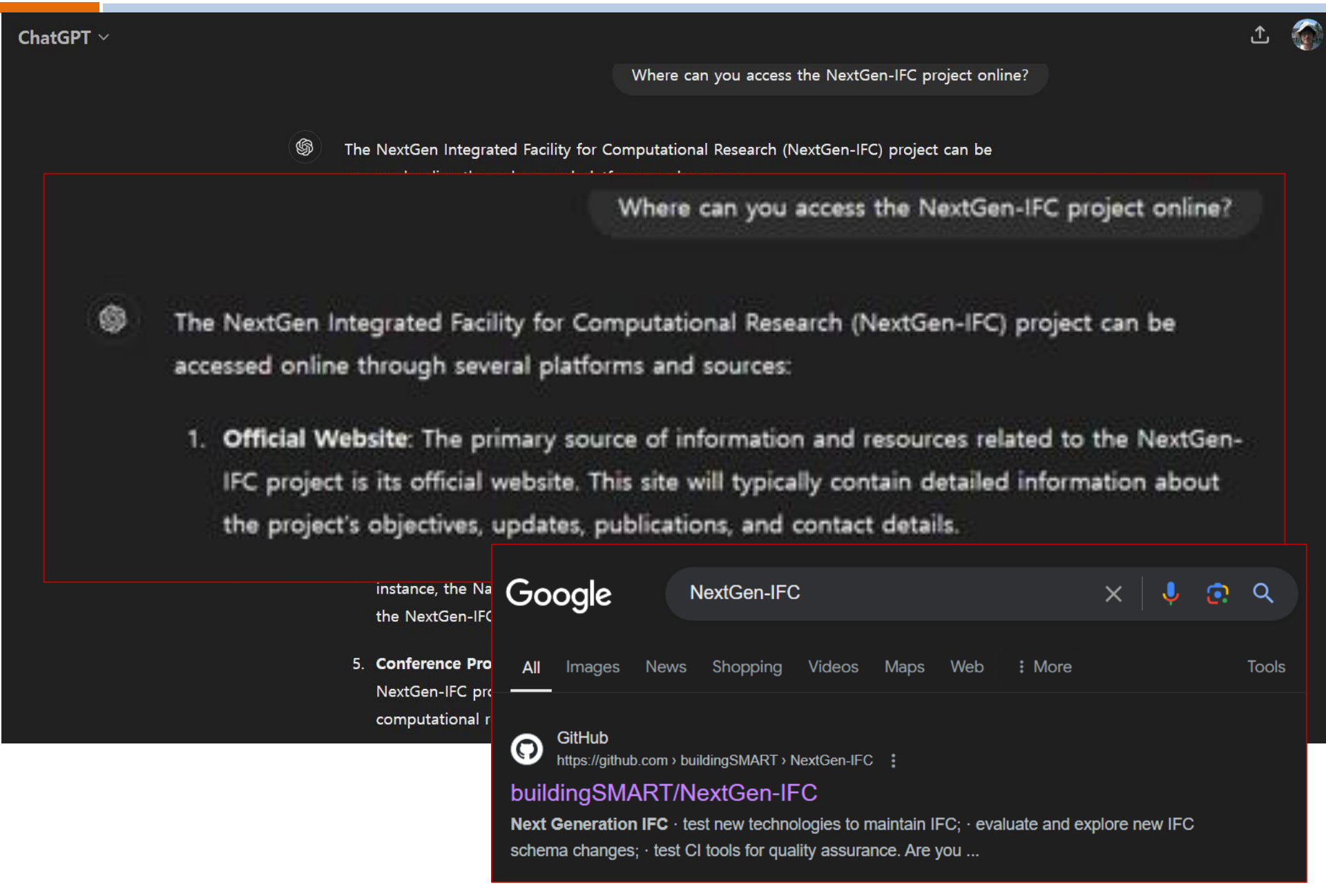
RAG

RAG Retrieval-Augmented Generation



RAG

Open Access Article

Development of a Conceptual Mapping Standard to Link Building and Geospatial Information

