

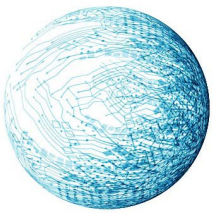
# Rethinking Virtual Reference Services with AI Chatbot in Library

(Hong Kong Polytechnic University Library)



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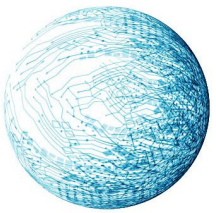
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# Development Objective

## Major Advantages

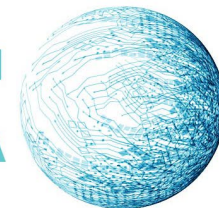
To assist users 24/7 in finding information and to address their queries about the Library services. The Chatbot will provide instant answers based on the published Library content, with source links for verification.

**Automated short answers with less library anxiety**

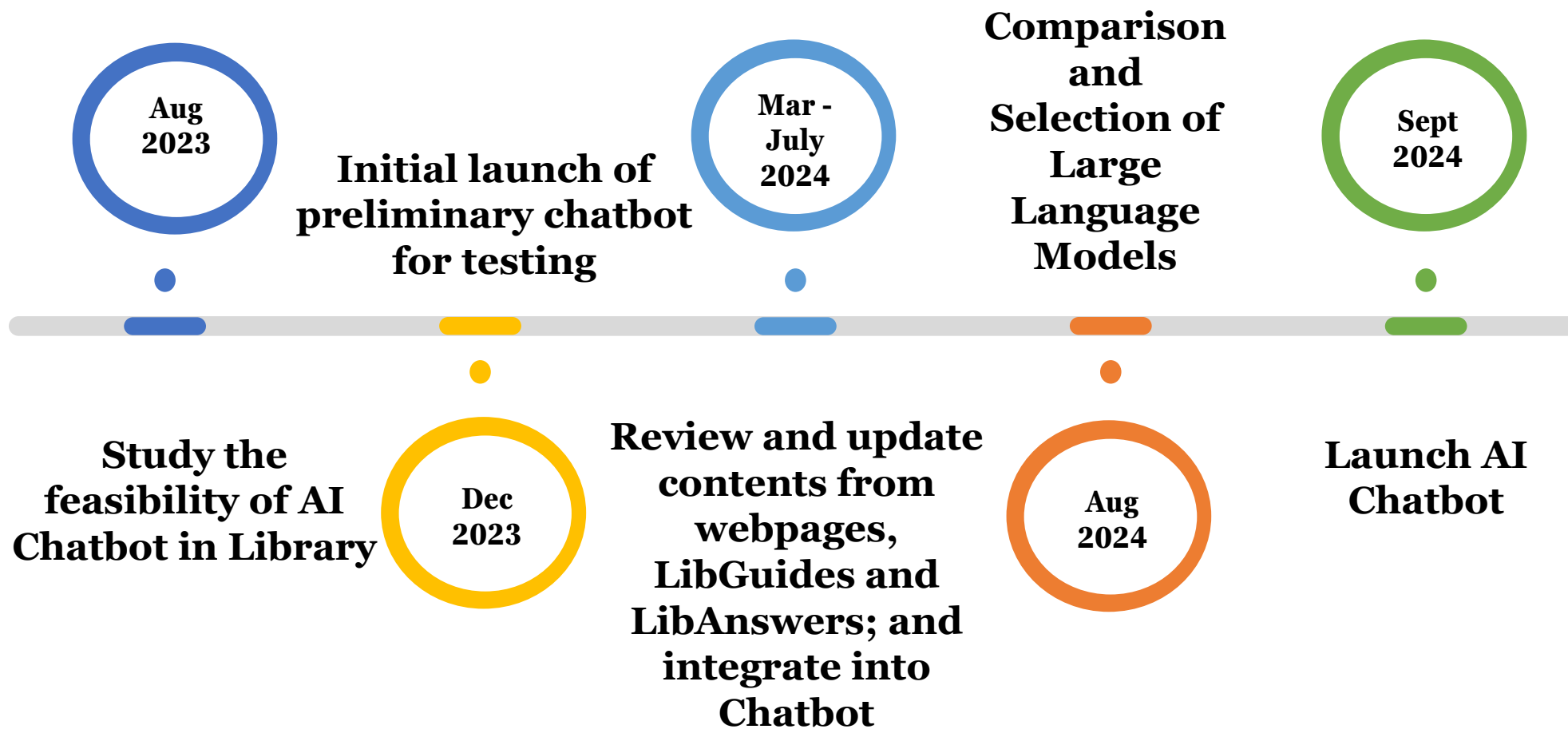
**Relieve staff from basic routine questions for more complex queries**

