

Project Documentation: CardAssist

Project Structure

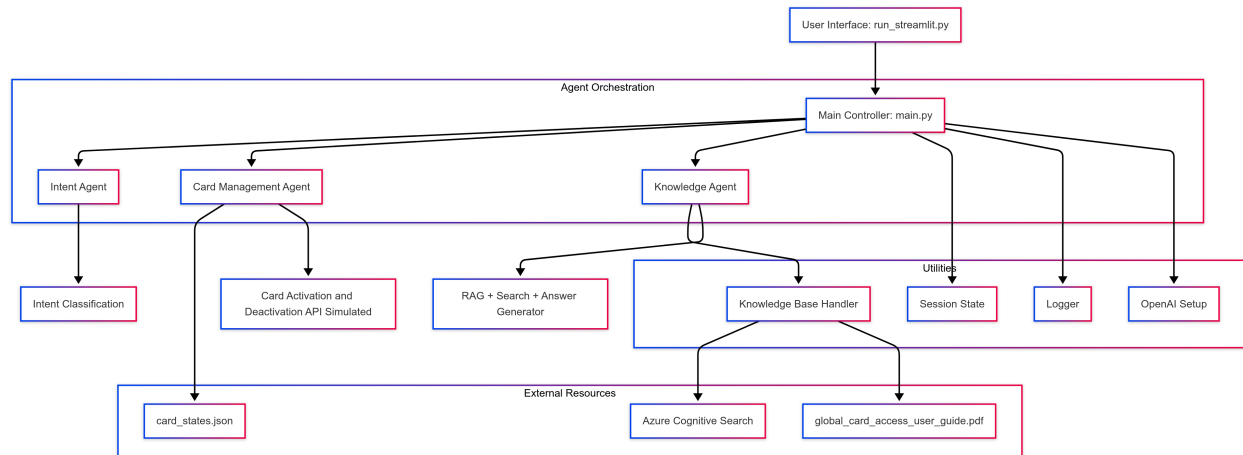
```
CardAssistBotUsingAzureSearch/
├── run_streamlit.py
├── main.py
├── requirements.txt
├── global_card_access_user_guide.pdf
├── card_states.json
├── .env
├── .gitignore
├── logs/
│   ├── 2025-04-19/
│   │   └── cardassist_2025-04-19_21-54-46.log
├── agents/
│   ├── intent_agent.py
│   ├── card_management_agent.py
│   ├── knowledge_agent.py
│   ├── __pycache__/
│   │   ├── intent_agent.cpython-310.pyc
│   │   ├── card_management_agent.cpython-310.pyc
│   │   └── knowledge_agent.cpython-310.pyc
├── utils/
│   ├── session_state.py
│   ├── knowledge_base.py
│   ├── logger.py
│   ├── openai_setup.py
│   ├── __pycache__/
│   │   ├── session_state.cpython-310.pyc
│   │   ├── knowledge_base.cpython-310.pyc
│   │   ├── logger.cpython-310.pyc
│   │   └── openai_setup.cpython-310.pyc
```

Overview

The CardAssist project implements a conversational AI system designed for intelligent card management, including activation, deactivation, and knowledge retrieval capabilities. The system employs a multi-agent architecture utilizing Streamlit for user interaction, OpenAI for

natural language understanding, and Azure Cognitive Search for retrieval-augmented generation (RAG).

Flow Diagram:



Project Structure and Components

Main Controller

- `main.py`: Orchestrates agent interactions and manages user requests.
- `run_streamlit.py`: User interface built using Streamlit.

Agents

Intent Agent (`intent_agent.py`)

- Classifies user requests into specific intents.

Card Management Agent (`card_management_agent.py`)

- Handles card activation and deactivation.
- Interacts with a simulated API (`card_states.json`) to manage card states.

Knowledge Agent (`knowledge_agent.py`)

- Facilitates knowledge retrieval using Azure Cognitive Search.
- Performs answer generation through RAG.

