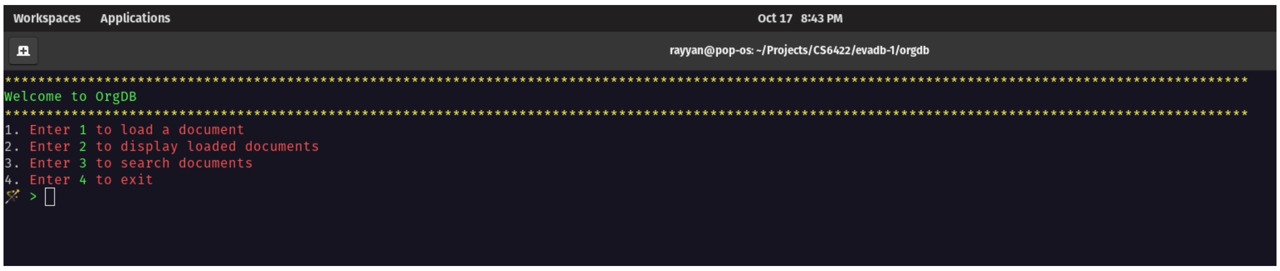
OrgDB

(https://github.com/sicario001/OrgDB)

Introduction

OrgDB is a tool that is closely inspired from Gerev and developed using EvaDB. OrgDB allows users to load their documents and supports user queries by generating relevant answers within the context of the loaded documents. In the following sections, I will describe the key features of OrgDB, some important implementation details, few use cases of OrgDB and finally the future directions.

Features



```
******************************************************************************************************************************
Welcome to OrgDB
******************************************************************************************************************************
1. Enter 1 to load a document
2. Enter 2 to display loaded documents
3. Enter 3 to search documents
4. Enter 4 to exit
 >
```

1. Supports loading of documents of the following types:
   a. **pdf**
   b. **txt**
   c. **web pages**
2. Allows users to display loaded documents along with the timestamp when they are loaded.
3. Allows users to search documents using some query string. Display the most relevant results from the documents along with the sources and also generates a consolidated response for the user.
4. Supports caching of user queries that helps reduce response times in case of semantically similar queries.

Implementation Details

1. **Following tables are being maintained using EvaDB**
   a. ***mydocs (name, page, paragraph, data) -*** For storing the parsed and decomposed txt and web pages
   b. ***pdfdocs (name, page, paragraph, data) -*** For storing the loaded PDF documents
   c. ***documents (name, time_added) -*** For keeping track of the loaded documents and the timestamp when they are loaded
   d. ***cached_queries (query, response) -*** For caching the previous queries in order to reduce response times for frequently asked queries. Note that ***cached_queries*** is reset every time a new document is loaded.
2. **Finding relevant documents**

a. A custom function `SentenceFeatureExtractor` (uses `all-MiniLM-L6-v2` from `sentence_transformers`) has been used (defined in `sentence_feature_extractor.py`) for converting document paragraphs into feature vectors.

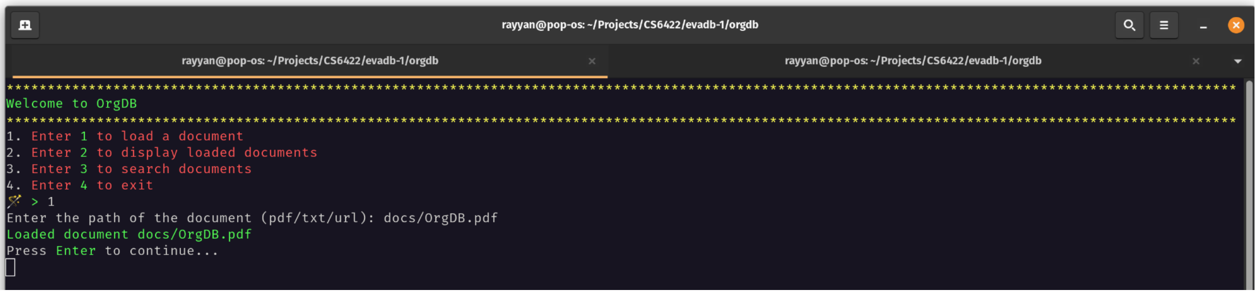
b. The paragraphs that have the highest similarity (i.e lowest similarity distance) with the query string using the feature embeddings generated from `SentenceFeatureExtractor` are returned in the result.

3. **Generating Consolidated Response**
    a. The data of the paragraphs having highest similarity scores (lowest similarity distances) , as returned in the previous step, is concatenated and used as the context.
    b. The LLM `GPT4All("ggml-model-gpt4all-falcon-q4_0.bin")` is being used to generate the response to the query based on the generated context.