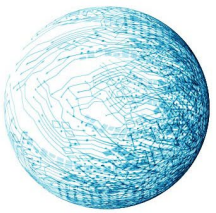
**Consistent responses to user queries**

**Enable data collection and analysis**

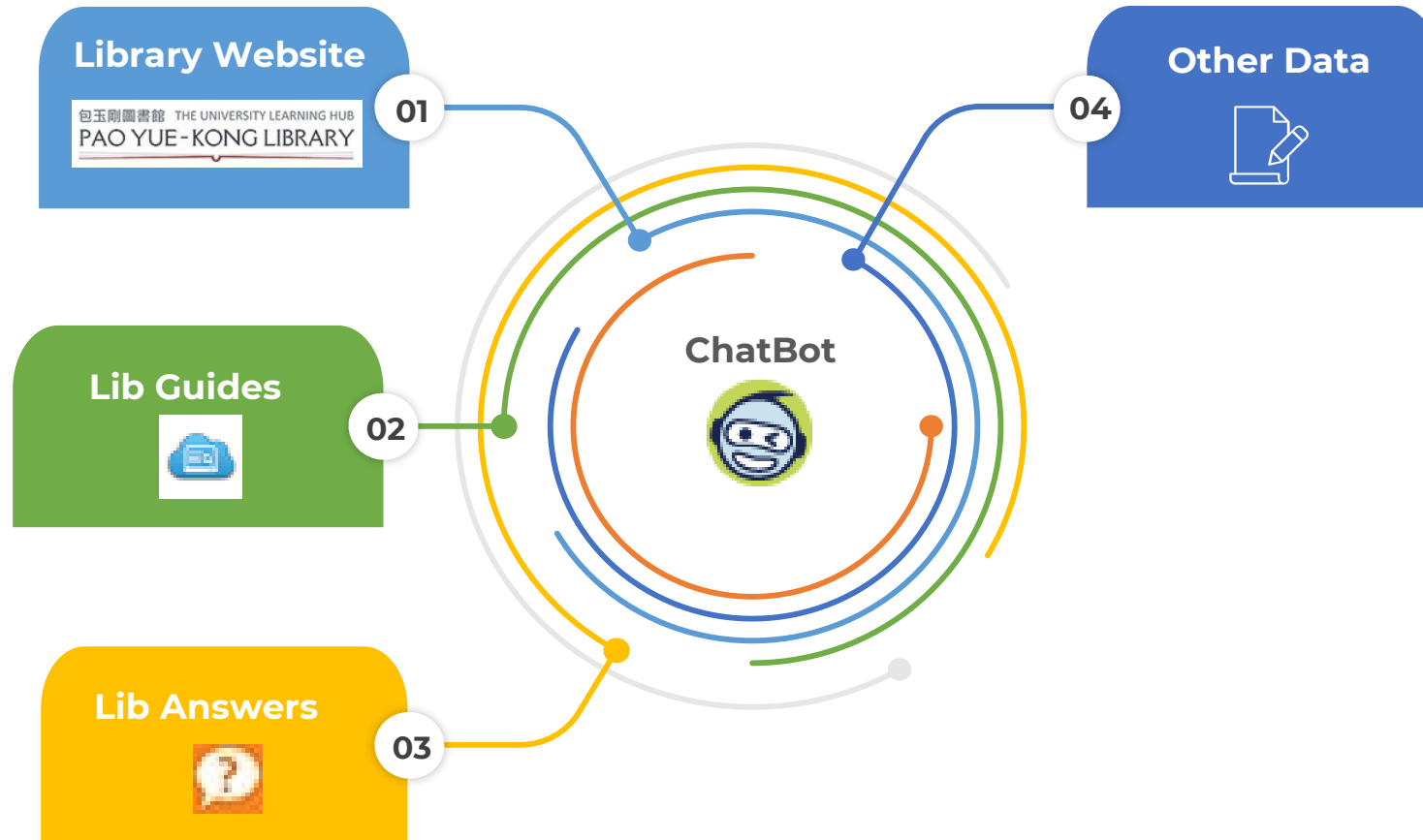


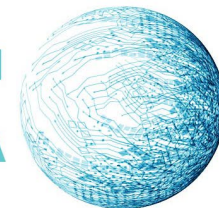
# Implementation Process



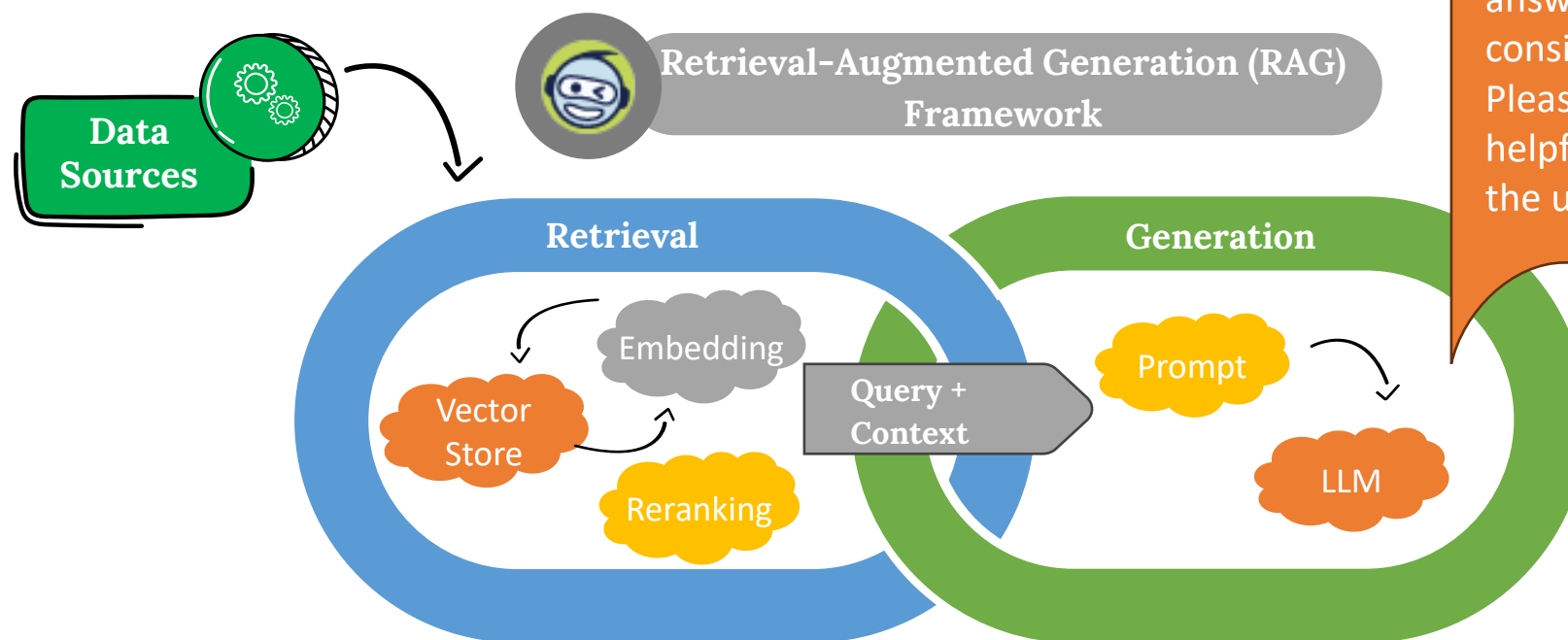


# Data Sources

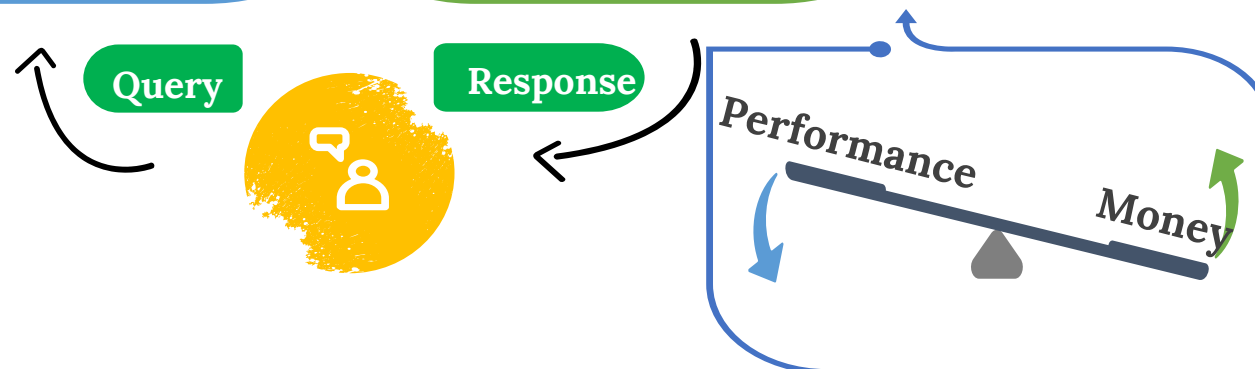


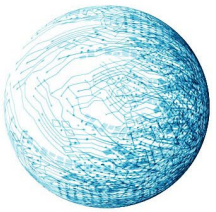


# ChatBot Architecture



You are a Q&A assistant. Your task is to provide accurate and concise answers to users' questions, considering the context provided. Please respond precisely and helpfully, aiming to fully address the user's query in your response.