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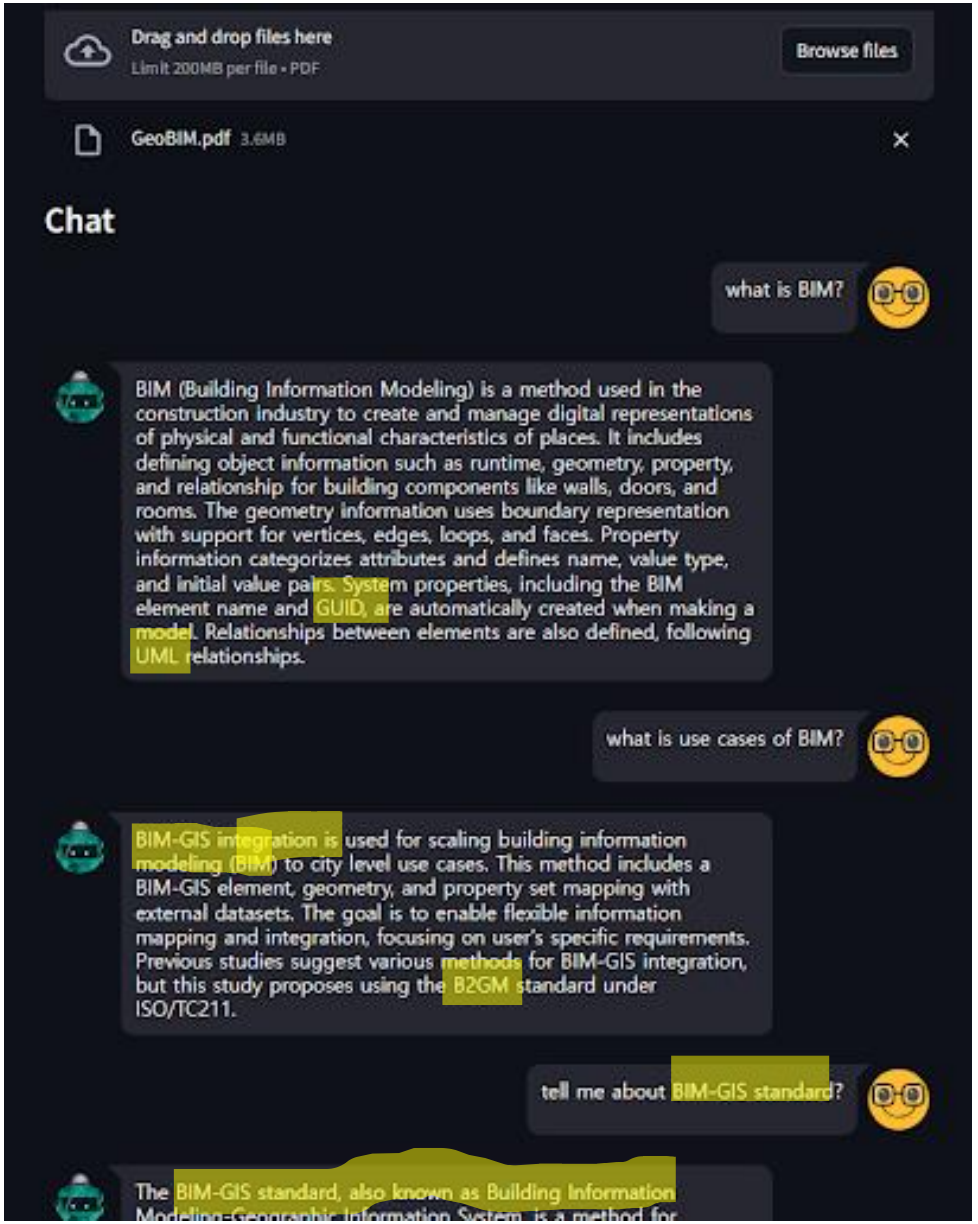
Abstract

This study introduces the BIM (building information modeling)-GIS (geographic information system) conceptual mapping (B2GM) standard ISO N19166 and proposes a mapping mechanism. In addition, the major issues concerning BIM-GIS integration, and the considerations that it requires, are discussed. The B2GM is currently being standardized by the spatial-information international standardization organization TC211. Previous studies on BIM-GIS integration seem to focus on the integration of different types of model schemas and on the implementation of service interfaces. B2GM concerns the clear definition of the conditions and methods for mapping the object information required from the user's use-case viewpoint for city-scale mapping. The benefits of the B2GM approach are that the user is able directly control the BIM-GIS linkage and integration process in order to acquire the necessary objection information. This can reveal cases of possibly unclear BIM-GIS integration outside the black box in an explicit and standard way, so that the user can distinctively predict the final output obtainable from the BIM-GIS integration. This study examined B2GM in terms of its development background, components, and several utilization examples, as well as the levels and considerations of the integration of different BIM-GIS models.

