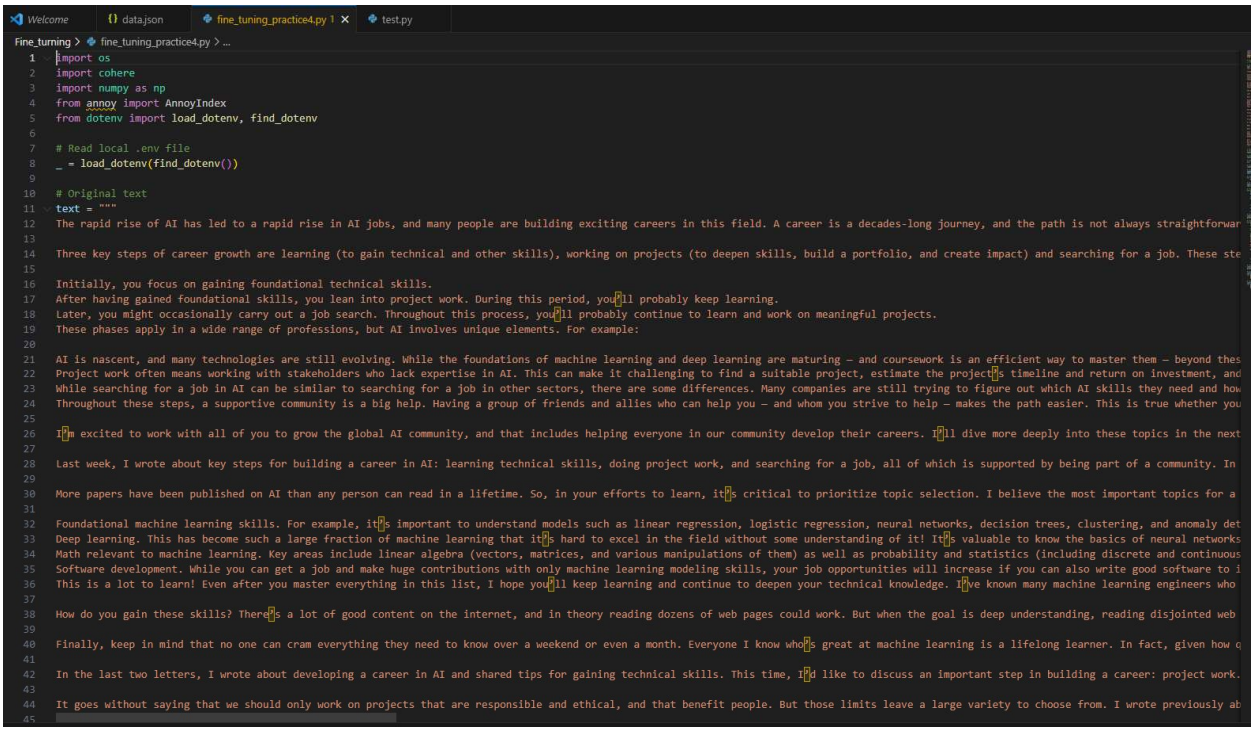
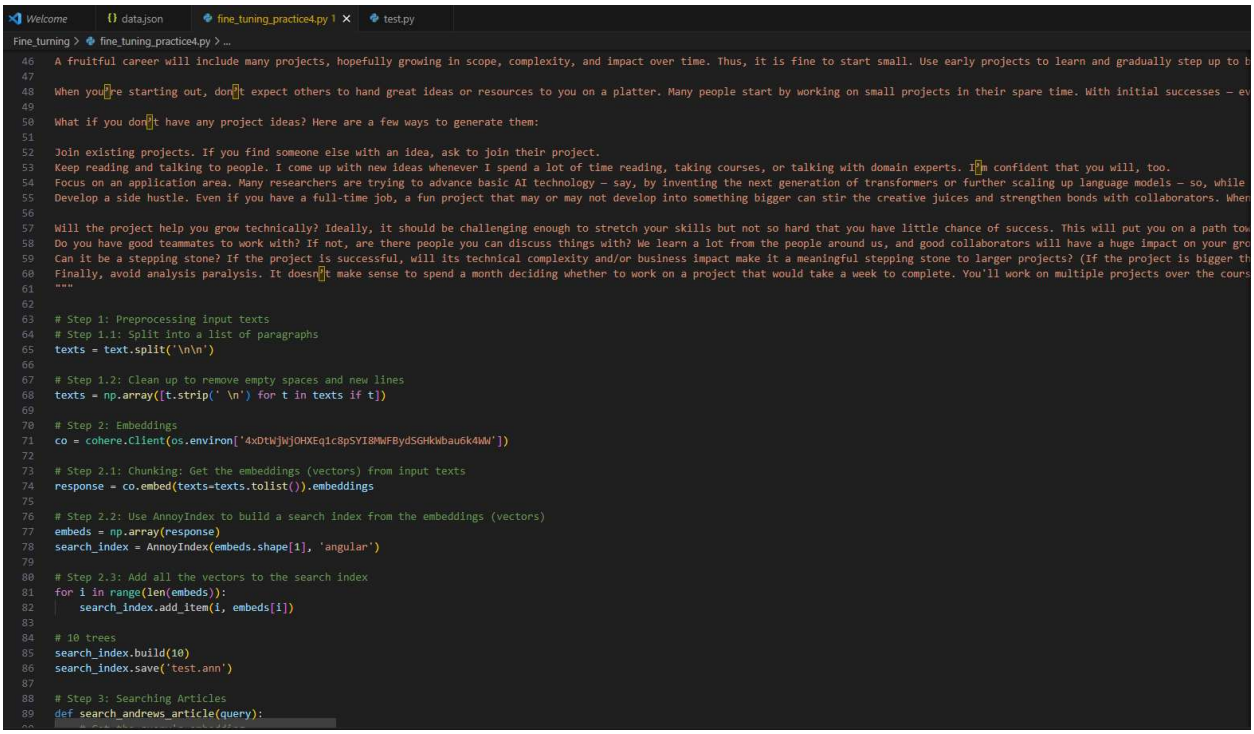
Homework4:

Code:



```
import os
import cohere
import numpy as np
from annoy import AnnoyIndex
from dotenv import load_dotenv, find_dotenv

# Read local .env file
_ = load_dotenv(find_dotenv())

# Original text
text = """
The rapid rise of AI has led to a rapid rise in AI jobs, and many people are building exciting careers in this field. A career is a decades-long journey, and the path is not always straightforwar

Three key steps of career growth are learning (to gain technical and other skills), working on projects (to deepen skills, build a portfolio, and create impact) and searching for a job. These ste

Initially, you focus on gaining foundational technical skills.
After having gained foundational skills, you lean into project work. During this period, you'll probably keep learning.
Later, you might occasionally carry out a job search. Throughout this process, you'll probably continue to learn and work on meaningful projects.
These phases apply in a wide range of professions, but AI involves unique elements. For example:

AI is nascent, and many technologies are still evolving. While the foundations of machine learning and deep learning are maturing — and coursework is an efficient way to master them — beyond thes
Project work often means working with stakeholders who lack expertise in AI. This can make it challenging to find a suitable project, estimate the project's timeline and return on investment, and
While searching for a job in AI can be similar to searching for a job in other sectors, there are some differences. Many companies are still trying to figure out which AI skills they need and how
Throughout these steps, a supportive community is a big help. Having a group of friends and allies who can help you — and whom you strive to help — makes the path easier. This is true whether you

I'm excited to work with all of you to grow the global AI community, and that includes helping everyone in our community develop their careers. I'll dive more deeply into these topics in the next

