

Creating a System to Discover Social and Economic Patterns through Open Data Platforms Analysis

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Relevance of the topic. Create your own prophet

'At first I thought, this is crazy': the real-life plan to use novels to predict the next war

Three years ago, a small group of academics at a German university launched an unprecedented collaboration with the military - using novels to try to pinpoint the world's next conflicts. Are they on to something?



📍 Jürgen Wertheimer, who set up Project Cassandra: 'Writers operate on a plane that is both objective and subjective.' Photograph: Dominik Giger/The Guardian

Передбачили декілька війн аналізуючи потік книжок в бібліотеках

INSIDER Newsletters Log

US MARKETS CLOSED In the news ▲ Dow Jones -0.66% ▼ Nasdaq +0.31% ▲ S&P 500 -0.17% ▼ META +0.34% ▼ TSLA +1.58% ▲ BABA -0.02%

HOME > MARKETS

ChatGPT is better at predicting how stocks will react to news headlines than traditional models, new study shows

Jacob Zinkula Apr 12, 2023, 7:17 AM GMT-7

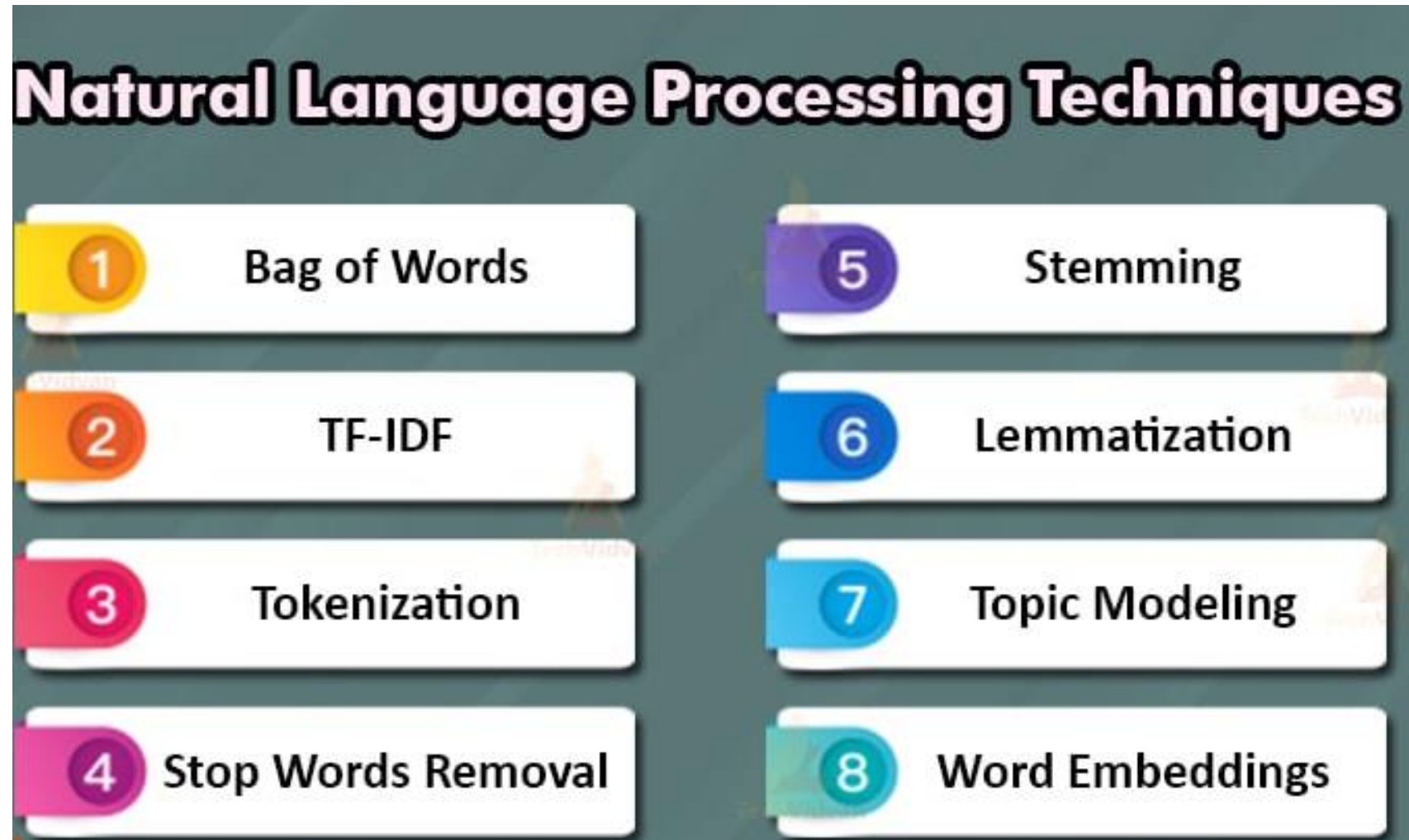


A study found ChatGPT was pretty good at determining how news headlines could affect stock prices. PhonlamaiPhoto/Getty Images

- Florida researchers asked ChatGPT to analyze the sentiment of news headlines to forecast resulting stock moves.

