LLM Chatbots with Custom Knowledge Base

Harry Field, October 2023, harry.field@bristol.ac.uk

Recent Developments

AI21 studio

Specific LLMs

Claude

ChatGPT

LLaMA

ERNIE

Alexa

Bing Chat (GPT4)

Jurassic1

Copilot

Bard

Tongyi Qianwen

ChatDev
Communicative Agents for Software Development
Software
Codes
Docs
ChatDev
Designing
Coding
Testing
Documenting
File Upload
File uploaded (Ping Pong_DefaultOrganization_20231006103654.log). Please click "Replay" to show ChatDev's development process
Replay
Task:
Replaying Speed
version_updates
num_code_files
num_png_files
num_doc_files

Microsoft AutoGen

Meta

Enter your ad text
A product two years in the making.
The Bronzer is a silky powder that adds instant warmth to the skin. Sheer and buildable, it can be used for color correction and to give skin a natural tint. Now available in 7 shades.
Need help finding your ideal shade? Head to our website and take The Bronzer Quiz.
Generate
Bronzer is a silky powder that adds instant warmth to the skin. Sheer and buildable, it can be used for color correction or to give skin a natural tint. Available in 7 shades. Take The Bronzer Quiz to find your ideal shade.
Not great
Looks good
A Bronzer silky powder that adds instant warmth to the skin. Sheer and buildable, it can be used for color correction or to give skin a natural tint. Available in 7 shades. Take The Bronzer Quiz to find your ideal shade.
Not great
Looks good
Our Bronzer is a silky powder that adds instant warmth to the skin. Sheer and buildable, it can be used for color correction or to give skin a natural tint. Available in 7 shades, you can find your ideal shade with The Bronzer Quiz.
Not great
Looks good
NEW! Bronzer is the only silky powder you need for winter that adds instant warmth to the skin. Sheer and buildable, it also offers color correction and helps give skin a natural tint. Available in 7 shades, take The Bronzer Quiz to find your ideal shade.

CS History
CS 106 class notes
Mark 1/UNIVAC history
Lovelace excerpt
Invention of the GUI
Babbage intro
New
Open notes
CS 106 class notes
Week Two: Ada Lovelace
Ada Lovelace was a British mathematician and writer who is considered to be the first computer programmer. She was born in 1815 to the poet Lord Byron and his wife Annabella Milbanke.
Showed an early aptitude for mathematics, and she was tutored by some of the leading mathematicians of her day. In 1833, she met Charles Babbage, a mathematician and inventor who was working on a machine that he called the Analytical Engine. The Analytical Engine was designed to be a programmable computer.
Contributions to Computing:
Ada Lovelace made several important contributions to the development of computing. She translated an article about the Analytical Engine from French to English. In her translation, she added a series of notes that outlined how the Analytical Engine could be used to solve mathematical problems. These notes are considered to be the first example of computer programming.
Ada Lovelace also wrote about the potential of the Analytical Engine to be used for creative purposes, such as composing music. She believed that the Analytical Engine would have a profound impact on society; one of the first people to envision the potential of computers to be used for more than just calculation.
Document guide
Class notes containing information about women in computing, including the British mathematician Ada Lovelace, the computer scientist Grace Hopper, and the NASA mathematician Katherine Johnson. These women were all pioneers in the field of computing, and their work has helped to pave the way for women in STEM fields.
Key topics
STEM and Diversity
Alan Kay's Dynabook
Katherine Johnson at NASA
Questions to try
How did Grace Hopper's work on the Mark I contribute to modern computing?
What challenges did Johnson face as an African American woman at NASA?
1 Source

H
I'm looking for somewhere nice to go for dinner near my house, got any ideas?
Google Maps
Here are some nice restaurants near you:
Adelina Yard: Imaginative venue for locally sourced fine dining creating but
Maps.
Pasture: Upscale steakhouse fare with craft cocktails & full bar in an elevat
The Ox: Stylish steak restaurant and cocktail bar in a basement bank vault
Casa Bristol: Sophisticated restaurant offering a single menu consisting of
Maps.
Mugshot Restaurants Bristol: Warm, 1920s-themed British steakhouse with
star rating on Google Maps.

ALLEN & OVERY + Harvey.

CENTRAL INTELLIGENCE AGENCY
UNITED STATES OF AMERICA

Rewind

AI generated notes of your entire day

Rewind is a personalized AI powered by everything you've seen, said, or heard. Your colleagues will wonder how you do it all.