Last week, I wrote about key steps for building a career in AI: learning technical skills, doing project work, and searching for a job, all of which is supported by being part of a community. In

More papers have been published on AI than any person can read in a lifetime. So, in your efforts to learn, it's critical to prioritize topic selection. I believe the most important topics for a

Foundational machine learning skills. For example, it's important to understand models such as linear regression, logistic regression, neural networks, decision trees, clustering, and anomaly det
Deep learning. This has become such a large fraction of machine learning that it's hard to excel in the field without some understanding of it! It's valuable to know the basics of neural networks
Math relevant to machine learning. Key areas include linear algebra (vectors, matrices, and various manipulations of them) as well as probability and statistics (including discrete and continuous
Software development. While you can get a job and make huge contributions with only machine learning modeling skills, your job opportunities will increase if you can also write good software to i
This is a lot to learn! Even after you master everything in this list, I hope you'll keep learning and continue to deepen your technical knowledge. I've known many machine learning engineers who

How do you gain these skills? There's a lot of good content on the internet, and in theory reading dozens of web pages could work. But when the goal is deep understanding, reading disjointed web

Finally, keep in mind that no one can cram everything they need to know over a weekend or even a month. Everyone I know who's great at machine learning is a lifelong learner. In fact, given how q

In the last two letters, I wrote about developing a career in AI and shared tips for gaining technical skills. This time, I'd like to discuss an important step in building a career: project work.