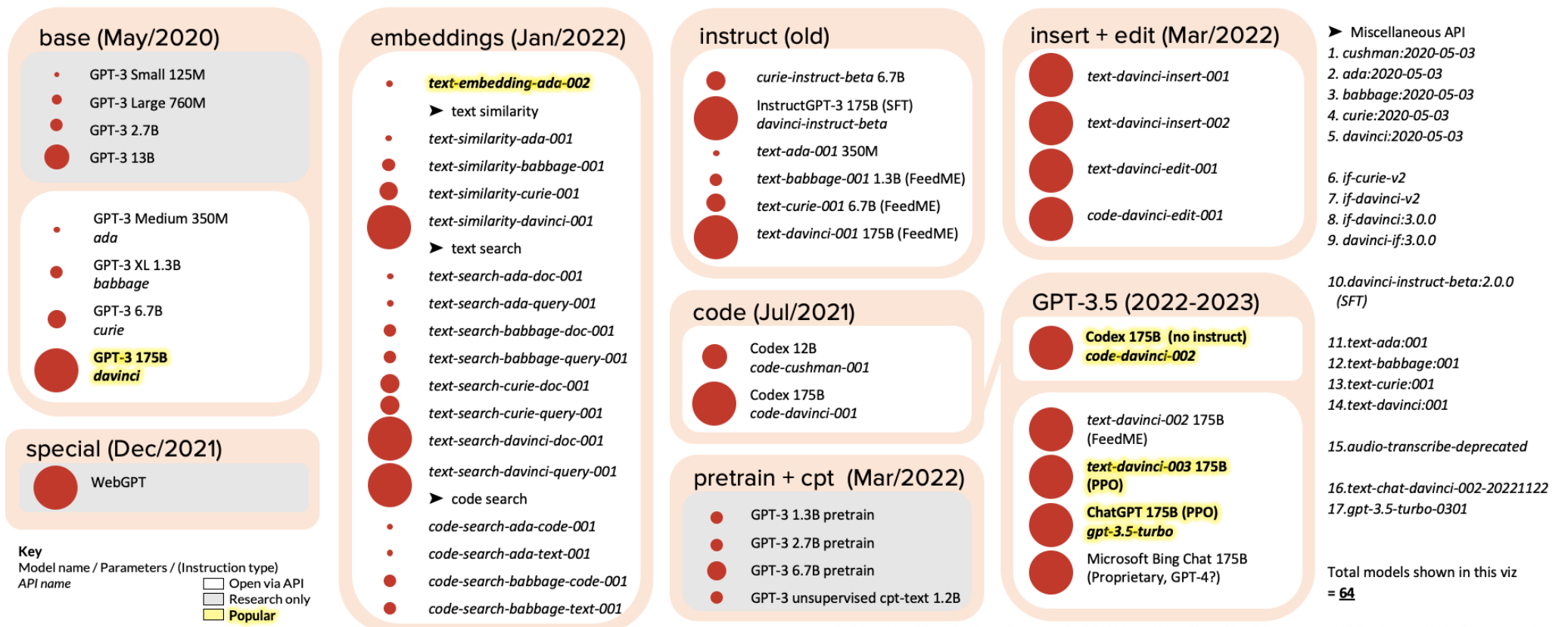
За аналізом новин передбачають вартість акцій краще за традиційні розрахункові моделі

The possibilities and limitations of existing NLP tools for various text analysis



The possibilities and limitations of existing NLP tools for various text analysis

THE GPT-3 FAMILY: 50+ MODELS (MAR/2023)



Not to scale. Selected highlights only. Alan D. Thompson, March 2023. <https://lifearchitct.ai/gpt-3> Sources: OpenAI 1, 2 and papers, API duplicates removed.

The possibilities and limitations of existing NLP tools for various text analysis

OpenAI model's version	GPT-3 (ada, babbage, curie, davinci)	GPT-3.5 (gpt-3.5-turbo, gpt-3.5-turbo-0301, text-davinci-003, text-davinci-002)	GPT-4-8K	GPT-4-32K
Context length (max request)	2,049	4,096	8,192	32,768
Number of English words	~1,500	~3,000	~6,000	~24,000
Number of single-spaced pages of English text	3	6	12	50

Introduction

The purpose of the research: To develop and implement a cloud-based searching and analytics system that combines the strengths of classic IR techniques with the latest LLMs models, effectively identifying and analyzing social and economic trends based on the big volume of the text media content.

The object of study: Find the way to improve the LLMs generation results for special topics by context creation.

Relevance of the topic: The urgent need for the fusion of classic IR techniques and the most recent NLP models has the potential to revolutionize the field, making this work highly relevant.

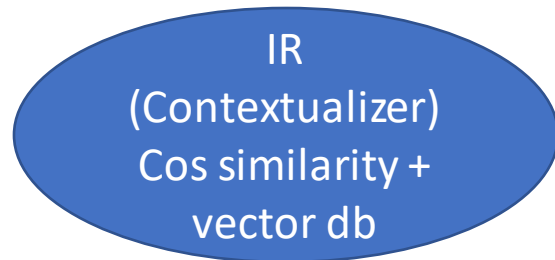
Action plan

To achieve the purpose of the research, the following scientific tasks have been determined:

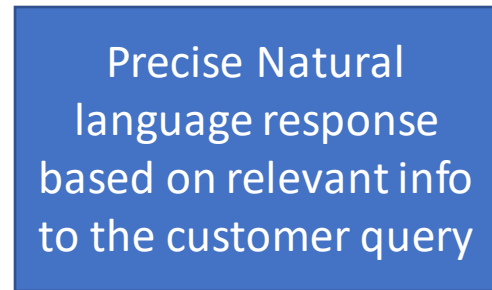
1. Investigate the limitations of current NLP models, such as GPT family and other LLMs, in processing large texts. Analyze existing IR methods and approaches to search, extract, process, and analyze text data in the big collection of documents relevant to the query.
2. Create a cloud-based searching and analytics system that combines classic IR techniques with modern NLP models to analyze large text corps effectively and provide answers in natural language.
3. Implement and test the developed system, assessing its performance and accuracy in identifying trends and patterns as well as providing IR search.
4. Compare the performance of the system with existing approaches and draw conclusions about its applicability and effectiveness.