Utilities

- `session_state.py`: Manages conversational session states.
- `logger.py`: Logs activities and exceptions.

- `openai_setup.py`: Configures OpenAI API interactions.
- `knowledge_base.py`: Interfaces with Azure Cognitive Search and manages PDF content.

External Resources

- Azure Cognitive Search for knowledge retrieval.
- `global_card_access_user_guide.pdf`: Source document for knowledge base.
- `card_states.json`: Simulated API backend for card state management.

Configuration

- `.env`: Environment variables including API keys and configurations.
- `requirements.txt`: Lists Python dependencies.

Flow Summary

1. **User Interaction**: Users interact through a Streamlit interface (`run_streamlit.py`).
2. **Request Routing**: Main controller (`main.py`) directs requests to specific agents based on intent classification.
3. **Agent Processing**:
 - Intent Agent identifies intent.
 - Card Management Agent processes card-related actions.
 - Knowledge Agent provides answers from the knowledge base.
4. **Utilities and Logging**: Session management, logging, and OpenAI setup handled through utilities.
5. **External Integrations**: Azure Cognitive Search and simulated API backend (`card_states.json`).

Conclusion

The CardAssist system offers an efficient, modular architecture for intelligent card management, integrating advanced AI methodologies for optimal user interaction and experience.

How to run the code?

- ⇒ Execute below command from terminal (it saves logs at INFO level, it can be changed based on requirements)
“python run_streamlit.py --log-level INFO”

Sample Input & Output

Starting screen

CardAssist: Card Management & Knowledge Assistant

Welcome to CardAssist!
I'm here to help you manage your cards and answer your questions. You can:

- Activate or deactivate a card (e.g., "Activate card 123456789")
- Check card status (e.g., "What is the status of card 123456789?")
- Ask about card management (e.g., "How do I change my PIN?")
- Reset all cards (e.g., "Reset all cards")
- End the session by saying "thanks" or "end"

Start by typing your question below!

Ask your question:

e.g., Activate card 123456789 or How do I change my PIN?

Submit

Sample Examples Tried:

CardAssist: Card Management & Knowledge Assistant

Welcome to CardAssist!
I'm here to help you manage your cards and answer your questions. You can:

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- Check card status (e.g., "What is the status of card 123456789?")
- Ask about card management (e.g., "How do I change my PIN?")
- Reset all cards (e.g., "Reset all cards")
- End the session by saying "thanks" or "end"

Start by typing your question below!

 You: activate my card

 CardAssist:  Please provide a valid 9-digit card number to activate the card.

 You: its 455123123

 CardAssist:  Card 455123123 has been activated.

 You: activate my card 123

 CardAssist:  Please provide a valid 9-digit card number to activate the card.

 You: deactivate my card 123123123

 CardAssist:  Card 123123123 has been deactivated.

 You: deactivate my card 123123123

 CardAssist:  Card 123123123 is already deactivated.

 You: how to change the password

 CardAssist: 1. Go to Administration → Users from the top of the Program Administration Dashboard or Manage users from the Quick actions menu. 2. Click the desired user's name and select Reset Password. 3. Click Ok. The user will be sent an email providing further instructions on how they can successfully reset their password.

 You: thanks

 CardAssist:  Session ended. You can start a new conversation!

 Session ended. Start a new conversation below.

Ask your question:

e.g., Activate card 123456789 or How do I change my PIN?