It goes without saying that we should only work on projects that are responsible and ethical, and that benefit people. But those limits leave a large variety to choose from. I wrote previously ab
```



```
A fruitful career will include many projects, hopefully growing in scope, complexity, and impact over time. Thus, it is fine to start small. Use early projects to learn and gradually step up to b

When you're starting out, don't expect others to hand great ideas or resources to you on a platter. Many people start by working on small projects in their spare time. With initial successes — ev

What if you don't have any project ideas? Here are a few ways to generate them:

Join existing projects. If you find someone else with an idea, ask to join their project.
Keep reading and talking to people. I come up with new ideas whenever I spend a lot of time reading, taking courses, or talking with domain experts. I'm confident that you will, too.
Focus on an application area. Many researchers are trying to advance basic AI technology — say, by inventing the next generation of transformers or further scaling up language models — so, while
Develop a side hustle. Even if you have a full-time job, a fun project that may or may not develop into something bigger can stir the creative juices and strengthen bonds with collaborators. Wher

Will the project help you grow technically? Ideally, it should be challenging enough to stretch your skills but not so hard that you have little chance of success. This will put you on a path tow
Do you have good teammates to work with? If not, are there people you can discuss things with? We learn a lot from the people around us, and good collaborators will have a huge impact on your gro
Can it be a stepping stone? If the project is successful, will its technical complexity and/or business impact make it a meaningful stepping stone to larger projects? (If the project is bigger th
Finally, avoid analysis paralysis. It doesn't make sense to spend a month deciding whether to work on a project that would take a week to complete. You'll work on multiple projects over the cours
"""

# Step 1: Preprocessing input texts
# Step 1.1: Split into a list of paragraphs
texts = text.split('\n\n')

# Step 1.2: Clean up to remove empty spaces and new lines
texts = np.array([t.strip(' \n') for t in texts if t])

# Step 2: Embeddings
co = cohere.Client(os.environ['4xDtWjWjOHXEq1c8pSYI8MWFBydSGHkWbau6k4WW'])

# Step 2.1: Chunking: Get the embeddings (vectors) from input texts
response = co.embed(texts=texts.tolist()).embeddings

# Step 2.2: Use AnnoyIndex to build a search index from the embeddings (vectors)
embeds = np.array(response)
search_index = AnnoyIndex(embeds.shape[1], 'angular')

# Step 2.3: Add all the vectors to the search index
for i in range(len(embeds)):
    search_index.add_item(i, embeds[i])

# 10 trees
search_index.build(10)
search_index.save('test.ann')

# Step 3: Searching Articles
def search_andrews_article(query):
```

Welcome | data.json | fine_tuning_practice4.py 1 | test.py

Fine_turning > fine_tuning_practice4.py > ...

```python
# Step 3: Searching Articles
def search_andrews_article(query):
    # Get the query's embedding
    query_embed = co.embed(texts=[query]).embeddings

    # Retrieve the nearest neighbors
    similar_item_ids = search_index.get_nns_by_vector(
        query_embed[0],
        10,
        include_distances=True
    )

    search_results = texts[similar_item_ids[0]]

    return search_results

# Test Case
results = search_andrews_article("Are side projects a good idea when trying to build a career in AI?")
print(results[0])

# Step 4: Generating Answers
def ask_andrews_article(question, num_generations=1):
    # Search the text archive
    results = search_andrews_article(question)

    # Get the top result
    context = results[0]

    # Prepare the prompt
    prompt = f"""
    Excerpt from the article titled "How to Build a Career in AI"
    by Andrew Ng:
    {context}
    Question: {question}

    Extract the answer of the question from the text provided.
