can result in slow performance for large datasets.	Refactor the `write_to_csv` function to collect data in a list and perform a bulk write operation for better efficiency.
Lack of Error Handling	The code lacks proper handling of exceptions, leading to less meaningful error messages.	Implement appropriate error handling by raising specific exceptions or using `try-except` blocks and log exceptions for improved error messages and handling.
Missing Exception Handling in API Endpoints	The API endpoints catch exceptions but only print them and return a generic error response.	Handle exceptions explicitly, log them, and return appropriate HTTP responses with error details to provide better information to users or clients.
Deprecated Dependencies	The code imports outdated libraries (`newspaper3k` and `nltk`) that have been replaced.	Update the code to use current and maintained libraries for web scraping and natural language processing tasks.
Missing Unit Tests	The code lacks unit tests, making it harder to ensure correctness and reliability.	Write unit tests to validate the code's functionality and prevent bugs or regressions, especially for critical parts of the code.

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Justification and Benefits

Improved Efficiency

Enhanced Collaboration

Modularity and Scalability

Intelligent Data Processing

Structured Data Storage and Access

Proposal for Automating Academic Research Solution.

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