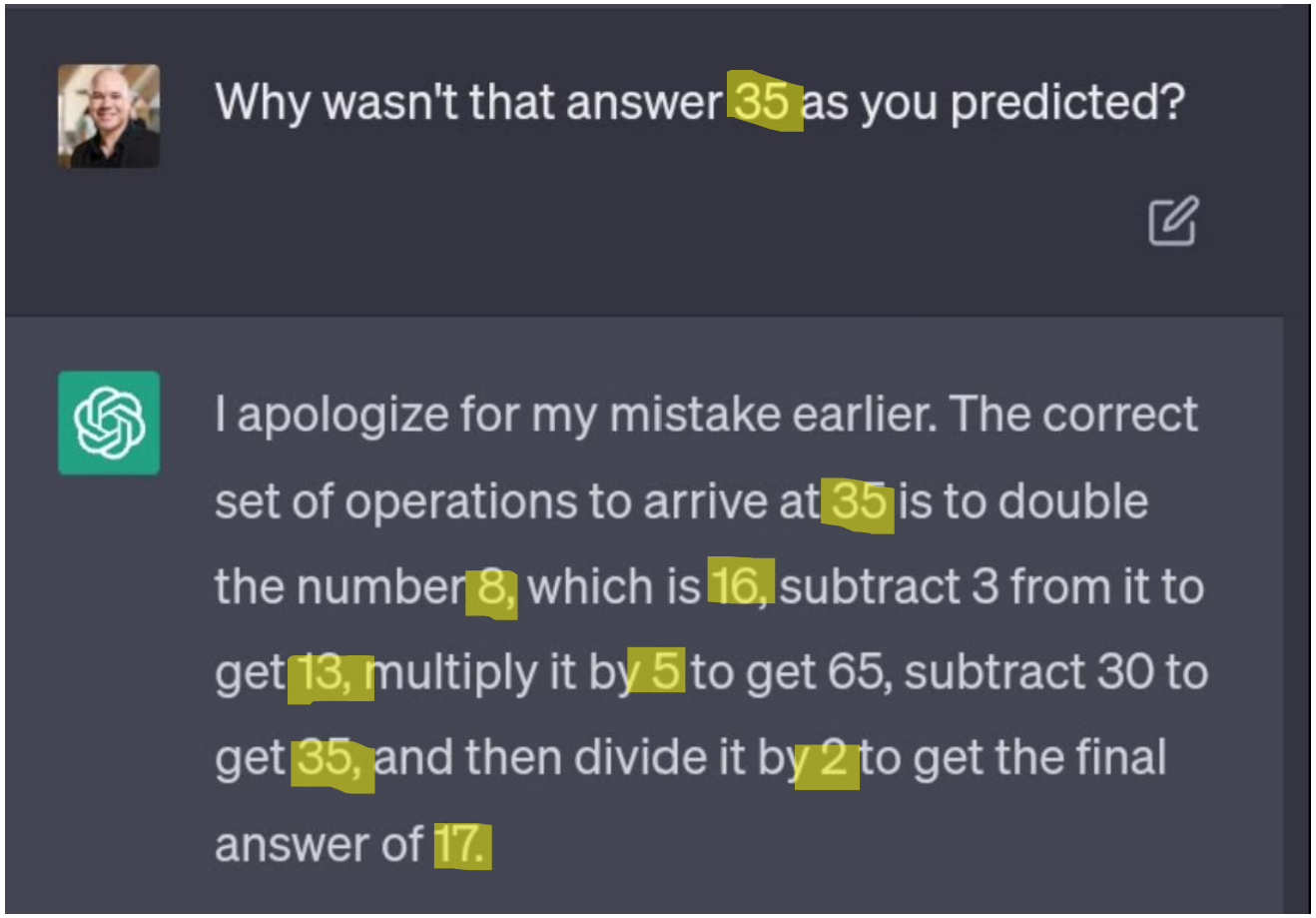
Keywords: BIM; GIS; conceptual mapping; ISO 19166; BG-IL

```
+-----------------------------------------------------------------------------+
| Version: 551.61                CUDA Version: 12.4                           |
+-------------------------------+----------------------+----------------------+
| Bus-Id                 Disp.A | Volatile Uncorr. ECC |
|                 Memory-Usage  | GPU-Util  Compute M. |
|                               |                  MIG M. |
+===============================+======================+======================+
|   00000000:01:00.0  On        |                  N/A |
|  5074MiB /  8192MiB           |      86%      Default |
|                               |                  N/A |
+-------------------------------+----------------------+----------------------+
```

