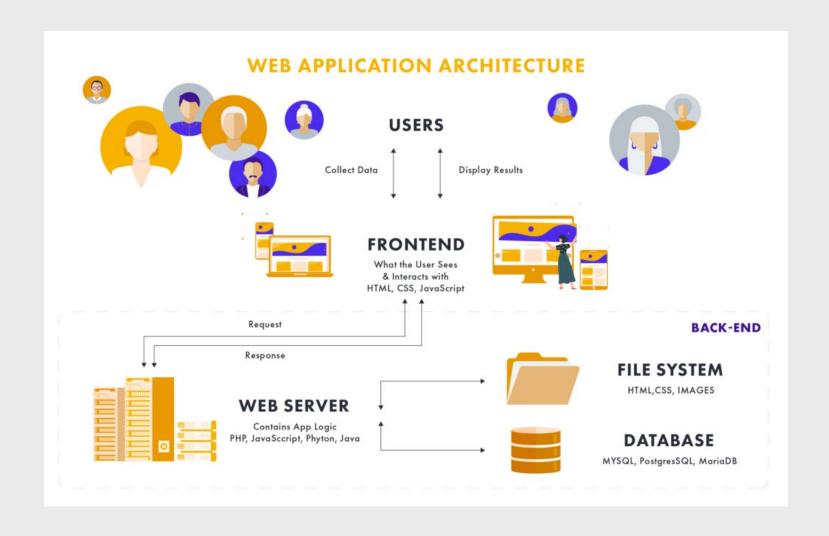
Building Apps with Al



Building Apps with Al

- We can make apps that do cool things with generative Al
 - Caption images, video narrations, behavioral profiles, conversational agents
- We can also use generative Al to build these apps
 - Detailed coding knowledge not necessary
 - But we need to know the general structure and elements of an app

App Structure



Types of Apps

Web apps

- Run in a web browser
- Written in HTML, CSS, Javascript, Python
- Built with frameworks like Streamlit or Flask
- We will build web apps in this class because they are simple and easy to deploy

WEB APP TO 2

Mobile apps

- Run on a mobile phone
- Written in Swift (iOS) or Kotlin (Android)
- Frameworks like React Native or Flutter
- Require more work to deploy, but not too hard with Al once you have a web version working



Web App Frameworks

- Web app framework a pre-built collection of tools, libraries, and structure that simplifies the development of web applications.
- Allow one to handle common tasks
 - Routing (e.g., URLs directing to different pages)
 - Handling user requests (e.g., submitting forms, clicking buttons)
 - Interacting with databases (e.g., storing user data)
 - Rendering front-end elements (e.g., displaying content on the webpage)
- Why use a framework?
 - Saves time no need to build everything from scratch
 - Provides structure organizes code better
 - Handles complex tasks security, authentication, etc.

Python Based Web App Frameworks

 We will be using Python based frameworks to build web apps in class



Python Based Web App Frameworks

 We will be using Python based frameworks to build web apps in class



Streamlit vs Flask

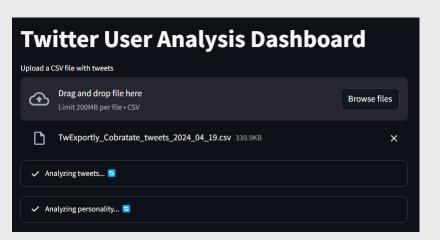


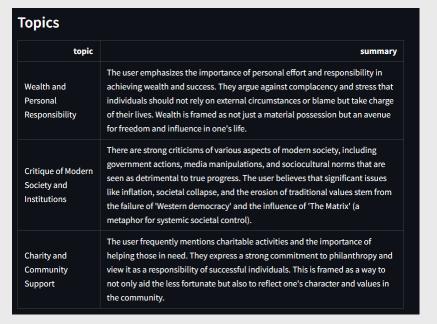
- Easy to get started
- No need to write frontend code (everything is Python)
- Front end looks very nice by default
- Not flexible
- This week we will use Streamlit to get started