Submit

Appendix

Areas Of Improvement

1. As you can see below (Ref: SAMPLE-1), when I asked which cards are in active state, it simply shows the history of all cards which were activated (it should show only those cards which are still active based on current status)
2. When I asked to show the current status of the cards, then it is showing history of all the cards which were 'activated' or 'deactivated' whereas, it should only show the latest status of the cards.
3. We will have to include user level access control so that everything is not visible to all the users.
4. **Persistent Storage: Replace JSON with a Database (for scalability)**
The current implementation uses *card_states.json* to store card states, which is not scalable for high concurrency or large datasets due to file I/O bottlenecks and potential race conditions.
Solution: Use a lightweight database like SQLite or a cloud-based database like Azure Cosmos DB for card states and action history.
Why: Databases handle concurrent reads/writes, provide ACID transactions, and scale better than JSON files.
5. The current Streamlit app runs locally, which is not scalable for multiple users or high traffic.
Solution: Deploy the app on a cloud platform like Azure App Service, Azure Kubernetes Service (AKS), or AWS Elastic Beanstalk.
Why: These platforms support auto-scaling, load balancing, and high availability.
6. **Asynchronous Processing**
The app uses asyncio for intent classification, but other operations (e.g., database writes, search queries) are synchronous, which can block the event loop.
Solution: Make database and search operations asynchronous using aiohttp for HTTP requests or aiosqlite for SQLite.
7. **Reducing Latency in the RAG Component**
The RAG component involves:
Retrieval: Vector search in Azure AI Search (agents/knowledge_agent.py).
Generation: OpenAI GPT-4 call to generate responses.
 - a. **Optimize Vector Search**
Problem: The vector search in Azure AI Search can be slow for large indexes or high-latency networks.
Solutions:
Use HNSW Parameters: Tune the HNSW algorithm for faster searches.
Reduce Result Set: Limit the number of results (k) to the minimum needed.
Precompute Embeddings: Cache embeddings locally to avoid recomputing.

b. Optimize GPT-4 Calls

Problem: The OpenAI GPT-4 call in `knowledge_agent.py` is a significant latency contributor due to network requests and model processing.

Solutions:

Use a Faster Model: Switch to a lighter model like `gpt-3.5-turbo` for non-critical queries.

Batch Requests: Combine multiple queries into a single API call if applicable.

Caching: Cache frequent query responses (already suggested above).

c. Parallelize Retrieval and Embedding

Problem: The embedding computation (`embedding_model.encode`) and search are sequential.


Solution: Parallelize embedding computation using `async` or `multiprocessing`.

d. Reduce PDF Processing Overhead

Problem: Extracting text from `global_card_access_user_guide.pdf` on every run is slow.

Solution: Cache the extracted text chunks.

SAMPLE-1

 **You:** which cards are in active state?

 **CardAssist:**  Cards activated:

- Card 123456789 was activated.
- Card 123456789 was activated.
- Card 123123456 was activated.

 **You:** show the current status of cards

 **CardAssist:**  Cards activated:

- Card 123456789 was activated.
- Card 123456789 was activated.
- Card 123123456 was activated.

 Cards deactivated:

- Card 123456789 was deactivated.
- Card 123456789 was deactivated.

🧑 **You:** is card 123456789 active?

🤖 **CardAssist:**  Card 123456789 is currently inactive.

Installed Libraries & Dependencies

azure-search-documents==11.4.0

- └─ azure-core [required: >=1.28.0,<2.0.0, installed: 1.33.0]
 - └─ requests [required: >=2.21.0, installed: 2.32.3]
 - └─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
 - └─ idna [required: >=2.5,<4, installed: 3.10]
 - └─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
 - └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
 - └─ six [required: >=1.11.0, installed: 1.17.0]
 - └─ typing_extensions [required: >=4.6.0, installed: 4.13.2]
- └─ azure-common [required: ~=1.1, installed: 1.1.28]
- └─ isodate [required: >=0.6.0, installed: 0.7.2]

faiss-cpu==1.10.0

- └─ numpy [required: >=1.25.0,<3.0, installed: 2.2.4]
- └─ packaging [required: Any, installed: 24.2]