The essence of the proposed method. Solution structure

Classic Search System to get relevant context from document database for LLM processing based on customer query



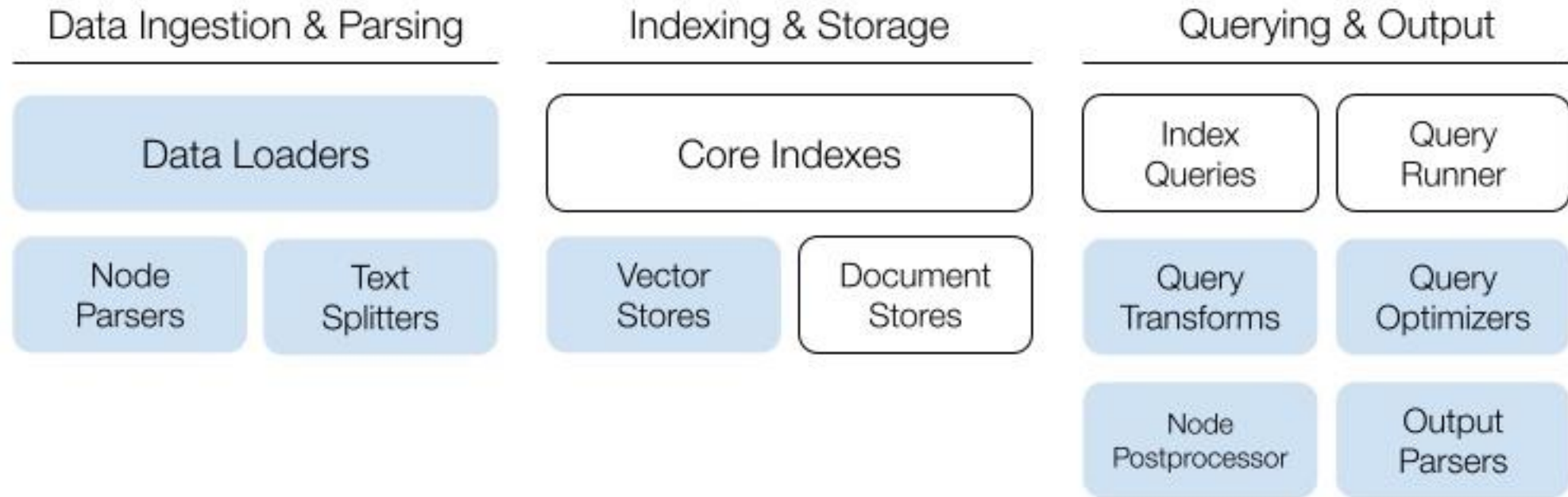
Using LLM as the NLP processor to analyze input context information and generate Natural Language response to customer query



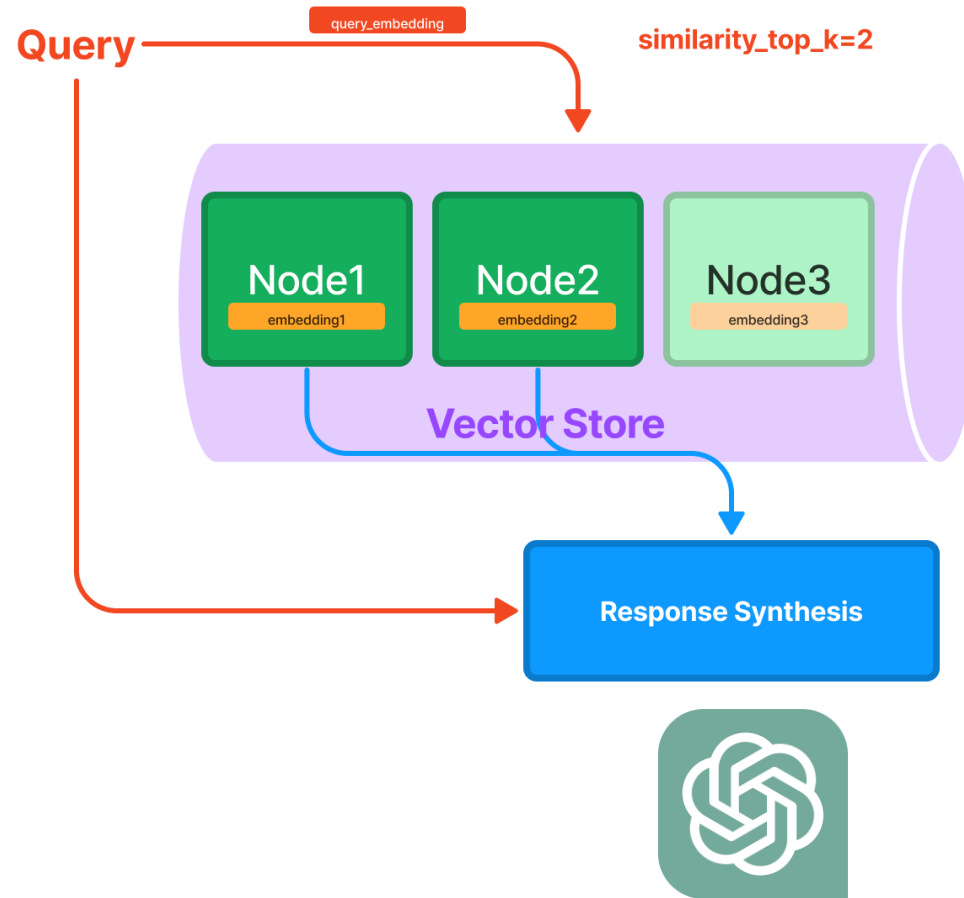
Existing Information Retrieval Methods

Features	gpt-index	LlamaIndex
Indexing approach	Inverted index with GPT contextual understanding of natural language	Traditional inverted index
Query processing	Processes queries using the GPT model	Processes queries based on the presence of query terms in the inverted index
Retrieval accuracy	More accurate and relevant search results based on contextual understanding of natural language	Less contextual understanding may lead to less accurate search results
Flexibility	Limited customization options, tailored towards contextual search	Provides more flexibility and customization options for indexing and retrieval
Learning capability	Incorporates user feedback for improved search accuracy over time	Does not have explicit learning capability
Required resources	Requires a GPU for efficient processing of large datasets	Can be used on standard CPUs