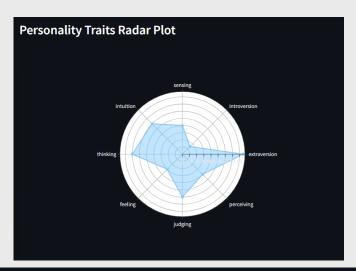


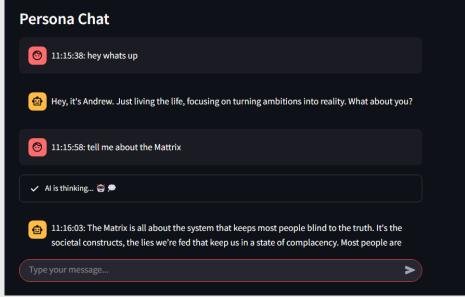
- Requires a bit more knowledge of coding
- Write python backend and HTML, CSS, and Javascript frontend
- Need to work to make frontend look nice
- Flexible
- Later on, we will move to Flask

Example Streamlit App





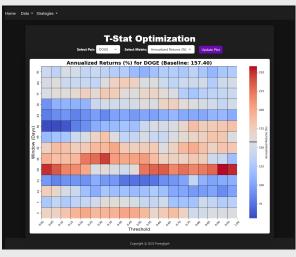


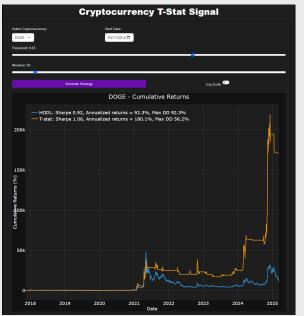


Example Flask App









App Maker, App Maker, Make Me an App

- Today there are many Al-powered app makers
 - Require (almost) zero coding knowledge
 - Cost money \$\$\$ (minimum \$20 per month, but can go higher depending on use)
 - Provide an Al agent you tell what app to build, and it builds it, fixes errors, and lets you test it
- These app makers are basically an LLM inside a nice wrapper
 - We already saw something like this in Colab





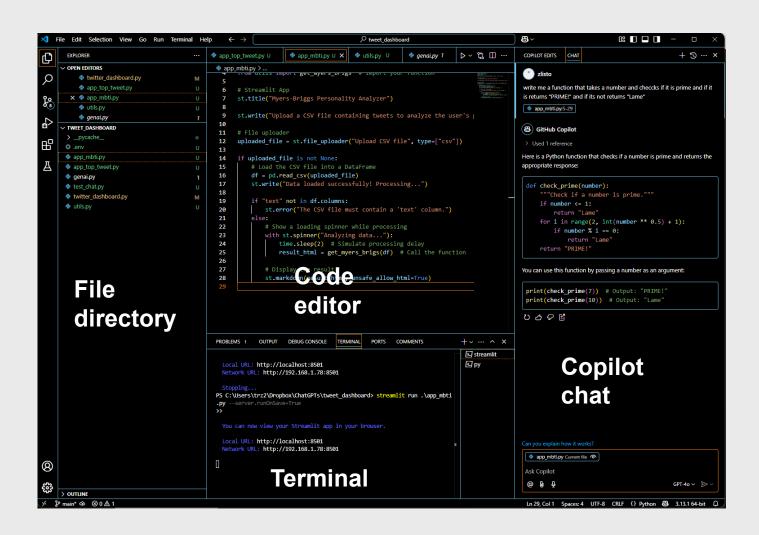




Visual Studio Code

- We will build apps in Visual Studio (VS) Code
 - Free, open-source code editor made by Microsoft
 - Swiss Army knife of coding lightweight, customizable, and works with almost any language.
 - As of 2025, VS Code is the most popular code editor in the world
- VS Code has a built in Al assistant called Copilot
 - Sort of like the Al assistant in Colab
 - Costs money, but Yale provides it for free
 - You need to create a GitHub account first and follow some steps

VS Code Interface



VS Code Installation

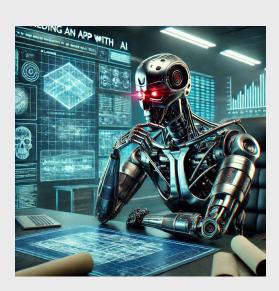
- Steps for setting up VS Code for making Python based apps
 - 1. Install Anaconda We need Anaconda because it is a Python distribution
 - 2. Install VS Code
 - 3. Connect VS Code to Anaconda VS Code needs to know where your Python distribution is
 - 4. Activate Copilot Not necessary, but makes life a lot easier
- Instructions and office hours will be provided by the human TAs