Open-source framework to build customized AI application



Simple and ease of use



Retrieval Augmented Generation (RAG) – allow LLM to answer questions related to domain-specific data only



Flexible AI Model Selection



**LlamaIndex**

```
1. from llama_index.core
import VectorStoreIndex,
SimpleDirectoryReader
```

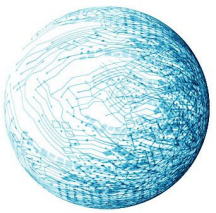
```
2. documents =
SimpleDirectoryReader("data"
).load_data()
```

```
3. index =
VectorStoreIndex.from_documents(documents)
```

```
4. query_engine =
index.as_query_engine()
```

```
5. response =
query_engine.query("Question")
```





# Data Preprocessing

## Cleaning Data

Remove all html code, program code (javascript, css)

## Filtering Data

Remove black-list URL, outdated link, unrelated data



## Dead Link Checking

Check dead link daily and remove it from DB

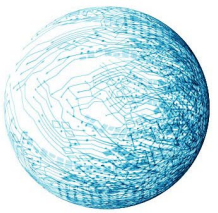
## HTML Table Handling

Change html table to machine readable table

## Customized Content

Generate and prepare customized contents, such as opening hours, facilities locations etc.





# Challenges Encountered

## Challenge 5

Multilingual support limitation



## Challenge 4

Limitation on query types  
(e.g. Library collections,  
research/assignment questions)