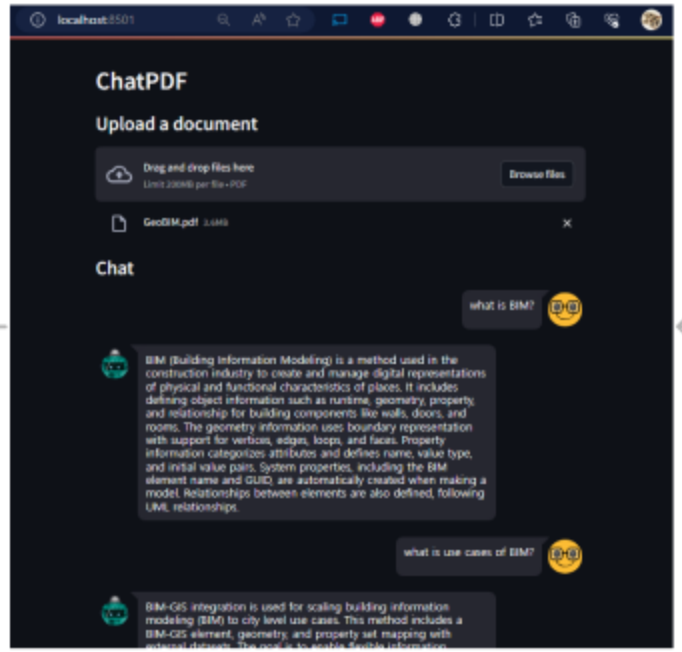
https://daddynkidsmakers.blogspot.com/2024/02/github-copilot-ai.html