4. **Caching User Queries**
    a. It may be possible that a user asks semantically similar queries multiple times. In such cases, we would need to execute the LLM each time and this negatively impacts the responsiveness of OrgDB, given that LLM execution has a very high latency. In order to tackle this problem, OrgDB caches the queries and the responses generated by the LLM in the table ***cached_queries***.
    b. When a new query arrives, we first check the semantic similarity of the query with the cached queries using the feature embeddings generated by `SentenceFeatureExtractor.` If the new query is very similar to some older cached query, we simply return the cached response rather than executing the LLM again.

Use Cases

1. Loading and querying documents


rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb
rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb
rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb

```
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1. Enter 1 to load a document
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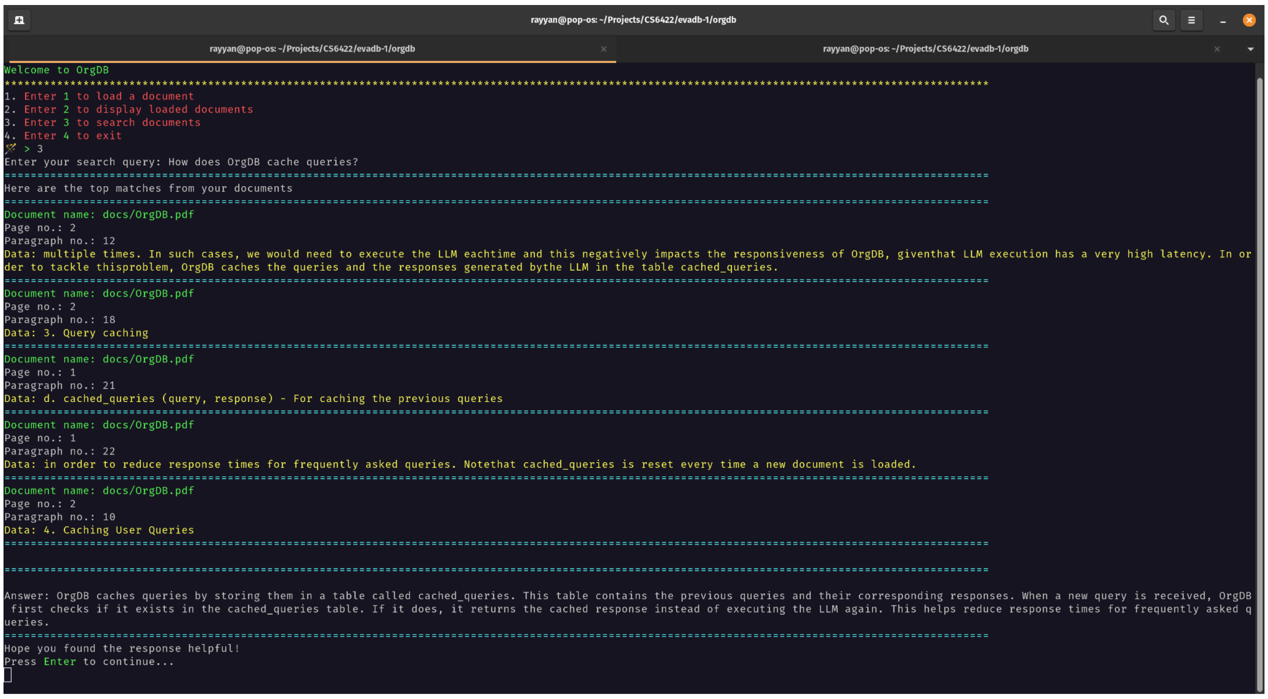
🪄 > 1
Enter the path of the document (pdf/txt/url): docs/OrgDB.pdf
Loaded document docs/OrgDB.pdf
Press Enter to continue...
```



```
rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb
rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb        rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb
Welcome to OrgDB
******************************************************************************************************************************************************
1. Enter 1 to load a document
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3. Enter 3 to search documents
4. Enter 4 to exit
> 3
Enter your search query: How does OrgDB cache queries?
======================================================================================================================================================
Here are the top matches from your documents
======================================================================================================================================================
Document name: docs/OrgDB.pdf
Page no.: 2
Paragraph no.: 12
Data: multiple times. In such cases, we would need to execute the LLM eachtime and this negatively impacts the responsiveness of OrgDB, giventhat LLM execution has a very high latency. In or
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======================================================================================================================================================
Document name: docs/OrgDB.pdf
Page no.: 2
Paragraph no.: 18
Data: 3. Query caching
======================================================================================================================================================