## Challenge 3

Resources limitation for better LLM



## Challenge 2

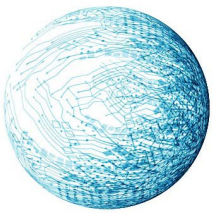
Models keep updating  
during our test



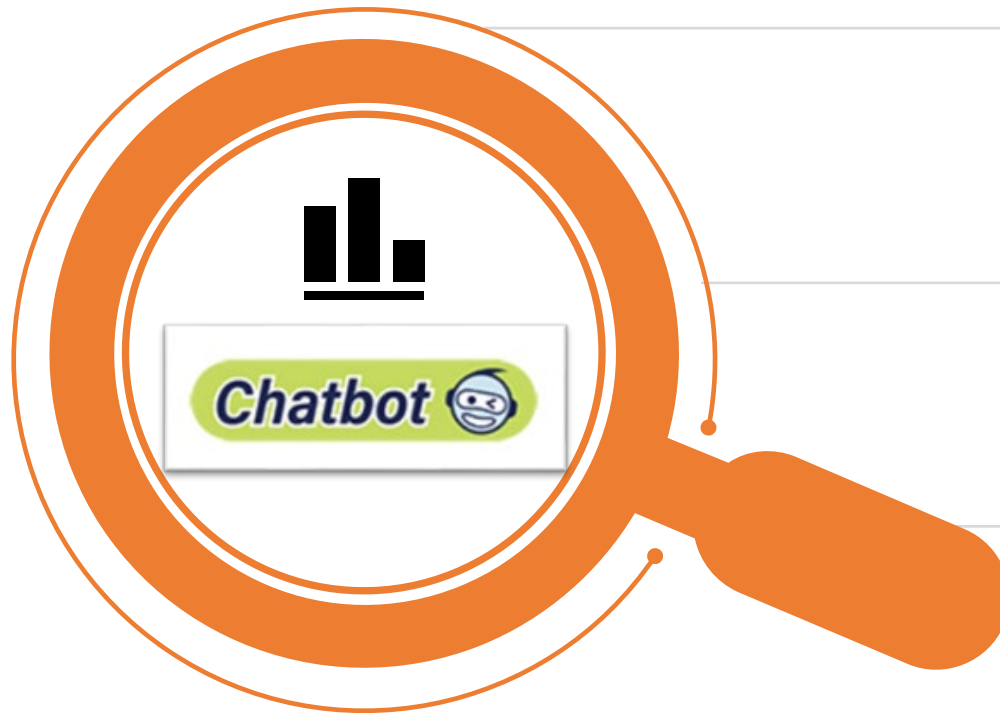
## Challenge 1

Evaluation of different models





# Observations during Implementation



Filter to show users' feedback: thumbs up, thumbs down



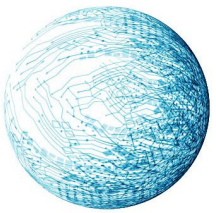
Positive feedbacks > Negative feedbacks



Study user query and response with thumbs down or could not provide answers, and identify ways for improvement

**Chatbot Histories:** log with questions from users and responses

**No personally identifiable information** in the chatbot log data to protect privacy



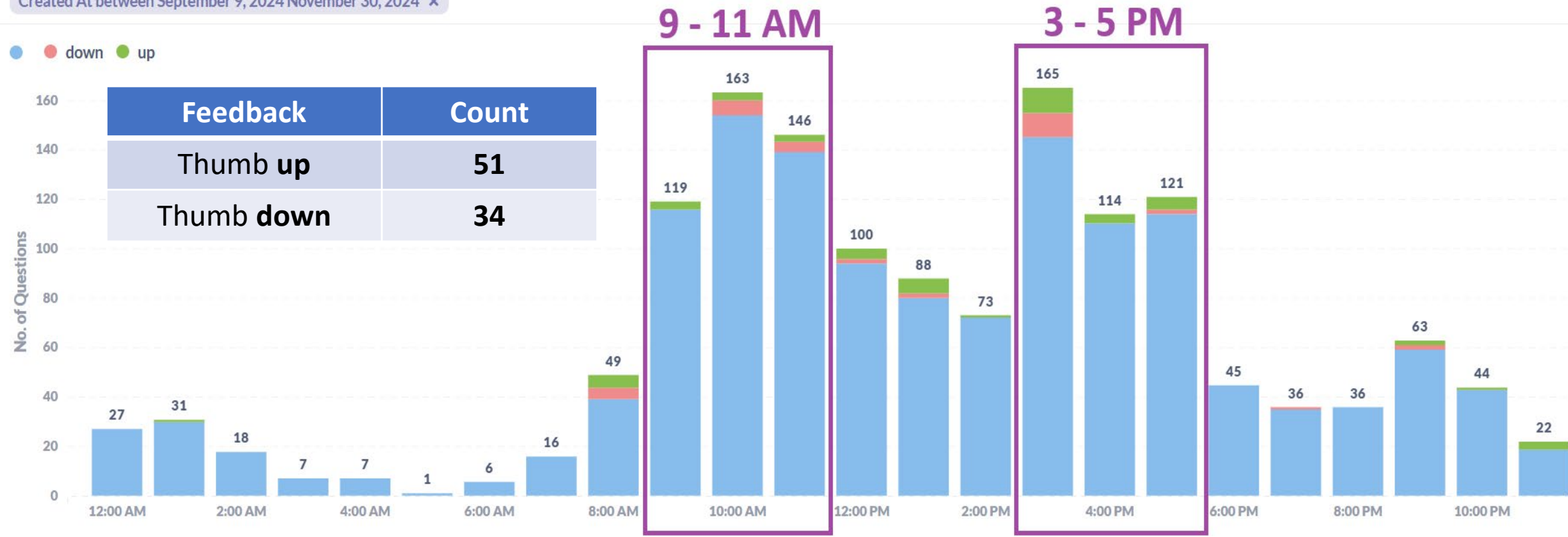
# Usage Pattern (as of 30 Nov 2024)

