AI-FT MAY24 REMOTE

Veritasium AI Chatbot

By
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Presentation Outline

Today's Topics

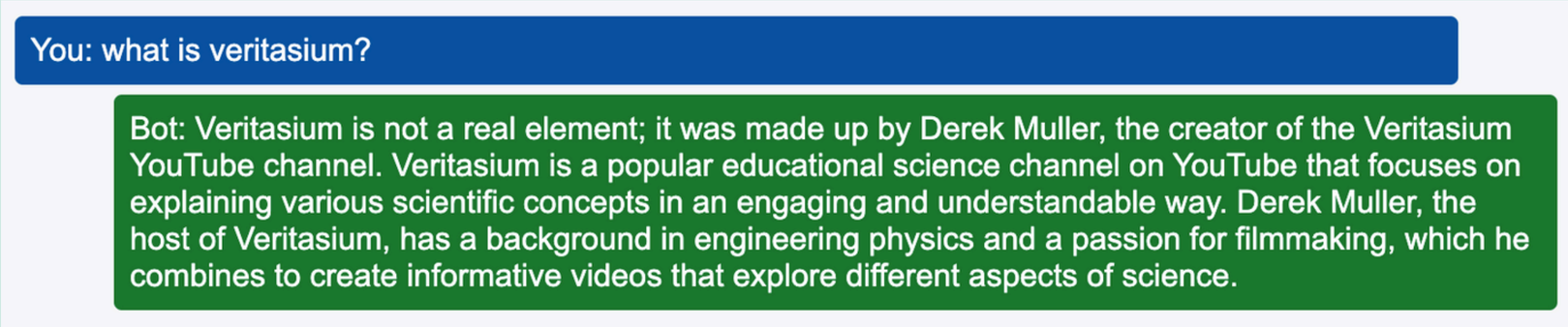
- Purpose
- Data
- Transcription
- Vectorization
- Orchestration & Deployment
- Limitations & Improvements

IRONHACK

VERITASIUM →

Who: Derek Muller
When: Jan 2011

NEXT SLIDE: DATA



```
[{'videoId': 'scliyWrN7mk',
  'title': 'how bikes *actually* work',
  'description': 'why are bicycles stable? the most common answer is gyroscopic effects, but this is not right.',
  'published_at': '2024-04-17T16:20:50Z',
  'url': 'https://www.youtube.com/watch?v=scliyWrN7mk'},
```

```
CHANNEL_ID = 'UCHnyfMqiRRG1u-2MsSQLbXA'
```

Google Cloud

YouTube Data API

Data Extraction &
Inspection

Data ↑

Initial Categorization

10 Categories

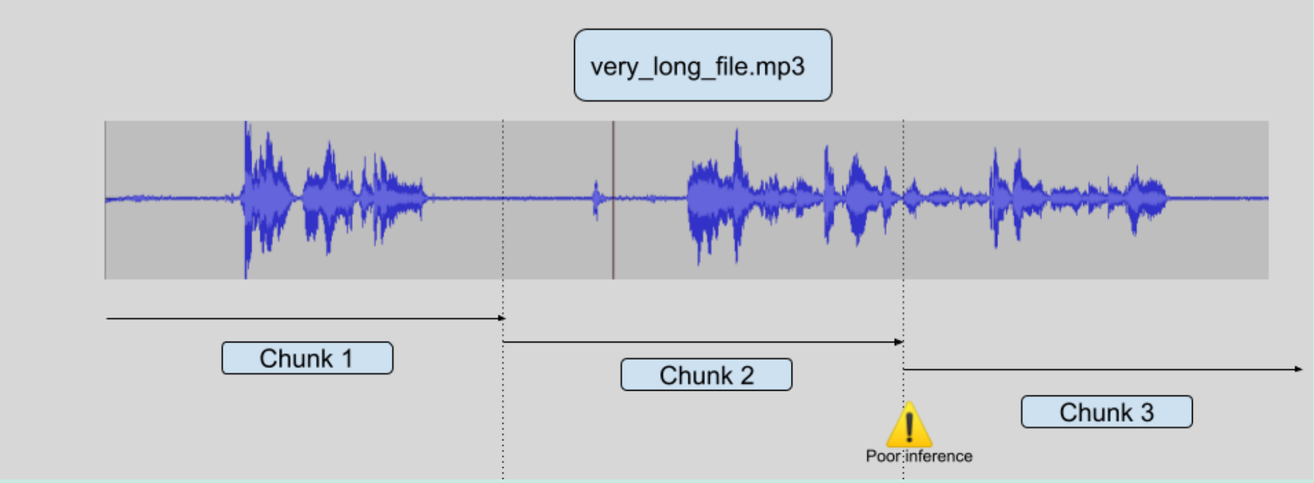
15 to +100 videos in each

```
predefined_categories = [
    "Physics",
    "Mathematics",
    "Engineering",
    "Biology",
    "Chemistry",
    "Space",
    "Technology",
    "Geoscience",
    "General Science",
    "Miscellaneous Educational Content"
]
```