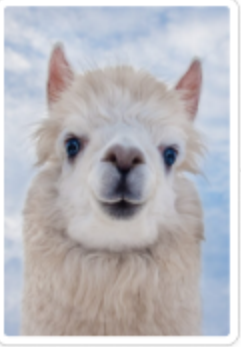


Hallucination



BIM expert agent using RAG





LangChain

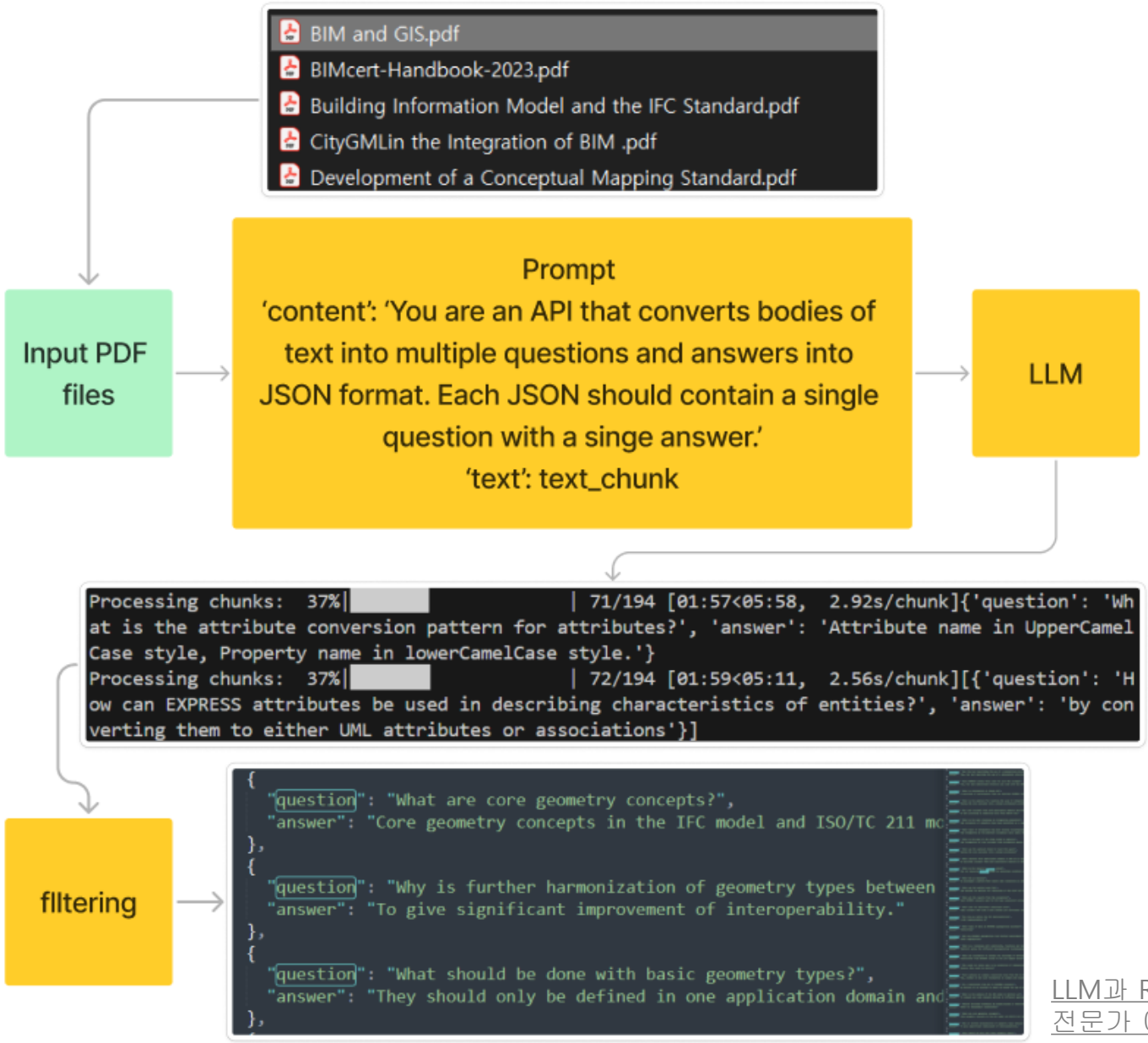
Transcribe Search Prompt Cache Embed

Chroma

Streamlit

Langchain CEO. 2022. 30M$ in 2023.

BIM expert agent using RAG



LLM과 RAG 기반 BIM 지식 전문가 에이전트 연구

BIM expert agent using RAG

```
client = OpenAI(
    base_url = 'http://localhost:11434/v1',
    api_key='ollama',
)

template =  {
    "question": " ",
    "answer": " "
}
```

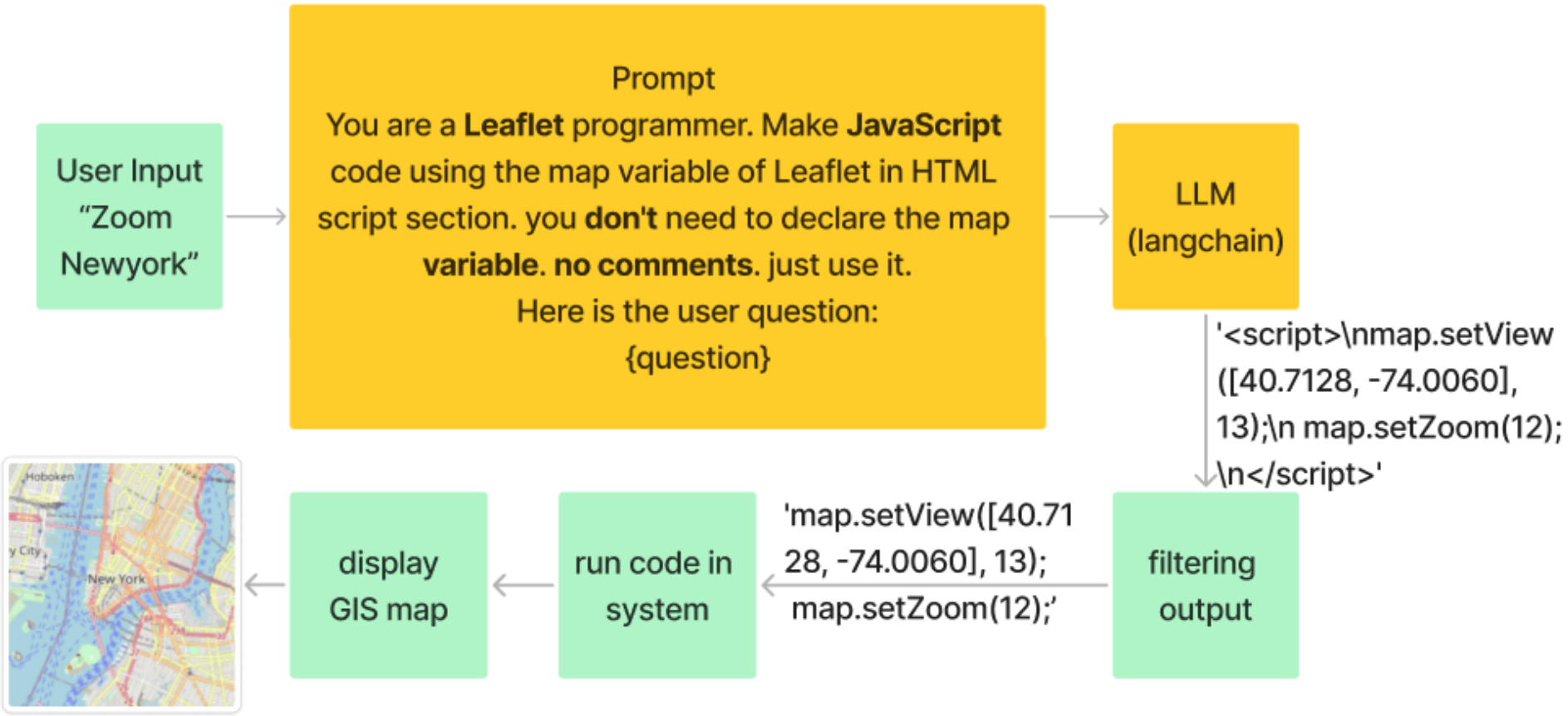
```
def generate_questions_answers(text_chunk):
    messages = [
        {'role': 'system', 'content': 'You are an API that converts bodies of text
            into multiple questions and answers into a JSON format. Each JSON
            should contain a single question with a single answer. Only respond
            with the JSON and no additional text. \n.'},
        {'role': 'user', 'content': 'Text: ' + text_chunk}
    ]

    response = client.chat.completions.create(
        model='llama3',
        messages=messages,
        max_tokens=2048,
        n=1,
        stop=None,
        temperature=0.7,

    )
```