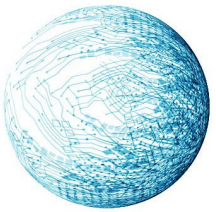
- 1,497 Questions Answered (since 9 Sept 2024)
- Peak usage throughout the day

Created At between September 9, 2024 November 30, 2024 x

● down ● up

Feedback	Count
Thumb up	51
Thumb down	34

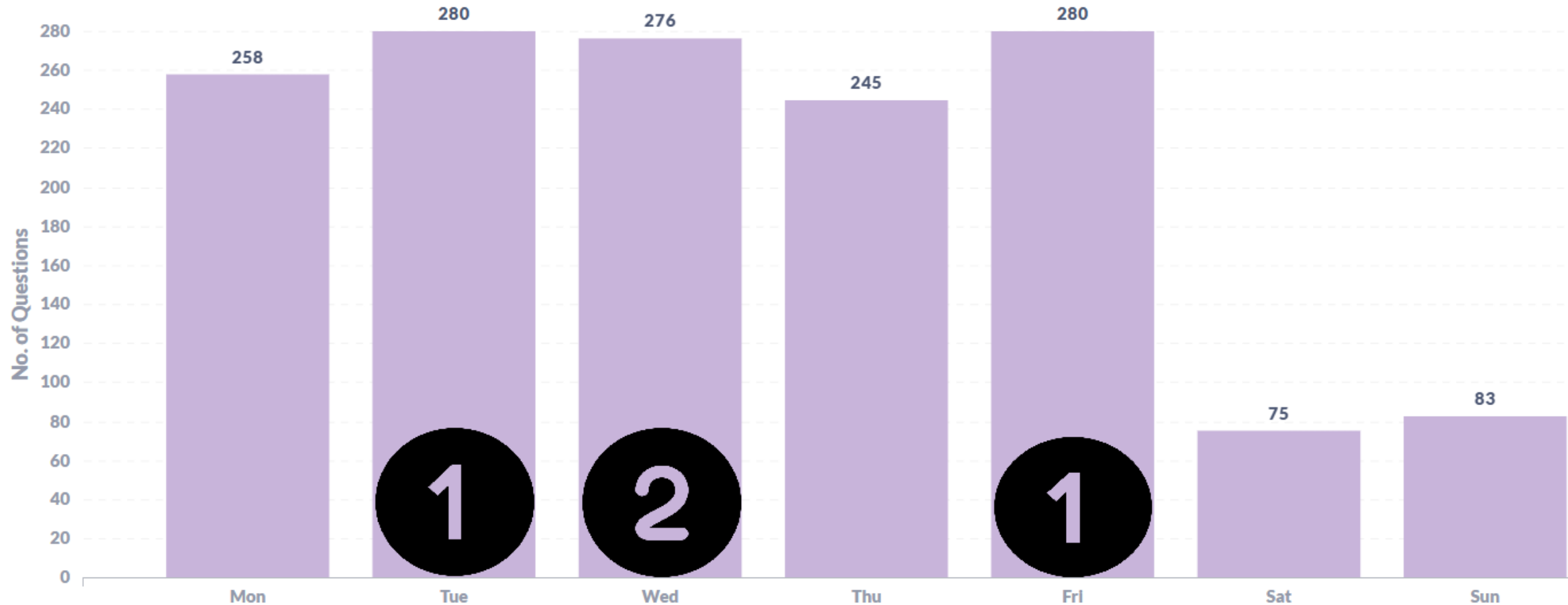


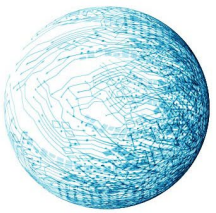


# Usage Pattern (as of 30 Nov 2024)

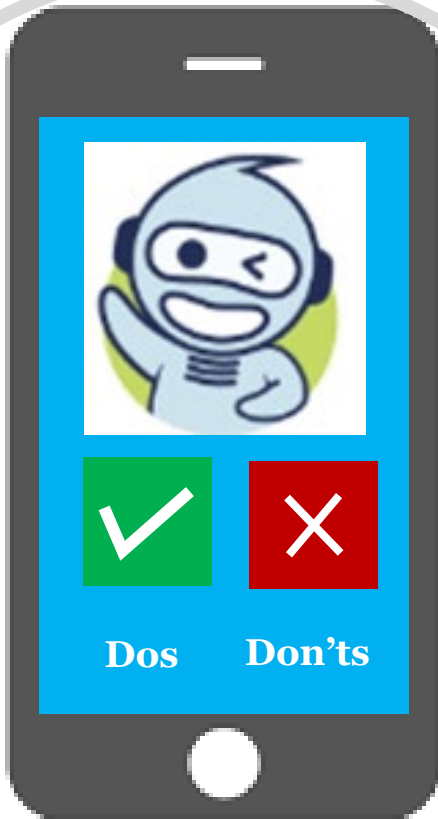
- Peak usage throughout the week

Created At between September 9, 2024 November 30, 2024 ×





# Lessons Learnt

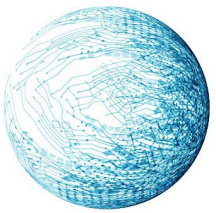


**Compare and evaluate** different AI chatbot methods to determine the most effective approach

Balance among **maintenance work, quality of responses, and cost**

**Adjust** some of the **information** so that in the future those questions with unsatisfactory responses could get answered

- 💡 Create new FAQs