OpenAI

NEXT

_DLP



DOWNLOADING

PROCESSING

TRANSCRIPTION

```
chunk_audio_with_no_overlap(audio, chunk_size=16000*15):  # 15-second chunks with no overlap performed best!
```

"openai/whisper-medium"

OpenAI

Vectorization Preprocessing →

RE-CATEGORIZATION

CHUNKING

OpenAI

Cleaning Metadata and basing categorizations on the transcript


```
{
    "videoId": "scliyWrN7mk",
    "title": "how bikes *actually* work",
    "description": "why are bicycles stable? the most common answer is gyroscopic effects, but this is not right.",
    "published_at": "2024-04-17T16:20:50Z",
    "url": "https://www.youtube.com/watch?v=scliyWrN7mk",
    "transcription": "How do bikes without riders stay upright? As long as a bike is moving with sufficient speed, it can keep coasting indefinitely. But it turned out the ground where we went to test this effect was really bumpy. But the bike still manages to absorb all these perturbations.\n and remain stable. So how does it do this? I think most people believe it's the wheels spinning that creates some sort of gyroscopic effect that resists falling over. Just like in this demonstration of gyroscopic precession, the wheels\n stays upright even though gravity is pulling it down. But this is not why bikes are stable. Just watch what happens when we lock the handlebars completely, so you can only go straight ahead.\n The real reason bicycles are stable without riders is because they're cleverly designed to steer themselves. If they start falling to one side, the handlebars turn in that direction to steer the wheels back underneath them."
}
```

Vectorization Preprocessing →

RE-CATEGORIZATION 

CHUNKING 

```
chunk_transcriptions(videos, category, chunk_size=3000, chunk_overlap=150):
```

```
Chunk ID: liqF6EamiE4_0
Video ID: liqF6EamiE4
Title: can you solve this shadow illusion?
Description: when sunlight shines through a small hole, it casts a circular image on the wall regardless of the shape
of the hole. the size of the ...
Category: Physics
Published At: 2011-06-13T22:30:47Z
Summary: We have that card with a little round hole in it and what I want you to do is hold it up and try to cast a sh
adow on that wall there. Before you do it, predict what we're gonna see. We will see that figure enlarged on the wall.
It'll be a triangle. Why is it going to a circle though? You look at the Sun it looks at around.
Chunk Content: We have that card with a little round hole in it and what I want you to do is hold it up and try to cas
t a shadow on that wall there and I want you before you do it to predict what we're gonna see. Shadow of the card. Sha
dow of the card. With a little hole in it. We will see that figure enlarged on the wall. It's not very pronounced but
you can actually do see the little hole in it and of course me. My next question for you is we have this card. What's
that like? It's a big a hole. Can you tell ...

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

Chunk ID: liqF6EamiE4_1
Video ID: liqF6EamiE4
Title: can you solve this shadow illusion?
Description: when sunlight shines through a small hole, it casts a circular image on the wall regardless of the shape
of the hole. the size of the ...
Category: Physics
Published At: 2011-06-13T22:30:47Z
Summary: re seeing is... A projection of the sun. I've never thought about it before. Well, I did photography at schoo
l and we did pinhole cameras. The hole actually reflects what it's showing on the wall. So? So you see what you see on
the other side.
Chunk Content: re seeing is... A projection of the sun. I've never thought about it before. I think that you actually
know and I think you have actually thought about it before. But I think you're not queuing that right part of your bra
in that knows the answer. Yeah, probably. There's a part of your brain that knows the answer. Well, I did photography
at school and we did pinhole cameras. The hole actually reflects what it's showing on the wall. So? So you see what yo
u see on the other side. So what's that? So...
```