MEETINGS

Automate note-taking and get human-level meeting summaries

Record meetings no matter who's the host and without inviting bots. Save hours each week with auto-recording and human-level meeting summaries, ready to share with your colleagues.

- ✓ No bots
- ✓ Shareable summaries
- ✓ Record no matter the host
- ✓ Across Zoom, Meet, Teams

Company All Hands (7/24/23)

Team (rewind.ai)

Company All Hands (7/24/23)

Hi all,

Thanks for the meeting! Here's a summary of our conversation:

1. Calendar integration and meeting summarization were highlighted as major differences compared to the previous version.
2. Ask Rewind was identified as an important part of the value proposition that could help differentiate the product.
3. There were concerns about launching on the planned date due to the amount of work still remaining and limited time before most people would be traveling
4. Pre-ordering on the App Store was suggested as an option to keep the

Harry Field, October 2023, harry.field@bristol.ac.uk

shop

14:54 5G 67%

Hi, I am your shopping assistant. How can I help you?

Tap to see similar products

Things I can help you find

- What should I look for in hiking shoes?
- What should I look for in a winter coat?
- Help me find something
- What should I look for in a moisturizer?

Type here

14:54 5G 67%

Hi, I am your shopping assistant. How can I help you?

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When looking for hiking shoes, there are a few key factors to consider:

1. Comfort: Hiking shoes should provide a comfortable fit to prevent blisters and discomfort during long hikes. Look for shoes with cushioning, a supportive midsole, and a snug but not tight fit.

2. Durability: Hiking shoes need to withstand rough terrain and constant use. Look for shoes made from durable materials such as leather or synthetic fabrics that can handle the wear and tear of hiking.

3. Traction: Good traction is essential for hiking shoes to provide stability and prevent slips and falls. Look for shoes with a

Type here

14:55 5G 66%

Like Dislike

Recommended a specific hiking shoe

I found a few options for hiking shoes. Could you please let me know if you have any specific preferences, such as the brand, style, or any other features you're looking for? This will help me narrow down the options and provide you with a more tailored recommendation.

Prepperia
Hiking shoes
£30.00

Offset Fashion Store
Men Outdoor Hiking Shoes ...
£9.00

NI
O
£2

Like Dislike

Type here

Snoop Dogg

DUNGEON MASTER

The Guide to Games

Harry Field, October 2023, harry.field@bristol.ac.uk

LangChain

Llama Index

Chatbots are…

- Language classifiers
- Decision Trees
- Lookup tables
- Databases

Large Language Models (LLMs)

- Fine-tuned LLMs are good for obtaining LLM behavior
- Custom knowledge bases are better for obtaining domain knowledge

How it works

Credit: https://gpt-index.readthedocs.io/en/stable/getting_started/concepts.html

Database encoding & query

Database encoding & query

Database encoding & query

Database encoding & query

Sparse Retrieval

Answer	'septic shock'
Context	'l patients. 273 critically ill patients (197 patients with sepsis or septic shock, 76 without evidence of sepsis) and 43 healthy controls were consecu'
Answer	'increases region-specific cellular regeneration'
Context	' results suggest that sepsis induced by CLP in rats increases region-specific cellular regeneration, in a ' 'possible attempt to compensate for the devas'
Answer	'severe'
Context	'0.79 (95% confidence interval [CI]: 0.72-0.86, P < 0.0001) and 0.75 for severe sepsis (95% CI: 0.68-0.81, P < 0.0001). At a cut-off level of 6.4 ng mL'

Dense Retrieval

Answer	'septic shock'
Context	' the database. This analysis includes patients who had severe sepsis/septic shock before leaving the ED. Epidemiological, severity of illness criteria'
Answer	'a whole body inflammatory response often caused by microbial infections of the blood'
Context	'sample. The diagnosis of sepsis, a whole body inflammatory response often caused by microbial infections of the blood, is a model system for pursuing '
Answer	'a high-mortality disease'
Context	'e patients: intervention and mortality rates. Severe sepsis is a high-mortality disease, and early resuscitation decreases mortality. Do-not-resuscita'