- 💡 Create an URL blacklist to revoke the indexing from unwanted webpage
- 💡 Create a file with all the opening hours for every day



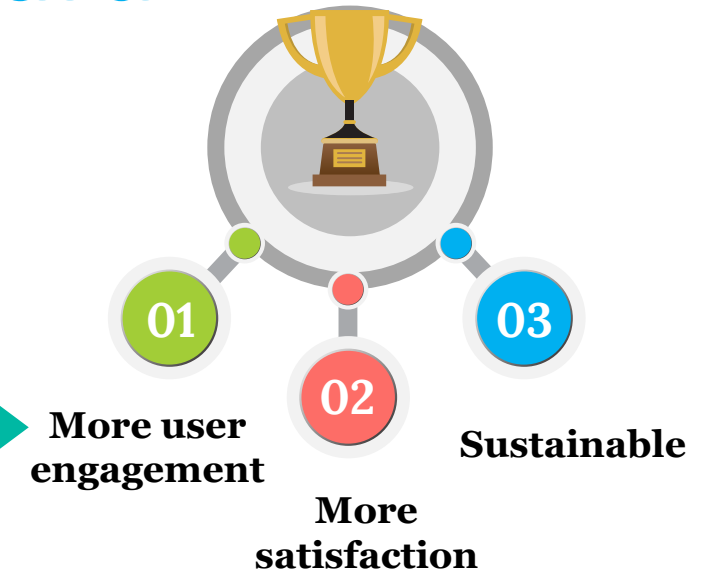
# Discussion and Way Forward

How does the chatbot affect **user engagement** and **service delivery**?

Will the chatbot replace **staffed virtual reference services** (e.g. WhatsApp, Online Form)?

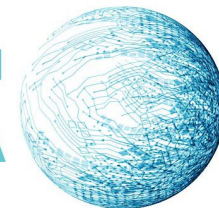
Plans for **additional features or expansions** in the future?

Further analysis of **categories of question types** by AI





2024 JULAC LIBRARIES FORUM  
INNOVATING IN THE DIGITAL ERA

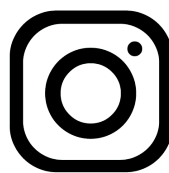


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**THANK YOU**



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