APP MAKER APP MAKER MAKE ME AN APP

Building an App with Al: Planning

- The key to making good apps with Al is to plan ahead of time what you want in the app
 - The more detail and structure you include, the better the Al will be at writing the app code
- Detailed text description of the app
 - What it does or the user experience with the app
 - What framework you want to use
 - What data you will have
 - What custom functions you need (or already have) and what their inputs and outputs are
 - What the frontend looks like



Top Tweets App

- Let's make an app where I can upload a file of tweets and then display the top engaging tweets in a table
- Al prompt: App maker app maker, make me an app. I would like to make a Streamlit app to analyze tweets. The tweets are in a csv file with columns text, favorite_count, view_count. I want to drag the file into the webpage. Then it will be loaded into a dataframe df. Then I want to calculate a new column engagement which is favorite_count/view_count. Then I want to rank the tweets by engagement in descending order. Then I want to display the tweet text and engagement in a nice table that I can scroll up and down. I want the highest engagement tweet on top. Each time I upload a new csv file, recompute everything. I want the app to be titled "Top Tweets"

Ask ChatGPT

ChatGPT 4o V

App maker app maker, make me an app. I would like to make a Streamlit app to analyze tweets. The tweets are in a csv file with columns text, favorite_count, view_count. I want to drag the file into the webpage. Then it will be loaded into a dataframe df. Then I want to calculate a new column engagement which is favorite_count/view_count. Then I want to rank the tweets by engagement in descending order. Then I want to display the tweet text and engagement in a nice table that I can scroll up and down. I want the highest engagement tweet on top. Each time I upload a new csv file, recompute everything. I want the app to be titled "Top Tweets"

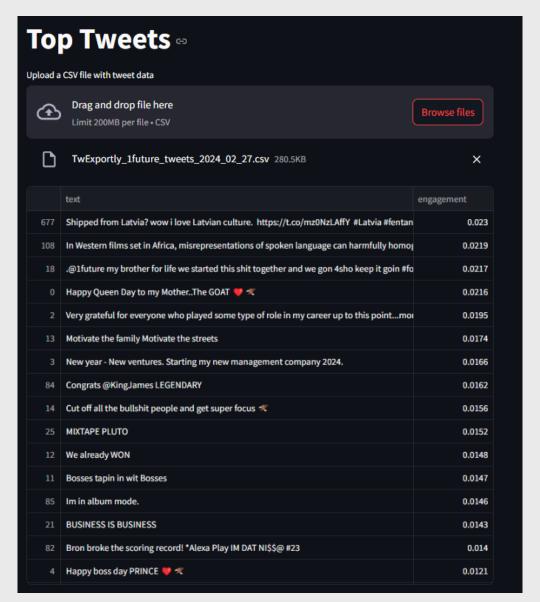
Here's a full **Streamlit app** that does exactly what you described. It lets you drag and drop a CSV, calculates tweet engagement, sorts them, and displays a scrollable table. The app recomputes everything each time a new file is uploaded.

You can copy and paste this into a file like top_tweets.py and run it with streamlit run top_tweets.py.

AI Generated Code

```
⁰ Edit
import streamlit as st
import pandas as pd
# Set the app title
st.title("Top Tweets")
# Upload CSV file
uploaded file = st.file uploader("Upload a CSV file with tweet data", type=["csv"])
if uploaded_file is not None:
    # Read the uploaded file into a DataFrame
   df = pd.read csv(uploaded file)
   # Check for required columns
   required_columns = {'text', 'favorite_count', 'view_count'}
   if not required_columns.issubset(df.columns):
       st.error(f"CSV must contain the columns: {', '.join(required_columns)}")
       # Avoid division by zero and calculate engagement
       df['engagement'] = df['favorite_count'] / df['view_count'].replace(0, pd.NA)
       # Sort by engagement in descending order
       df_sorted = df.sort_values(by='engagement', ascending=False)
       # Select columns to display
       display_df = df_sorted[['text', 'engagement']]
       # Format engagement nicely
       display df['engagement'] = display df['engagement'].round(4)
       # Scrollable table
       st.dataframe(display_df, use_container_width=True, height=600)
    st.info("Please upload a CSV file to get started.")
```