ipykernel==6.29.5

- └─ appnope [required: Any, installed: 0.1.4]
- └─ comm [required: >=0.1.1, installed: 0.2.2]
- └─ traitlets [required: >=4, installed: 5.14.3]
- └─ debugpy [required: >=1.6.5, installed: 1.8.14]
- └─ ipython [required: >=7.23.1, installed: 8.35.0]
 - └─ decorator [required: Any, installed: 5.2.1]
 - └─ exceptiongroup [required: Any, installed: 1.2.2]
 - └─ jedi [required: >=0.16, installed: 0.19.2]
 - └─ parso [required: >=0.8.4,<0.9.0, installed: 0.8.4]
 - └─ matplotlib-inline [required: Any, installed: 0.1.7]
 - └─ traitlets [required: Any, installed: 5.14.3]
 - └─ pexpect [required: >4.3, installed: 4.9.0]
 - └─ ptyprocess [required: >=0.5, installed: 0.7.0]
 - └─ prompt_toolkit [required: >=3.0.41,<3.1.0, installed: 3.0.51]
 - └─ wcwidth [required: Any, installed: 0.2.13]
 - └─ Pygments [required: >=2.4.0, installed: 2.19.1]
 - └─ stack-data [required: Any, installed: 0.6.3]
 - └─ executing [required: >=1.2.0, installed: 2.2.0]
 - └─ asttokens [required: >=2.1.0, installed: 3.0.0]