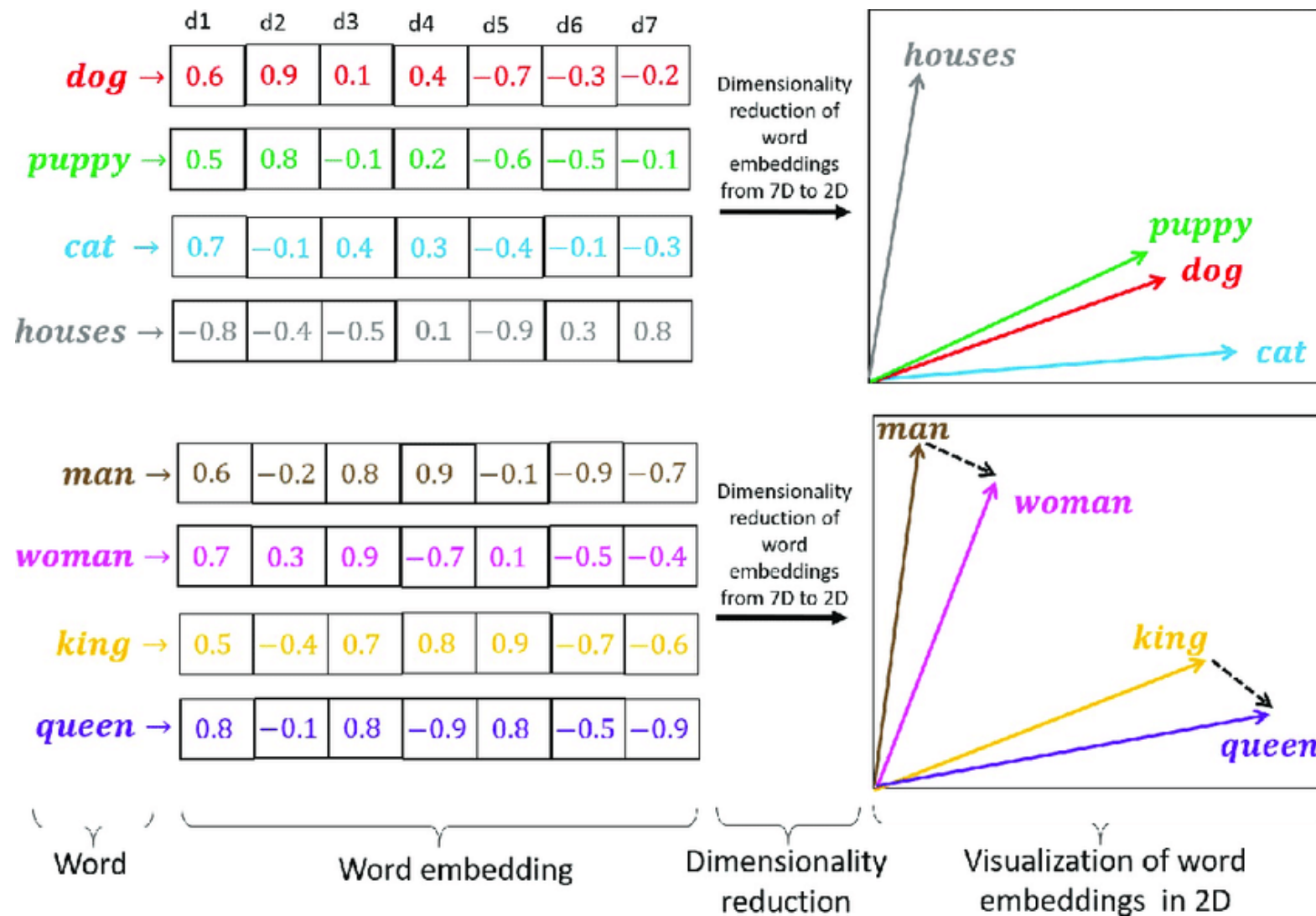
Existing Information Retrieval Methods



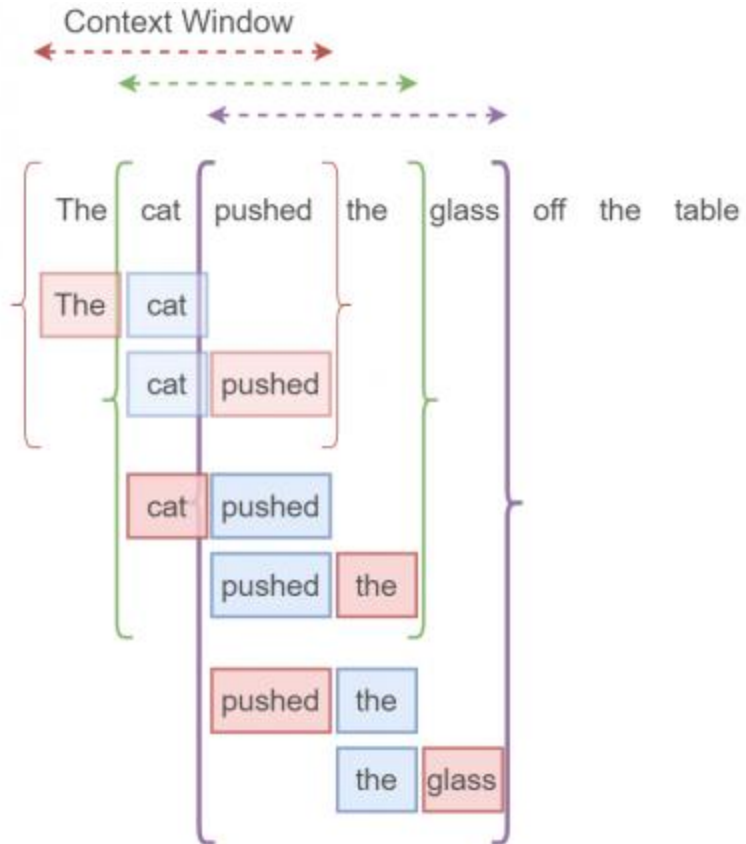
The essence of the proposed method. Solution structure