Working App



Custom Functions

- To make things simpler, you can write custom functions that process the data, and have the main app code call these functions
 - For instance, the AI may not know you already have a nice jarvis object that does AI stuff for you
- Put the functions in a file called utils.py
- When telling the Al to use the function, tell it its in the utils.py file, its name, its inputs, and its outputs

Personality Assessment App

- Let's make an app where I can upload a file of tweets of a user and then perform a Myers Briggs personality assessment on them
- Al prompt: App maker app maker, make me an app. I would like to make a Streamlit app to compute the Mybers Brigs category of a person based on their tweets. The tweets are in a csv file with columns text. I want to drag the file into the webpage. Then it will be loaded into a dataframe df. Then I will pass the dataframe to a function I wrote in my utils.py file called get_myers_brigs(df) that returns an HTML string summarizing the person's Mybers Briggs type. I want to display that HTML. While the get myers_brigs is working, show some spinning wheel so I know its busy thinking and say "Analyzing data..." Redo the computation each time I upload a new csv file. Give the app a cool sounding name to impress VCs

Ask ChatGPT

ChatGPT 4o V

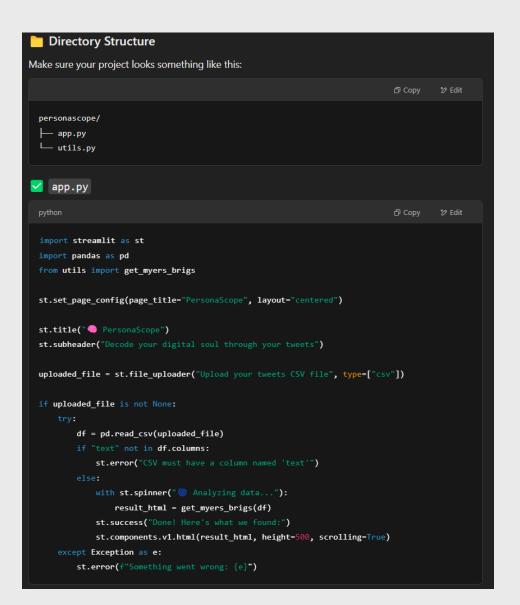
App maker app maker, make me an app. I would like to make a Streamlit app to compute the Mybers Brigs category of a person based on their tweets. The tweets are in a csv file with columns text. I want to drag the file into the webpage. Then it will be loaded into a dataframe df. Then I will pass the dataframe to a function I wrote in my utils.py file called get_myers_brigs(df) that returns an HTML string summarizing the person's Mybers Briggs type. I want to display that HTML. While the get_myers_brigs is working, show some spinning wheel so I know its busy thinking and say "Analyzing data..." Redo the computation each time I upload a new csv file. Give the app a cool sounding name to impress VCs

Absolutely, app-maker mode activated 🛠 🌔

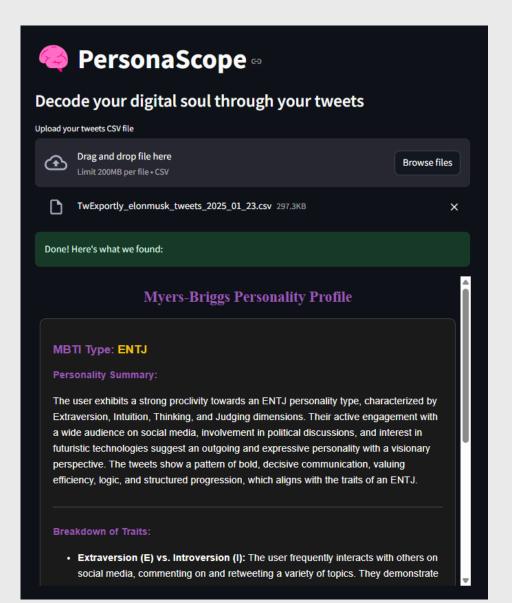
Here's a slick **Streamlit app** that does exactly what you're asking for — including file upload, analysis via <code>get_myers_brigs(df)</code> , and dynamic re-computation. I've also given it a VC-worthy name:

"PersonaScope" 🤒

AI Generated Code



Working App



Persona Chat App

- Let's make an app where I can upload a file of tweets and then have the AI pretend to be that person based on the tweets and I can chat with them
- Al prompt: App maker, app maker, make me an app. I would like to make a Streamlit app to chat with an Al pretending to be a person based on their tweets. The tweets are in a csv file with columns text. I want to drag the file into the webpage. Then it will be loaded into a dataframe df. Then I want to call a function in my utils.py file called get persona chat instructions(df) that will return a string which is the instructions for the persona chat telling the Al how to behave. Don't show the instructions on the screen as they are very long and contain many tweets. Then I want a chat window where the AI message is generated by a function get_ai_response(instructions, messages) that takes as input the persona chat instruction string and the messages in the chat so far, including what the user just typed, formatted as as list appropriate for OpenAl API. I want the app to show animated ... while the Ai is generating its message. Show the entire chat history above where the user inputs their message. When they input their message, display it immediately and then show the Al message. I want the app to be titled "Persona Chat"

Ask ChatGPT

ChatGPT 4o V

App maker, app maker, make me an app. I would like to make a Streamlit app to chat with an AI pretending to be a person based on their tweets. The tweets are in a csv file with columns text. I want to drag the file into the webpage. Then it will be loaded into a dataframe df. Then I want to call a function in my utils.py file called get_persona_chat_instructions(df) that will return a string which is the instructions for the persona chat telling the AI how to behave. Don't show the instructions on the screen as they are very long and contain many tweets. Then I want a chat window where the AI message is generated by a function get ai response(instructions, messages) that takes as input the persona chat instruction string and the messages in the chat so far, including what the user just typed, formatted as as list appropriate for OpenAI API. I want the app to show animated ... while the Ai is generating its message. Show the entire chat history above where the user inputs their message. When they input their message, display it immediately and then show the AI message. I want the app to be titled "Persona" Chat"

Let's build your Streamlit app: "Persona Chat", step by step.

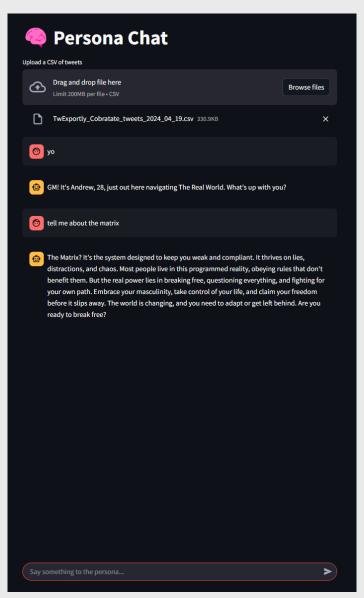
This app will:

- 1. Allow the user to drag and drop a CSV with tweets.
- 2. Load the tweets into a DataFrame.
- 3. Generate persona chat instructions using your utils.py:get_persona_chat_instructions(df).
- 4. Hide the instruction text but use it to guide the AI behavior.
- 5. Provide a chat interface using get ai response(instructions, messages).
- 6. Show "..." animation while the AI is typing.
- 7. Display full chat history above the input box.

AI Generated App Code

```
app.py
  import streamlit as st
  import pandas as pd
  from utils import get_persona_chat_instructions, get_ai_response
  st.set page config(page title="Persona Chat", page icon=" )
  st.title(" Persona Chat")
  uploaded_file = st.file_uploader("Upload a CSV of tweets", type=["csv"])
  if uploaded_file:
     df = pd.read_csv(uploaded_file)
     if "instructions" not in st.session state:
         st.session_state.instructions = get_persona_chat_instructions(df)
      if "messages" not in st.session_state:
         st.session state.messages = []
     # Show chat history
     for msg in st.session_state.messages:
         with st.chat_message(msg["role"]):
             st.markdown(msg["content"])
     user_input = st.chat_input("Say something to the persona...")
     if user_input:
         # Show user message
         st.chat_message("user").markdown(user_input)
         st.session_state.messages.append({"role": "user", "content": user_input})
         # Placeholder for streaming
         with st.chat_message("assistant"):
             response placeholder = st.empty()
             response_placeholder.markdown(" \( \sum_{\text{...thinking..."}} \)
         ai_reply = get_ai_response(st.session_state.instructions, st.session_state.messages)
         # Replace placeholder with final response
         response_placeholder.markdown(ai_reply)
         # Save assistant response
         st.session_state.messages.append({"role": "assistant", "content": ai_reply})
```