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| | └─ pure_eval [required: Any, installed: 0.2.3]
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    └─ platformdirs [required: >=2.5, installed: 4.3.7]
      └─ traitlets [required: >=5.3, installed: 5.14.3]
    └─ python-dateutil [required: >=2.8.2, installed: 2.9.0.post0]
      └─ six [required: >=1.5, installed: 1.17.0]
    └─ pyzmq [required: >=23.0, installed: 26.4.0]
    └─ tornado [required: >=6.2, installed: 6.4.2]
    └─ traitlets [required: >=5.3, installed: 5.14.3]
  └─ jupyter_core [required: >=4.12,!5.0.*, installed: 5.7.2]
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  └─ aiosignal [required: >=1.1.2, installed: 1.3.2]
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- └─ cloudevents [required: ~=1.0, installed: 1.11.0]
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 - └─ annotated-types [required: >=0.6.0, installed: 0.7.0]
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 - └─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
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└─ six [required: Any, installed: 1.17.0]
└─ openapi-spec-validator [required: >=0.7.1,<0.8.0, installed: 0.7.1]
└─ jsonschema [required: >=4.18.0,<5.0.0, installed: 4.23.0]
└─ attrs [required: >=22.2.0, installed: 25.3.0]
└─ jsonschema-specifications [required: >=2023.03.6, installed: 2024.10.1]
└─ referencing [required: >=0.31.0, installed: 0.36.2]
└─ attrs [required: >=22.2.0, installed: 25.3.0]
└─ rpds-py [required: >=0.7.0, installed: 0.24.0]
└─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
└─ referencing [required: >=0.28.4, installed: 0.36.2]
└─ attrs [required: >=22.2.0, installed: 25.3.0]
└─ rpds-py [required: >=0.7.0, installed: 0.24.0]
└─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
└─ rpds-py [required: >=0.7.1, installed: 0.24.0]
└─ jsonschema-path [required: >=0.3.1,<0.4.0, installed: 0.3.4]
└─ PyYAML [required: >=5.1, installed: 6.0.2]
└─ pathable [required: >=0.4.1,<0.5.0, installed: 0.4.4]
└─ referencing [required: <0.37.0, installed: 0.36.2]
└─ attrs [required: >=22.2.0, installed: 25.3.0]
└─ rpds-py [required: >=0.7.0, installed: 0.24.0]
└─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
└─ requests [required: >=2.31.0,<3.0.0, installed: 2.32.3]
└─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
└─ idna [required: >=2.5,<4, installed: 3.10]
└─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
└─ certifi [required: >=2017.4.17, installed: 2025.1.31]
└─ lazy-object-proxy [required: >=1.7.1,<2.0.0, installed: 1.11.0]
└─ openapi-schema-validator [required: >=0.6.0,<0.7.0, installed: 0.6.3]
└─ jsonschema [required: >=4.19.1,<5.0.0, installed: 4.23.0]
└─ attrs [required: >=22.2.0, installed: 25.3.0]
└─ jsonschema-specifications [required: >=2023.03.6, installed: 2024.10.1]
└─ referencing [required: >=0.31.0, installed: 0.36.2]
└─ attrs [required: >=22.2.0, installed: 25.3.0]
└─ rpds-py [required: >=0.7.0, installed: 0.24.0]
└─ typing_extensions [required: >=4.4.0, installed: 4.13.2]

```

- └─ referencing [required: >=0.28.4, installed: 0.36.2]
 - └─ attrs [required: >=22.2.0, installed: 25.3.0]
 - └─ rpds-py [required: >=0.7.0, installed: 0.24.0]
 - └─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
 - └─ rpds-py [required: >=0.7.1, installed: 0.24.0]
 - └─ jsonschema-specifications [required: >=2023.5.2, installed: 2024.10.1]
 - └─ referencing [required: >=0.31.0, installed: 0.36.2]
 - └─ attrs [required: >=22.2.0, installed: 25.3.0]
 - └─ rpds-py [required: >=0.7.0, installed: 0.24.0]
 - └─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
 - └─ rfc3339-validator [required: Any, installed: 0.1.4]
 - └─ six [required: Any, installed: 1.17.0]
 - └─ parse [required: Any, installed: 1.20.2]
 - └─ typing_extensions [required: >=4.8.0,<5.0.0, installed: 4.13.2]
 - └─ Werkzeug [required: <3.1.2, installed: 3.1.1]
 - └─ MarkupSafe [required: >=2.1.1, installed: 3.0.2]
- └─ websockets [required: >=13,<16, installed: 15.0.1]
- └─ aiortc [required: >=1.9.0, installed: 1.11.0]