Document name: docs/OrgDB.pdf
Page no.: 1
Paragraph no.: 21
Data: d. cached_queries (query, response) - For caching the previous queries
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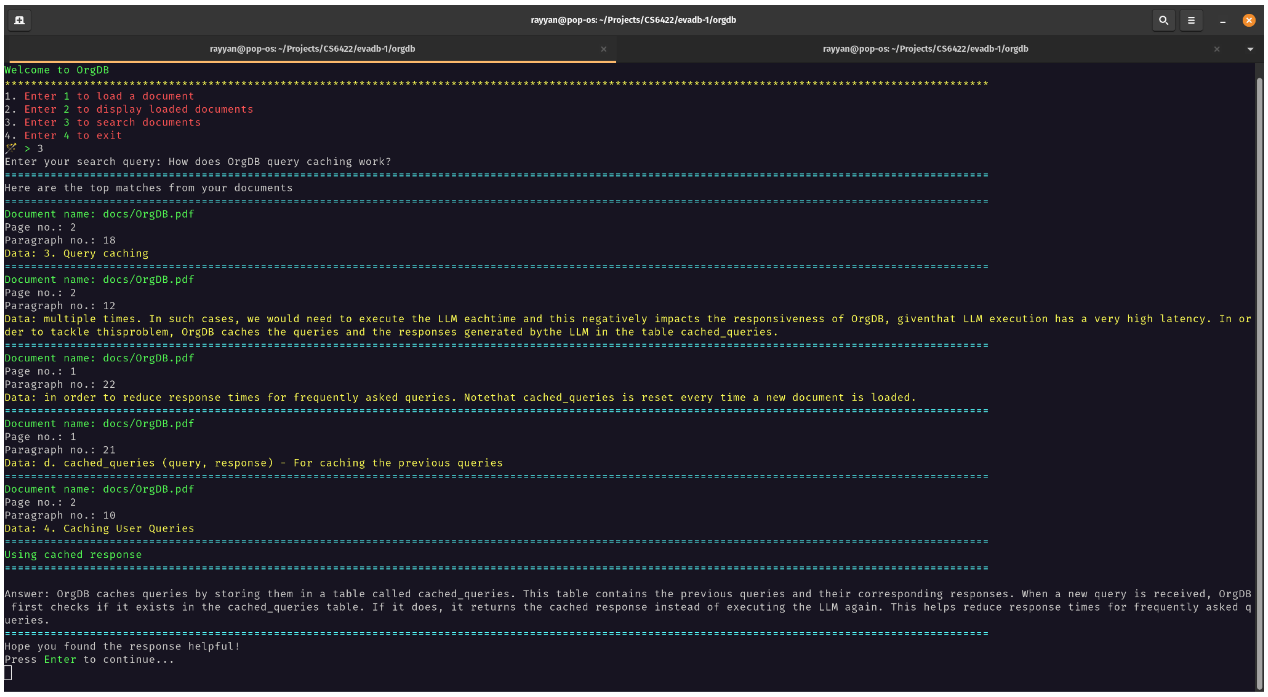
Document name: docs/OrgDB.pdf
Page no.: 1
Paragraph no.: 22
Data: in order to reduce response times for frequently asked queries. Notethat cached_queries is reset every time a new document is loaded.
======================================================================================================================================================
Document name: docs/OrgDB.pdf
Page no.: 2
Paragraph no.: 10
Data: 4. Caching User Queries
======================================================================================================================================================

======================================================================================================================================================

Answer: OrgDB caches queries by storing them in a table called cached_queries. This table contains the previous queries and their corresponding responses. When a new query is received, OrgDB
 first checks if it exists in the cached_queries table. If it does, it returns the cached response instead of executing the LLM again. This helps reduce response times for frequently asked q
ueries.
======================================================================================================================================================
Hope you found the response helpful!
Press Enter to continue...
```

2. Query caching

How does OrgDB cache queries, How does OrgDB query caching work (semantically similar)



```
rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb
rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb        rayyan@pop-os: ~/Projects/CS6422/evadb-1/orgdb
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Enter your search query: How does OrgDB query caching work?
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Here are the top matches from your documents
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Using cached response
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Future Directions

1. Improving the performance of txt and web page queries.
2. Use more powerful LLMs like ChatGpt or GPT4 for generating consolidated responses.
3. Currently the user needs to explicitly provide the documents that they want OrgDB to load in its database. As an extension, OrgDB can be integrated with platforms like Piazza or Slack, where it will have access to all the posts and messages on a channel. This will make the experience more seamless.
4. Currently the UI is terminal based. As an extension, a GUI can be developed for OrgDB.