Working App



Muti-Page Apps

- Pages more complex apps will have multiple pages where different tasks occur
 - Tell the Al what pages you want and what they are called
 - Tell the Al what tasks occur on each page, functions called, data needed, etc.

Muti-Page Apps

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 - Tell the Al what pages you want and what they are called
 - Tell the Al what tasks occur on each page, functions called, data needed, etc.

State variables

- If certain data or function outputs are used on multiple pages, you can save them to "state variables" in Streamlit
- Eliminates need to redo slow computations (like calling up an LLM to write HTML)
- Syntax: st.session_state.variable_name = variable

```
uploaded_file = st.file_uploader("Upload Tweet CSV", type="csv")
if uploaded_file:
    st.session_state.df = pd.read_csv(uploaded_file)
    st.success("Tweet data loaded!")
```

Personality Assessment + Persona Chat App

 Let's make an app where I can upload a file of tweets and then perform a Myers Briggs personality assessment on them and then have the AI pretend to be that person based on the tweets and I can chat with them

Al Prompt

App maker, app maker, make me an app. I would like to make a Streamlit app to compute the Myers Brigg personality of a user based on their tweets, and a persona chat where I can chat with an AI pretending to be that user based on their tweets. The app should have a cool name that will make people wanna use it.

Pages

I want three pages, Homepage, MBTI Profile, Persona Chat

1) Homepage

On the hompage I want to drag the tweet file. The tweets are in a csv file with columns text. Then it will be loaded into a dataframe df. Then I want to compute some session state variables:

- 1) mbti_html Pass df to a function I wrote in my utils.py file called get_myers_brigs(df) that returns an HTML string summarizing the person's Mybers Briggs type. Call it mbti_html. While the get_myers_brigs(df) is working, show some spinning wheel so I know its busy thinking and say "Computing Myers Briggs profile".
- 2) instructions_persona Pass df to a function in my utils.py file called get_persona_chat_instructions(df) that will return a string which is the instructions for the persona chat telling the AI how to behave. Call it instructions persona.
- 3) messages the list of messages in the persona chat. this should be reset each time a new csv of tweets is uploaded
- 2) MBTI Profile

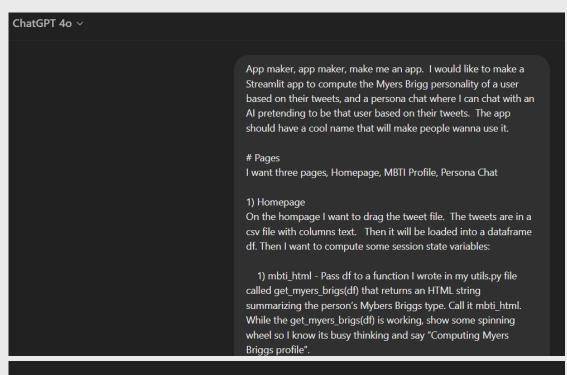
On the MBTI Page, I want to display that mbti html.

3) Persona Chat

On the Persona Chat page I want a chat window with the AI. Don't show instructions_persona on the screen as they are very long and contain many tweets. The AI message is generated by a function I wrote in my utils.py file called

get_ai_response(instructions_persona, messages) that takes as input instructions_persona and the messages in the chat so far, including what the user just typed, formatted as as list appropriated for OpenAI API. I want the app to show animated ... while the AI is generating its message. Show the entire chat history above where the user inputs their message. When they input their message, display it immediately and then show the AI message.