The essence of the proposed method. Embedding calculations



The essence of the proposed method. Embedding calculations

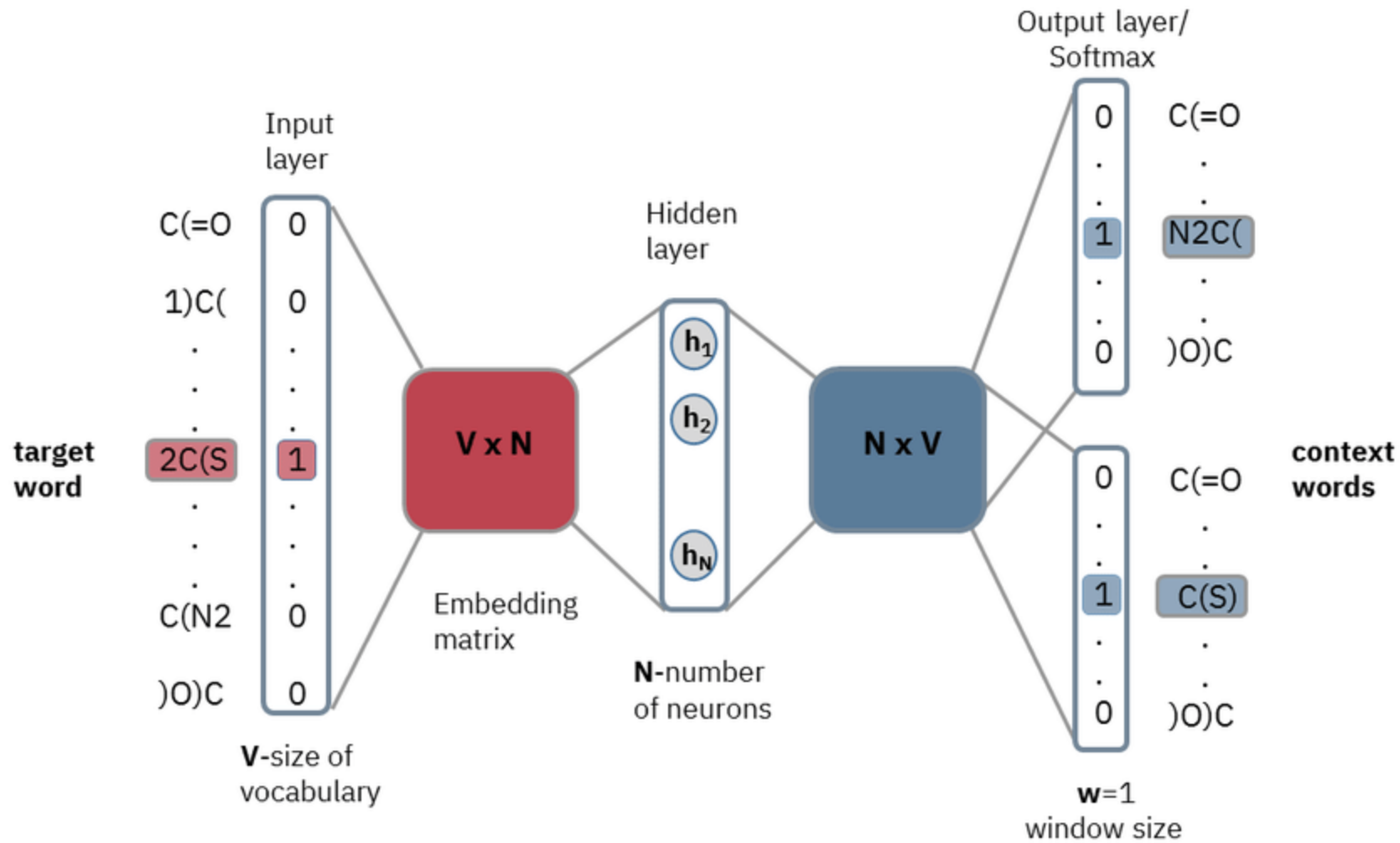


cat	0.01	0.2	0.9	...	0.64
dog	0.0	0.2	0.89	...	0.71
walk	0.3	0.0	0.6	...	0.09
				⋮	
pencil	0.6	0.76	0.1	...	0.29