Combined Sparse and Dense Retrieval

Sepsis is a systemic inflammatory response syndrome with a suspected or proven infection caused by any pathogen or a clinical syndrome associated with a high probability of infection. The definition of septic shock includes sepsis-induced hypotension despite adequate fluid resuscitation, along with the presence of organ perfusion abnormalities, and ultimately cell dysfunction. As the most common causes of morbidity and mortality in intensive care units worldwide, the societal and economic costs of sepsis and septic shock are staggering. The molecular pathophysiology of sepsis and septic shock and the complex roles played by cytokines, reactive oxygen and nitrogen species, and eicosanoids remain controversal despite decades of study. The lipid A part of lipopolysaccharide, also known as endotoxin, is the most potent microbial mediator of the pathogenesis of sepsis and septic shock. 20-Hydroxyeicosatetraenoic acid (20-HETE) is a vasoconstrictor ω-hydroxylation product of arachidonic acid that is produced by cytochrome P450 (CYP) enzymes, mainly by CYP4A and CYP4F isoforms. Studies from our laboratory and others have provided substantial evidence that administration of a synthetic analog of 20-HETE, N-[20-hydroxyeicosa-5(Z),14(Z)-dienoyl]glycine, prevents endotox-ininduced vascular hyporeactivity, hypotension, and mortality associated with increased formation of inducible nitric oxide synthase-derived nitric oxide (NO) and cyclooxygenase-2-derived vasodilator prostanoids as well as decreased expression and activity of CYP4A1 and 20-HETE production in a rodent model of septic shock. CYP4A- and CYP4F-derived 20- HETE is also a proinflammatory mediator of endotoxin-induced acute systemic inflammation. In this review, we will present an overview of our current understanding of the interactions between prostanoids, NO, and 20-HETE in sepsis, and provide a rationale for the development of synthetic 20-HETE analogs for the treatment of sepsis and septic shock.

LangChain

Llama Index

Llama Index

- A data framework for connecting custom data sources to LLMs
- Many different options available for different kinds of data
- Today we will be talking about text databases forming the knowledge base of a chatbot

How it works

Credit: https://gpt-index.readthedocs.io/en/stable/getting_started/concepts.html

Document Embedding

Query and Relevant Context

- The same embedding model used to embed the document chunks is used to embed the Query
- The Vector Store Index is searched for the nearest vectors to the query
- A list of similar document chunks is retrieved

Query and Embeddings

Query and Embeddings

Query and Embeddings

Response Generation

- The Query, Nodes and Prompt Template are sent to the LLM
- The LLM responds with a response object

Example

Query: "Can I pay in installments?"

Retrieved Nodes:

"USER_PROFILE { US_RESIDENT : True, SHOP_PAY: False, CARD: True, AFFIRM: TRUE}"

"Paying in installments with Shop Pay is powered and serviced by Affirm and is only available for payment on a limited number of Shop Pay Sites ("Eligible Shop Pay Sites"). Shopify…"

"To pay in installments with Shop Pay on an Eligible Shop Pay Site, you need to meet the following requirements:
1.Reside in the United States.
2.Sign up for Shop Pay.
3.Add your debit or credit card to your Shop Pay account.
4.Sign up for Affirm to confirm your eligibility."

Response

"In order to pay in installments, you will need to sign up for our Shop Pay service, which you can find here.

Once you have signed up for Shop Pay, you will be able to pay for products in installments, given that you are a US customer, have a debit card associated with your account, and have an account with Affirm.

Is there anything else I can help you with?"

shop

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Activity 1: Customer Service

- Discover the limitations of the Shop LLM chatbot through interaction
  - Download the App or use the website at shop.app/search
  - Open the chatbot
  - Interact and discuss
- With your table:
  - Discuss potential behaviours that could negatively impact Shopify or its customers
  - Investigate whether any of these behaviours can be observed through interaction
- You have 30 minutes for this activity, after which we will go around the room and ask one member from each table to share their group's findings.

Activity 2: Workflow Integration

Activity 2: Workflow Integration

- Discuss the viability of integrating LLMs into business workflows with either:
  - Bard (preferred) - https://bard.google.com/chat
  - h2oGPT - https://gpt-gm.h2o.ai/
- Integrating LLMs into people's workflows is supposed to speed up processes which would otherwise consume large amounts of people's time. Common tasks include:
  - Summarizing emails/documents around a certain topic/person
  - Drafting email replies, automatically gathering the necessary information from your workspace
  - Creating content based on your workspace documents
- You have 20 minutes for this activity, after which we will have an open discussion.