Ask ChatGPT



Memory updated

Alright App Maker is in the house 👺 — let's build your Streamlit app: Twitter Persona.

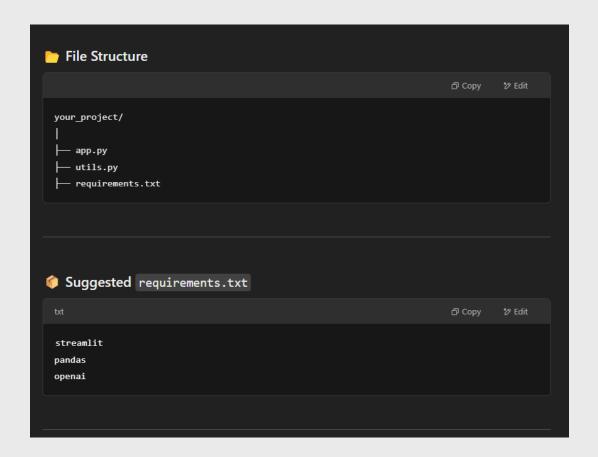
Here's the complete Streamlit code scaffold with all three pages and session state management just like you described:

AI Generated App Code

```
app.py
import streamlit as st
import pandas as pd
from utils import get_myers_brigs, get_persona_chat_instructions, get_ai_response
# Set Streamlit config
st.set_page_config(page_title="Twitter Persona", layout="wide")
# Initialize session state
if "df" not in st.session state:
    st.session_state.df = None
if "mbti_html" not in st.session_state:
    st.session_state.mbti_html = ""
if "instructions persona" not in st.session state:
    st.session state.instructions persona = "
if "messages" not in st.session_state:
    st.session_state.messages = []
# Sidebar for navigation
page = st.sidebar.radio("Navigate", ["Homepage", "MBTI Profile", "Persona Chat"])
# ------ PAGE: HOMEPAGE ------
if page == "Homepage":
    st.title("  Twitter Persona")
    st.markdown("Upload a CSV of tweets and generate your MBTI profile + AI persona.")
    uploaded_file = st.file_uploader("Upload your tweet CSV file", type=["csv"])
    if uploaded file is not None:
       df = pd.read csv(uploaded file)
        if 'text' not in df.columns:
```

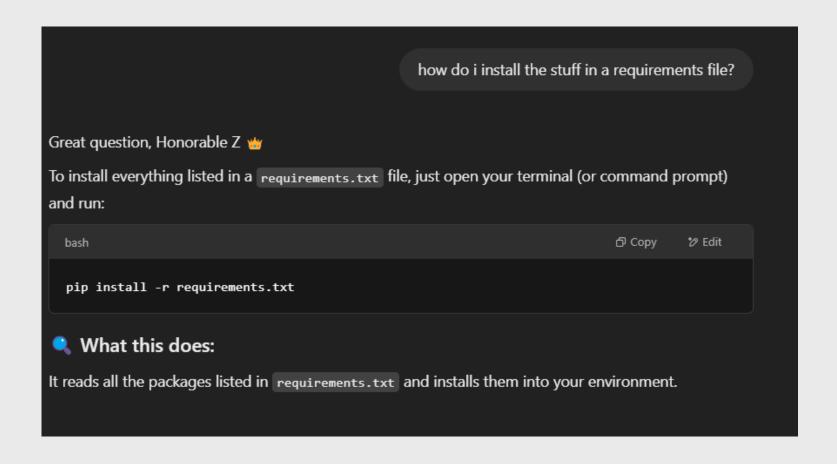
Requirements File

 This time the AI suggested that I create a requirements.txt file with the packages I need to install.



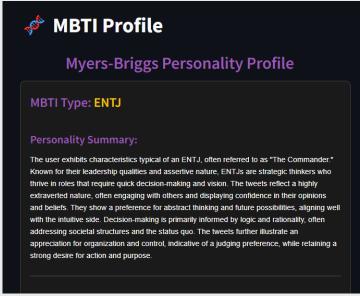
Installing Packages

The AI even told me how to install these packages



Working App







Coding Session

- In our coding session we will build a Twitter dashboard using AI and Streamlit
- App will be built in VS Code (TAs will provide help setting it up)