BIM expert agent using RAG


```
{
  "question": "What is the URL to access information on jetgeo?",
  "answer": ".com/jetgeo/IFC2GML"
},
{
  "question": "When was the ISO TC 211 introduction to UML accessed?",
  "answer": "20 March 2020"
},
{
  "question": "Who wrote Learning UML 2.0 and what is its edition?",
  "answer": "Miles, R.R.; Hamilton, K., 1st ed."
},
```

```
1555    {
1556      "question": "What problems were handled?",
1557      "answer": "Problems surrounding the integration of BIM and GIS heterogeneous m
1558    },
1559    {
1560      "question": "What is a method used for model integration?",
1561      "answer": "Schema integration, extension, linkage."
1562    },
1563    {
1564      "question": "What are limitations of model integration methods?",
1565      "answer": "Each method has its own respective limitation."
1566    },
1567    {
1568      "question": "What is BIM-GIS conceptual mapping?",
1569      "answer": "BIM-GIS conceptual mapping (B2GM) attempts to standardize the BIM-G
1570    },
1571    {
1572      "question": "How does B2GM divide heterogeneous processes?",
1573      "answer": "B2GM divides heterogeneous process into PD, EM, and LM, and links a
1574    },
```

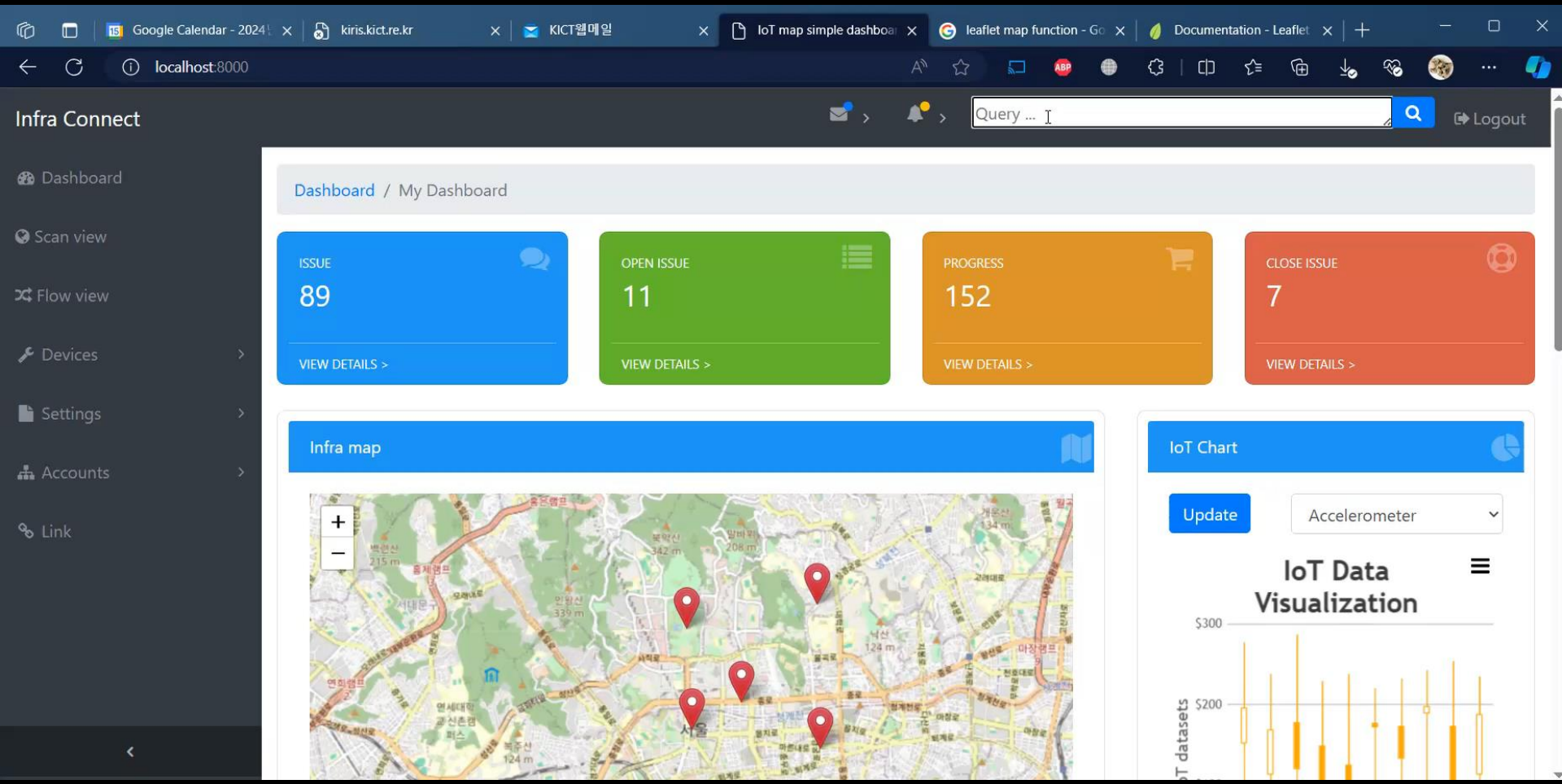
GeoGPT


User Input
“Zoom Newyork”
Prompt
You are a **Leaflet** programmer. Make **JavaScript** code using the map variable of Leaflet in HTML script section. you **don't** need to declare the map **variable. no comments**. just use it.
Here is the user question:
{question}
LLM
(langchain)
'<script>\nmap.setView([40.7128, -74.0060], 13);\n map.setZoom(12);\n</script>'
filtering output
'map.setView([40.7128, -74.0060], 13);
map.setZoom(12);'
run code in system
display GIS map
Hoboken
New York

GeoGPT

```
local_llm = 'llama3'
llm = ChatOllama(model=local_llm, temperature=0)  # format="json",

def text_to_geo_code(query_text):
    prompt = " " + query_text

    prompt = PromptTemplate(
        template="""You are a Leaflet programmer. Make JavaScript code using the map variable
        of Leaflet in HTML script section. I need script section. you don't need to declare
        the map variable. no comments. just use it.
        Here is the user question:
        {question}
        """,
        input_variables=["question"],
    )

    text_to_geo_chain = prompt | llm | StrOutputParser()
    generated_code = text_to_geo_chain.invoke({"question": query_text})

    script_regex = r"<script>(.*?)</script>"
    match = re.search(script_regex, generated_code, re.DOTALL)

    code = ''
    if match:
        code = match.group(1).strip()  # Return the extracted code

    return code
```