Chunks were processed in batches to avoid memory issues and ensure efficient handling of the data

Next step: embedding and upserting

Pinecone

VECTOR COUNT
1,062

1

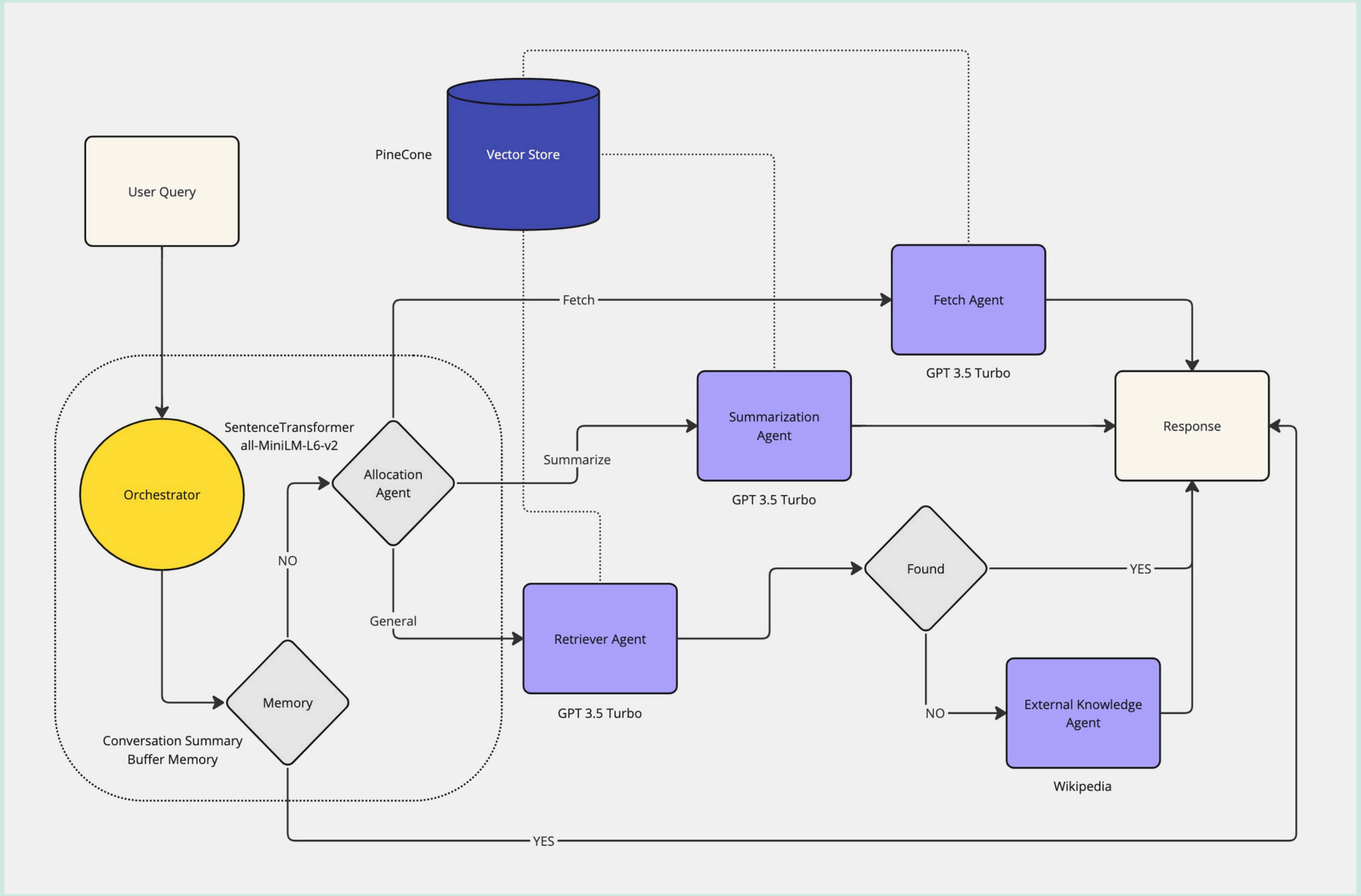
ID	VALUES
357_DHp3Ny...	-0.0172668695, 0.00981656089, 0.00676747737, -0.0218100715, -0.014035248...