 - └─ aioice [required: >=0.9.0,<1.0.0, installed: 0.10.1]
 - └─ dnspython [required: >=2.0.0, installed: 2.7.0]
 - └─ ifaddr [required: >=0.2.0, installed: 0.2.0]
 - └─ av [required: >=14.0.0,<15.0.0, installed: 14.3.0]
 - └─ cffi [required: >=1.0.0, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
 - └─ cryptography [required: >=44.0.0, installed: 44.0.2]
 - └─ cffi [required: >=1.12, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
 - └─ google-crc32c [required: >=1.1, installed: 1.7.1]
 - └─ pyee [required: >=13.0.0, installed: 13.0.0]
 - └─ typing_extensions [required: Any, installed: 4.13.2]
 - └─ pylibsrtp [required: >=0.10.0, installed: 0.12.0]
 - └─ cffi [required: >=1.0.0, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
 - └─ pyOpenSSL [required: >=25.0.0, installed: 25.0.0]
 - └─ cryptography [required: >=41.0.5,<45, installed: 44.0.2]
 - └─ cffi [required: >=1.12, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
 - └─ typing_extensions [required: >=4.9, installed: 4.13.2]
 - └─ opentelemetry-api [required: ~1.24, installed: 1.32.1]
 - └─ Deprecated [required: >=1.2.6, installed: 1.2.18]
 - └─ wrapt [required: >=1.10,<2, installed: 1.17.2]
 - └─ importlib_metadata [required: >=6.0,<8.7.0, installed: 8.6.1]

- └─ zipp [required: >=3.20, installed: 3.21.0]
- └─ opentelemetry-sdk [required: ~=1.24, installed: 1.32.1]
 - └─ opentelemetry-api [required: ==1.32.1, installed: 1.32.1]
 - └─ Deprecated [required: >=1.2.6, installed: 1.2.18]
 - └─ wrapt [required: >=1.10,<2, installed: 1.17.2]
 - └─ importlib_metadata [required: >=6.0,<8.7.0, installed: 8.6.1]
 - └─ zipp [required: >=3.20, installed: 3.21.0]
 - └─ opentelemetry-semantic-conventions [required: ==0.53b1, installed: 0.53b1]
 - └─ Deprecated [required: >=1.2.6, installed: 1.2.18]
 - └─ wrapt [required: >=1.10,<2, installed: 1.17.2]
 - └─ opentelemetry-api [required: ==1.32.1, installed: 1.32.1]
 - └─ Deprecated [required: >=1.2.6, installed: 1.2.18]
 - └─ wrapt [required: >=1.10,<2, installed: 1.17.2]
 - └─ importlib_metadata [required: >=6.0,<8.7.0, installed: 8.6.1]
 - └─ zipp [required: >=3.20, installed: 3.21.0]
 - └─ typing_extensions [required: >=3.7.4, installed: 4.13.2]
 - └─ prance [required: ~=23.6.21.0, installed: 23.6.21.0]
 - └─ chardet [required: >=3.0, installed: 5.2.0]
 - └─ ruamel.yaml [required: >=0.17.10, installed: 0.18.10]
 - └─ ruamel.yaml.clib [required: >=0.2.7, installed: 0.2.12]
 - └─ requests [required: >=2.25, installed: 2.32.3]
 - └─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
 - └─ idna [required: >=2.5,<4, installed: 3.10]
 - └─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
 - └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
 - └─ six [required: ~=1.15, installed: 1.17.0]
 - └─ packaging [required: >=21.3, installed: 24.2]
 - └─ pybars4 [required: ~=0.9, installed: 0.9.13]
 - └─ PyMeta3 [required: >=0.5.1, installed: 0.5.1]
 - └─ Jinja2 [required: ~=3.1, installed: 3.1.6]
 - └─ MarkupSafe [required: >=2.0, installed: 3.0.2]
 - └─ nest-asyncio [required: ~=1.6, installed: 1.6.0]
 - └─ scipy [required: >=1.15.1, installed: 1.15.2]
 - └─ numpy [required: >=1.23.5,<2.5, installed: 2.2.4]
 - └─ websockets [required: >=13,<16, installed: 15.0.1]
 - └─ aiortc [required: >=1.9.0, installed: 1.11.0]
 - └─ aioice [required: >=0.9.0,<1.0.0, installed: 0.10.1]
 - └─ dnspython [required: >=2.0.0, installed: 2.7.0]
 - └─ ifaddr [required: >=0.2.0, installed: 0.2.0]
 - └─ av [required: >=14.0.0,<15.0.0, installed: 14.3.0]
 - └─ cffi [required: >=1.0.0, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]

- └─ cryptography [required: >=44.0.0, installed: 44.0.2]
 - └─ cffi [required: >=1.12, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
- └─ google-crc32c [required: >=1.1, installed: 1.7.1]
- └─ pyee [required: >=13.0.0, installed: 13.0.0]
 - └─ typing_extensions [required: Any, installed: 4.13.2]
- └─ pylibsrtp [required: >=0.10.0, installed: 0.12.0]
 - └─ cffi [required: >=1.0.0, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