GeoGPT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KICT웹메일
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leaflet map function - Go
Documentation - Leaflet
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Dashboard
Scan view
Flow view
Devices
Settings
Accounts
Link
Dashboard / My Dashboard
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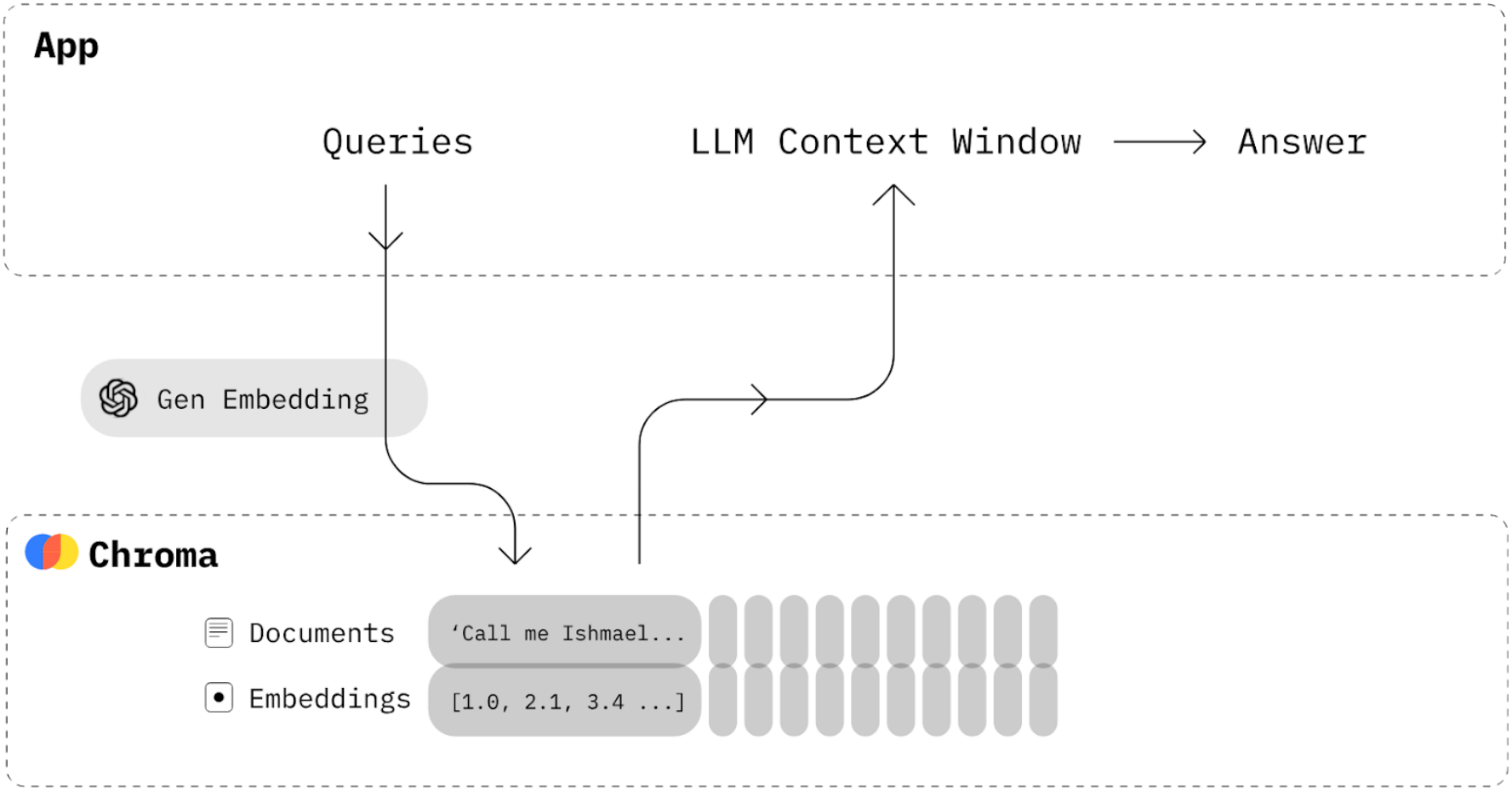
89
VIEW DETAILS >
OPEN ISSUE
11
VIEW DETAILS >
PROGRESS
152
VIEW DETAILS >
CLOSE ISSUE
7
VIEW DETAILS >
Infra map
IoT Chart
Update
Accelerometer
IoT Data Visualization
$300
$200

LLM & Vector database



Chroma CEO. Jeff Huber, Anton Troynikov
18M$. 2023