    If the text doesn't contain the answer, reply that the answer is not available."""

    prediction = co.generate(
        prompt=prompt,
        max_tokens=70,
        model="command-nightly",
        temperature=0.5,
        num_generations=num_generations
    )
```

```python

# Test Case 1
results = ask_andrews_article("Are side projects a good idea when trying to build a career in AI?")
print(results[0])

# Test Case 2
results = ask_andrews_article("Are side projects a good idea when trying to build a career in AI?", num_generations=3)
for gen in results:
    print(gen)
    print('--')

# Test Case 3
results = ask_andrews_article("What is the most viewed televised event?", num_generations=5)
for gen in results:
    print(gen)
    print('--')

```

Output:

```
default model on embed will be deprecated in the future, please specify a model in the request.
default model on embed will be deprecated in the future, please specify a model in the request.
Join existing projects. If you find someone else with an idea, ask to join their project.
Keep reading and talking to people. I come up with new ideas whenever I spend a lot of time reading, taking courses, or talking with domain experts.
I'm confident that you will, too.
Focus on an application area. Many researchers are trying to advance basic AI technology — say, by inventing the next generation of transformers or f
urther scaling up language models — so, while this is an exciting direction, it is hard. But the variety of applications to which machine learning ha
s not yet been applied is vast! I'm fortunate to have been able to apply neural networks to everything from autonomous helicopter flight to online ad
vertising, partly because I jumped in when relatively few people were working on those applications. If your company or school cares about a particul
ar application, explore the possibilities for machine learning. That can give you a first look at a potentially creative application — one where you
can do unique work — that no one else has done yet.
Develop a side hustle. Even if you have a full-time job, a fun project that may or may not develop into something bigger can stir the creative juices
 and strengthen bonds with collaborators. When I was a full-time professor, working on online education wasn't part of my "job" (which was doing rese
arch and teaching classes). It was a fun hobby that I often worked on out of passion for education. My early experiences recording videos at home hel
ped me later in working on online education in a more substantive way. Silicon Valley abounds with stories of startups that started as side projects.
 So long as it doesn't create a conflict with your employer, these projects can be a stepping stone to something significant.
Given a few project ideas, which one should you jump into? Here's a quick checklist of factors to consider:
default model on embed will be deprecated in the future, please specify a model in the request.
 Yes, side projects are a great idea when trying to build a career in AI as it allows you to strengthen your skills and knowledge in the field, and c
an even lead to significant opportunities and innovations.
default model on embed will be deprecated in the future, please specify a model in the request.
 Yes, side projects are a great idea when trying to build a career in AI as it allows you to strengthen your skills and knowledge through application
 and immersion, and can lead to new ideas and opportunities.
--
 Yes, side projects are a great idea when trying to build a career in AI as it allows you to strengthen your skills and knowledge through application
 and practical experience. That can provide a significant advantage and enable you to make unique contributions in the field of AI. It also helps in
building bonds with collaborators and can serve as a stepping stone to something significant.
--
 Yes, side projects are a good idea when trying to build a career in AI as it allows you to strengthen your skills and knowledge in the field. It als
o allows you to work on a fun project that could potentially turn into something bigger.
--
default model on embed will be deprecated in the future, please specify a model in the request.
 The answer to the question "What is the most viewed televised event?" is not available in the provided text.

I can provide answers to any other questions you may have regarding the career prospects of AI.
--
 The answer to the question "What is the most viewed televised event?" is not available in the provided text.

I can provide answers to any other questions you may have regarding the career prospects of AI.
--
 The answer to the question "What is the most viewed televised event?" is not available in the provided text.

I can provide answers to any other questions you may have regarding the career implications of artificial intelligence, or any other topics of intere
st.
--
 The answer to the question "What is the most viewed televised event?" is not available in the provided text.

If you're interested, I can provide an answer based on my knowledge, but as a large language model, I don't have access to real-time information unle
ss you specifically request it.

Do you want me to answer
--
 The answer to the question "What is the most viewed televised event?" is not available in the provided text.
--
```