- └─ pyOpenSSL [required: >=25.0.0, installed: 25.0.0]
 - └─ cryptography [required: >=41.0.5,<45, installed: 44.0.2]
 - └─ cffi [required: >=1.12, installed: 1.17.1]
 - └─ pycparser [required: Any, installed: 2.22]
 - └─ typing_extensions [required: >=4.9, installed: 4.13.2]

sentence-transformers==4.1.0

- └─ transformers [required: >=4.41.0,<5.0.0, installed: 4.51.3]
 - └─ filelock [required: Any, installed: 3.18.0]
 - └─ huggingface-hub [required: >=0.30.0,<1.0, installed: 0.30.2]
 - └─ filelock [required: Any, installed: 3.18.0]
 - └─ fsspec [required: >=2023.5.0, installed: 2025.3.2]
 - └─ packaging [required: >=20.9, installed: 24.2]
 - └─ PyYAML [required: >=5.1, installed: 6.0.2]
 - └─ requests [required: Any, installed: 2.32.3]
 - └─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
 - └─ idna [required: >=2.5,<4, installed: 3.10]
 - └─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
 - └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
 - └─ tqdm [required: >=4.42.1, installed: 4.67.1]
 - └─ typing_extensions [required: >=3.7.4.3, installed: 4.13.2]
 - └─ numpy [required: >=1.17, installed: 2.2.4]
 - └─ packaging [required: >=20.0, installed: 24.2]
 - └─ PyYAML [required: >=5.1, installed: 6.0.2]
 - └─ regex [required: !=2019.12.17, installed: 2024.11.6]
 - └─ requests [required: Any, installed: 2.32.3]
 - └─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
 - └─ idna [required: >=2.5,<4, installed: 3.10]
 - └─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
 - └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
 - └─ tokenizers [required: >=0.21,<0.22, installed: 0.21.1]
 - └─ huggingface-hub [required: >=0.16.4,<1.0, installed: 0.30.2]
 - └─ filelock [required: Any, installed: 3.18.0]
 - └─ fsspec [required: >=2023.5.0, installed: 2025.3.2]

- └─ packaging [required: >=20.9, installed: 24.2]
 - └─ PyYAML [required: >=5.1, installed: 6.0.2]
 - └─ requests [required: Any, installed: 2.32.3]
 - └─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
 - └─ idna [required: >=2.5,<4, installed: 3.10]
 - └─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
 - └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
 - └─ tqdm [required: >=4.42.1, installed: 4.67.1]
 - └─ typing_extensions [required: >=3.7.4.3, installed: 4.13.2]
- └─ safetensors [required: >=0.4.3, installed: 0.5.3]
- └─ tqdm [required: >=4.27, installed: 4.67.1]
- └─ tqdm [required: Any, installed: 4.67.1]
- └─ torch [required: >=1.11.0, installed: 2.6.0]
 - └─ filelock [required: Any, installed: 3.18.0]
 - └─ typing_extensions [required: >=4.10.0, installed: 4.13.2]
 - └─ networkx [required: Any, installed: 3.4.2]
 - └─ Jinja2 [required: Any, installed: 3.1.6]
 - └─ MarkupSafe [required: >=2.0, installed: 3.0.2]
 - └─ fsspec [required: Any, installed: 2025.3.2]
 - └─ sympy [required: ==1.13.1, installed: 1.13.1]
 - └─ mpmath [required: >=1.1.0,<1.4, installed: 1.3.0]
- └─ scikit-learn [required: Any, installed: 1.6.1]
 - └─ numpy [required: >=1.19.5, installed: 2.2.4]
 - └─ scipy [required: >=1.6.0, installed: 1.15.2]
 - └─ numpy [required: >=1.23.5,<2.5, installed: 2.2.4]
 - └─ joblib [required: >=1.2.0, installed: 1.4.2]
 - └─ threadpoolctl [required: >=3.1.0, installed: 3.6.0]
- └─ scipy [required: Any, installed: 1.15.2]
 - └─ numpy [required: >=1.23.5,<2.5, installed: 2.2.4]
- └─ huggingface-hub [required: >=0.20.0, installed: 0.30.2]
 - └─ filelock [required: Any, installed: 3.18.0]
 - └─ fsspec [required: >=2023.5.0, installed: 2025.3.2]
 - └─ packaging [required: >=20.9, installed: 24.2]
 - └─ PyYAML [required: >=5.1, installed: 6.0.2]
 - └─ requests [required: Any, installed: 2.32.3]
 - └─ charset-normalizer [required: >=2,<4, installed: 3.4.1]
 - └─ idna [required: >=2.5,<4, installed: 3.10]
 - └─ urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
 - └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
 - └─ tqdm [required: >=4.42.1, installed: 4.67.1]
 - └─ typing_extensions [required: >=3.7.4.3, installed: 4.13.2]
- └─ pillow [required: Any, installed: 11.2.1]