METADATA

Collapse

category: "Physics"
chunk_id: "357_DHp3Nys_0"
description: "how should we depict an atom like a solar system with electrons orbiting the nucleus on hula hoop orbits that id...
published_at: "2011-11-11T02:54:54Z"
summary: "The Bohr-Summerfeld atom was the image of an atom in the 1920s. It's 90 years old and yet people still think of thi...
title: "atomic rant"
transcription: "Now it s time for me to get something off my chest It s been bugging me since I was a little kid So you may as ...
url: "https://www.youtube.com/watch?v=357_DHp3Nys"
video_id: "357_DHp3Nys"

Chunks, along with their embeddings and metadata, were uploaded to Pinecone in batches. Each chunk was assigned a unique ID and stored in Pinecone, facilitating efficient retrieval.


User Query
PineCone
Vector Store
Fetch
Fetch Agent
GPT 3.5 Turbo
Summarization Agent
GPT 3.5 Turbo
Response
SentenceTransformer all-MiniLM-L6-v2
Orchestrator
Allocation Agent
Summarize
NO
General
Retriever Agent
GPT 3.5 Turbo
Found
YES
NO
External Knowledge Agent
Wikipedia
Memory
Conversation Summary Buffer Memory
YES

```
"query": "Fetch me a video explaining quantum entanglement.",
"reference_response": "Here are the top 5 video recommendations (while the video might not be strictly about your topic, it might be related):<br>quantum entanglement spooky action at a distance: h
"chatbot_response": "From Memory: Here are the top 5 video recommendations (while the video might not be strictly about your topic, it might be related):<br>quantum entanglement spooky action at a
"evaluation": {
    "results": "INCORRECT"
}
```


```
Average Success Rate: 72.38%

Query: how are you?
Success Rate: 42.86%

Query: tell me about the number 37?
Success Rate: 100.00%

Query: where do you get this info from?
Success Rate: 100.00%

Query: Can you fetch me some YouTube video URLs about physics?
Success Rate: 85.71%

Query: Tell me about the speed limit in the universe.
Success Rate: 100.00%

Query: Can you summarize the video about imaginary numbers?
Success Rate: 100.00%

Query: Who is the president of Spain?
Success Rate: 42.86%

Query: Can you share a video about quantum computing?
Success Rate: 28.57%
...

Query: Who are some notable scientists in the field of quantum mechanics?
Success Rate: 57.14%
```

Evaluation Limitation

The chatbot demonstrated a good overall performance with a 73% success rate.

However, the evaluation using GPT QAEvalChain was not of high quality, as some responses marked as incorrect were actually correct, and vice versa.

Limitations

01.
TIME

02.
RESOURCE INTENSITY

&

OVERALL COMPLEXITY

03.
BOOLEAN EVALUATION LOGIC

Improvments

Improving the Fetch and Summarization speed for better UX

Employing agents to deal with ambiguous and other queries

Enhancing the orchestration/allocation logic for even more precise agent allocation (test performance of different models)

Improving memory usage and adding mechanisms that would override responding from memory when user requests

Upgrading HTML and Style for a nicer UI.

Using more advanced and accurate Evaluation techniques


That's all Folks!
IRON HACK
DEMO
Veritasium
an element of truth