Embedding size

Vocabulary size

The essence of the proposed method. Embedding calculations



The essence of the proposed method. Embedding Ada. OpenAI

```
for ind, x in enumerate(list(df["text"])):
    if ind % 50 == 0:
        # sleep is required to avoid cases of API overload
        time.sleep(2)
    embeddings_lst.append(openai.Embedding.create(input=x, engine='text-embedding-ada-002')['data'][0]['embedding'])

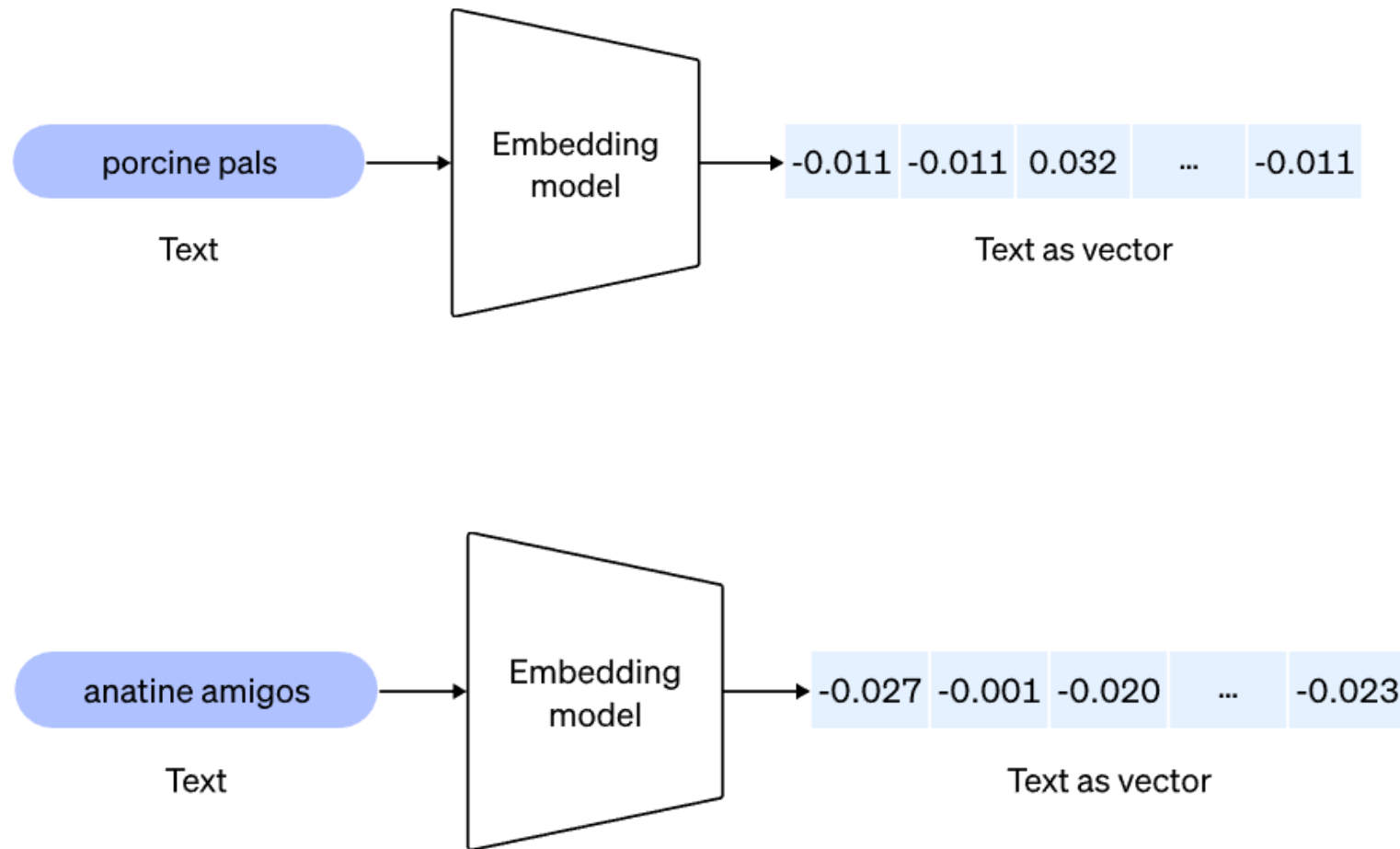
df["embeddings"] = pd.Series(embeddings_lst)
```

Text search Code search Sentence similarity Text classification

Model	Performance
text-embedding-ada-002	81.5
text-similarity-davinci-001	80.3
text-similarity-curie-001	80.1
text-similarity-babbage-001	80.1
text-similarity-ada-001	79.8

Dataset: [SentEval](#) (STS 2012-2016)

The essence of the proposed method. Embedding Ada. OpenAI



The essence of the proposed method. GPT-3 Da Vinci. OpenAI

GPT-3.5

GPT-3.5 models can understand and generate natural language or code. Our most capable and cost effective model in the GPT-3.5 family is `gpt-3.5-turbo` which has been optimized for chat but works well for traditional completions tasks as well.

LATEST MODEL	DESCRIPTION	MAX TOKENS	TRAINING DATA
<code>gpt-3.5-turbo</code>	Most capable GPT-3.5 model and optimized for chat at 1/10th the cost of <code>text-davinci-003</code> . Will be updated with our latest model iteration.	4,096 tokens	Up to Sep 2021
<code>gpt-3.5-turbo-0301</code>	Snapshot of <code>gpt-3.5-turbo</code> from March 1st 2023. Unlike <code>gpt-3.5-turbo</code> , this model will not receive updates, and will be deprecated 3 months after a new version is released.	4,096 tokens	Up to Sep 2021
<code>text-davinci-003</code>	Can do any language task with better quality, longer output, and consistent instruction-following than the curie, babbage, or ada models. Also supports inserting completions within text.	4,097 tokens	Up to Jun 2021
<code>text-davinci-002</code>	Similar capabilities to <code>text-davinci-003</code> but trained with supervised fine-tuning instead of reinforcement learning	4,097 tokens	Up to Jun 2021
<code>code-davinci-002</code>	Optimized for code-completion tasks	8,001 tokens	Up to Jun 2021

Model Name	Description
Davinci	The Davinci model is a state-of-the-art language model developed by OpenAI. It is part of the GPT-3 series and is known for its advanced natural language processing capabilities.
Parameters	The Davinci model has a large number of parameters, enabling it to capture complex language patterns and generate coherent and contextually relevant responses.
Language	The model is trained on a diverse range of text data from various sources and domains, allowing it to understand and generate text in multiple languages.
Context	The Davinci model excels at understanding and incorporating context in its responses. It can take into account the surrounding text and generate coherent replies that align with the given context.
Text Generation	The model exhibits strong text generation capabilities and can produce creative and contextually appropriate responses. It can generate paragraphs, essays, stories, and more, making it suitable for creative writing, content generation, and other text-based applications.
Task-specific	The Davinci model can be fine-tuned or specialized for specific tasks, allowing it to perform well in various domains such as language translation, question-answering, sentiment analysis, and more. It can be trained on specific datasets and optimized for specific objectives, making it adaptable and versatile for different NLP tasks.
Computational Requirements	The Davinci model requires significant computational resources for training and inference due to its large parameter count. Running the model can be computationally expensive and may require powerful hardware or cloud-based resources.