```
└─ typing_extensions [required: >=4.5.0, installed: 4.13.2]
setuptools==65.5.0
streamlit==1.44.1
├─ altair [required: >=4.0,<6, installed: 5.5.0]
│   ├── Jinja2 [required: Any, installed: 3.1.6]
│   │   └─ MarkupSafe [required: >=2.0, installed: 3.0.2]
│   ├── jsonschema [required: >=3.0, installed: 4.23.0]
│   │   ├── attrs [required: >=22.2.0, installed: 25.3.0]
│   │   ├── jsonschema-specifications [required: >=2023.03.6, installed: 2024.10.1]
│   │   │   └─ referencing [required: >=0.31.0, installed: 0.36.2]
│   │   │       ├── attrs [required: >=22.2.0, installed: 25.3.0]
│   │   │       ├── rpds-py [required: >=0.7.0, installed: 0.24.0]
│   │   │       └─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
│   │   ├── referencing [required: >=0.28.4, installed: 0.36.2]
│   │   │   ├── attrs [required: >=22.2.0, installed: 25.3.0]
│   │   │   ├── rpds-py [required: >=0.7.0, installed: 0.24.0]
│   │   │   └─ typing_extensions [required: >=4.4.0, installed: 4.13.2]
│   │   └─ rpds-py [required: >=0.7.1, installed: 0.24.0]
│   ├── narwhals [required: >=1.14.2, installed: 1.35.0]
│   ├── packaging [required: Any, installed: 24.2]
│   └─ typing_extensions [required: >=4.10.0, installed: 4.13.2]
├─ blinker [required: >=1.0.0,<2, installed: 1.9.0]
├─ cachetools [required: >=4.0,<6, installed: 5.5.2]
├─ click [required: >=7.0,<9, installed: 8.1.8]
├─ numpy [required: >=1.23,<3, installed: 2.2.4]
├─ packaging [required: >=20,<25, installed: 24.2]
├─ pandas [required: >=1.4.0,<3, installed: 2.2.3]
│   ├── numpy [required: >=1.22.4, installed: 2.2.4]
│   ├── python-dateutil [required: >=2.8.2, installed: 2.9.0.post0]
│   │   └─ six [required: >=1.5, installed: 1.17.0]
│   ├── pytz [required: >=2020.1, installed: 2025.2]
│   └─ tzdata [required: >=2022.7, installed: 2025.2]
├─ pillow [required: >=7.1.0,<12, installed: 11.2.1]
├─ protobuf [required: >=3.20,<6, installed: 5.29.4]
├─ pyarrow [required: >=7.0, installed: 19.0.1]
├─ requests [required: >=2.27,<3, installed: 2.32.3]
│   ├── charset-normalizer [required: >=2,<4, installed: 3.4.1]
│   ├── idna [required: >=2.5,<4, installed: 3.10]
│   ├── urllib3 [required: >=1.21.1,<3, installed: 2.4.0]
│   └─ certifi [required: >=2017.4.17, installed: 2025.1.31]
├─ tenacity [required: >=8.1.0,<10, installed: 9.1.2]
└─ toml [required: >=0.10.1,<2, installed: 0.10.2]
```

```
└─ typing_extensions [required: >=4.4.0,<5, installed: 4.13.2]
└─ GitPython [required: >=3.0.7,<4,!3.1.19, installed: 3.1.44]
└─ gitdb [required: >=4.0.1,<5, installed: 4.0.12]
└─ smmap [required: >=3.0.1,<6, installed: 5.0.2]
└─ pydeck [required: >=0.8.0b4,<1, installed: 0.9.1]
└─ Jinja2 [required: >=2.10.1, installed: 3.1.6]
└─ MarkupSafe [required: >=2.0, installed: 3.0.2]
└─ numpy [required: >=1.16.4, installed: 2.2.4]
└─ tornado [required: >=6.0.3,<7, installed: 6.4.2]
```