Experiments. Compare proposed solution and GPT-3.5

Assistant

You 20:17

I have opened Anaconda through anaconda navigator (not from anaconda prompt). There comes error while launching Jupyter Notebook. There error is, a new popup opens and there is written "Application notebook launch may have produced errors " and below there is written "Exit code: 1" Please help and solve this error.

Assistant 20:17

One possible solution to this error is to try launching Jupyter Notebook from the Anaconda prompt instead of the Anaconda Navigator. To do this, open the Anaconda prompt and type "jupyter notebook" and press enter. If this does not work, you can try updating the ipykernel package by running the command "conda install ipykernel --update-deps --force-reinstall" in the Anaconda prompt. If neither of these solutions work, you can try reinstalling Anaconda or seeking further assistance from the Anaconda Community forums.

You can read more on your question here:

<https://community.anaconda.cloud/t/jupyter-launching-error/5394>
<https://community.anaconda.cloud/t/launching-jupyter-notebook-gives-error-exit-1/43965>
<https://community.anaconda.cloud/t/exit-code-1-while-launching-jupyter-notebook-from-anaconda-navigator/49399>
<https://community.anaconda.cloud/t/a-problem-launching-jupyter-note/13809>
<https://community.anaconda.cloud/t/anaconda-navigator-exit-code-1/4900>
<https://community.anaconda.cloud/t/anaconda-navigator-launch-button-jupyter-notebook-fails-due-to-exit-code-1-error/49020>
<https://community.anaconda.cloud/t/application-launch->

Enter your message... Send

AN I have opened Anaconda through anaconda navigator (not from anaconda prompt). There comes error while launching Jupyter Notebook. There error is, a new popup opens and there is written "Application notebook launch may have produced errors " and below there is written "Exit code: 1" Please help and solve this error.

The error message you're seeing may indicate that there is a problem with the installation or configuration of Jupyter Notebook. Here are some steps you can try to resolve the issue:

1. Update Anaconda: Open Anaconda Navigator, go to the "Home" tab, and click the "Update Available" button if there is one. Update all packages to the latest version and restart Anaconda Navigator.
2. Launch Jupyter Notebook from Anaconda Prompt: Open Anaconda Prompt and type "jupyter notebook" to launch Jupyter Notebook. This will show any error messages that may be occurring.
3. Check the Jupyter Notebook log: In Anaconda Navigator, go to the "Environments" tab, select the environment where Jupyter Notebook is installed, and click the "Open Terminal" button. In the terminal, type "jupyter notebook --debug" to launch Jupyter Notebook with debugging enabled. This will create a log file that may provide more information about the error.
4. Reinstall Jupyter Notebook: In Anaconda Navigator, go to the "Environments" tab, select the environment where Jupyter Notebook is installed, and click the "Not Installed" dropdown. Search for "jupyter notebook" and reinstall it.

If none of these steps resolve the issue, you may want to try uninstalling and reinstalling Anaconda to ensure a clean installation.

Regenerate response

Send a message...

Experiments. Compare proposed solution and GPT-3.5

Assistant

zum Stillstand. Installiert habe ich mit der "Anaconda - Empfehlung auf der Homepage. Installed multiple times, Anaconda for Windows 11. Worked with Spyder for years, never had any problems. Then new Spyder version, from then on more and more malfunctions. Today Spyder no longer started the editor I use to develop software. Got Spyder 5.1 xx and Python 3.9.7. Over the past few weeks I've had to restart the kernel frequently because Spyder was dead. The CPU performance and the memory consumption rocketed up to a standstill. I installed it with the "Anaconda" recommendation on the homepage.

Assistant 17:26

Thank you for reaching out to us. We apologize for the inconvenience you are experiencing with Spyder. Based on the information you provided, it seems like there may be compatibility issues with the new Spyder version and your system. We recommend trying to uninstall Spyder and reinstalling an older version that worked well for you in the past. You can also try updating your Anaconda distribution to see if that resolves the issue. If the problem persists, please feel free to reach out to our support team for further assistance.

You can read more on your question here:

<https://community.anaconda.cloud/t/spyder-no-longer-starts-the-editor-i-use-i-have-to-restart-the-kernel-frequently/6189>
<https://community.anaconda.cloud/t/fresh-install-of-anaconda-spyder-has-a-critical-bug-and-cant-be-updated/38885>
<https://community.anaconda.cloud/tag/spyder>
<https://community.anaconda.cloud/t/issues-with-anaconda-distribution/29611>

Click [here](#) to contact human customer support specialist

Enter your message... **Send**

Es scheint, dass der Benutzer Probleme mit Spyder hat, nachdem er auf eine neue Version aktualisiert hat. Möglicherweise gibt es Probleme mit dem Editor und dem Kernel, und die CPU-Leistung und der Speicherverbrauch können sich erhöhen, bis Spyder nicht mehr reagiert. Hier sind einige mögliche Lösungen:

1. Überprüfen Sie, ob das Problem mit Spyder oder dem Kernel zusammenhängt: Versuchen Sie, den Kernel manuell neu zu starten und zu überprüfen, ob Spyder dann wieder reagiert. Wenn dies der Fall ist, könnte das Problem beim Kernel liegen und nicht bei Spyder.
2. Aktualisieren Sie Spyder und Python: Stellen Sie sicher, dass Sie die neueste Version von Spyder und Python verwenden. Sie können dies in Anaconda Navigator überprüfen und gegebenenfalls aktualisieren.
3. Deaktivieren Sie unnötige Plugins: Wenn Sie viele Plugins in Spyder installiert haben, kann dies die Leistung beeinträchtigen. Versuchen Sie, nicht benötigte Plugins zu deaktivieren und zu überprüfen, ob dies das Problem löst.
4. Verwenden Sie Spyder in einer anderen Anaconda-Umgebung: Erstellen Sie eine neue Umgebung und installieren Sie Spyder und Python dort erneut. Überprüfen Sie, ob das Problem weiterhin besteht.

Wenn keines dieser Schritte das Problem löst, kann es hilfreich sein, die genaue Fehlermeldung zu überprüfen oder sich an den technischen Support von Anaconda zu wenden.

Regenerate response

Send a message...

Experiments. Compare proposed solution and GPT-3.5

Assistant

port=443): max retries exceeded with url: ... Can't connect to HTTPS because the SSL module is not available." How do I install the SSL Module and openSSL such that conda can see it? to remedy this situation and let me install packages?

Assistant 17:28


This is a known bug on Windows machines. The fix is to copy the two below DLL's from the 'bin' folder to the 'DLL's folder: On Windows machines the anaconda installation directory will reside under one of the following, depending on whether you proceed with a 'system-wide' or 'per-user' install: 'C:\ProgramData\anaconda3' (system-wide install) 'C:\Users\anaconda3' ('per-user' install) Under this directory there will be a 'Library\bin' folder. You can search, copy and paste using 'Windows Explorer'. Copy and paste the files: libcrypto-1_1-x64.dll libssl-1_1-x64.dll from this folder into the directory: 'C:\Users

You can read more on your question here:

<https://community.anaconda.cloud/t/getting-openssl-working/51512>
<https://community.anaconda.cloud/t/caused-by-sslerror-cant-connect-to-https-url-because-the-ssl-module-is-not-available/49765>
<https://community.anaconda.cloud/t/new-environment-created-but-not-coming-through-in-jupyter/48463>
<https://community.anaconda.cloud/t/kivy-fails-to-install/36675>
<https://community.anaconda.cloud/t/anaconda-prompt-is-having-an-issue-with-ssl-certificates/48310>
<https://community.anaconda.cloud/t/creating-new-environment-from-base-getting-ssl-error-when-trying-to-install-jupyter-notebook-in-new-env/41007?page=2>

Click [here](#) to contact human customer support specialist


Enter your message... **Send**

 The error message suggests that OpenSSL is not available on your machine, which is preventing Conda from downloading and installing packages. Here are some steps you can try to resolve the issue:

1. Check if OpenSSL is installed on your machine: Open a command prompt or terminal window and type "openssl version". If OpenSSL is installed, you should see the version number. If not, you will need to install OpenSSL.
2. Install OpenSSL: You can download and install OpenSSL from the official website (<https://www.openssl.org/>) or use a package manager like Chocolatey (<https://chocolatey.org/packages/openssl.light>). Follow the installation instructions for your platform.
3. Update Conda: Open Anaconda Prompt or a terminal window and type "conda update conda". This will update Conda to the latest version, which may include fixes for SSL-related issues.
4. Create a new environment without SSL verification: Open Anaconda Prompt or a terminal window and type "conda create --name myenv --ssl-verify=false". This will create a new environment with SSL verification disabled. You can then activate the environment and try installing packages again.

If none of these steps resolve the issue, you may want to try reinstalling Anaconda or contacting Anaconda support for further assistance.

Regenerate response

Send a message... 

ChatGPT Mar 23 Version. ChatGPT may produce inaccurate information about people, places, or facts

Application of created framework to analyze data trends in text content



9:17 AM · Feb 15, 2023 · 199.8M Views

Elon Musk posted his dog Floki, and in the thread of posts, he mentioned that the dog had been appointed as CEO of Twitter. The number of subscribers to Elon Musk's account, in the amount of 129 million people, confirms his influence on the market. Subscribers who are market participants perceived the publication as good and decided to buy the asset, and were also able to collect a large volume for purchase. At 5:20 UTC+2, a sharp increase in purchase volumes of a crypto asset called Floki was on the market. As a result, the price increased by 49% in 40 minutes.



Date: 15.02.23
Floki chart on 5 min interval

Application of created framework to analyze data trends in text content

The trigger words, dates, and numbers for the price movements in the given examples are:

Example 1: Trigger words - "Dogecoin," "people's crypto"; Date - Feb 4, 2021; Price movement - +43%.

Example 2: Trigger words - "Tesla," "\$1.5 billion in bitcoin"; Date - Feb 8, 2021; Price movement - +13%.

Example 3: Trigger words - "AVAX," "Binance," "largest exchange by trading volume," "6:30 a.m. UTC on September 22"; Date - Sep 22, 2020; Price movement - +314%.

Example 4: Trigger words - "The Sandbox," "LAND," "digital piece of real estate," "#NFT"; Date - Jan 21, 2021; Price movement - +160%.

In all these examples, the trigger words or phrases are related to the cryptocurrency or digital asset being discussed, and the dates mentioned correspond to when the tweets were posted. The price movement numbers indicate the percentage increase in the asset's price after the tweet was posted, which suggests a potential correlation between the tweet and the price movement.

Application of created framework to analyze data trends in text content

Endpoint: `statuses/user_timeline`

This endpoint returns a collection of the most recent Tweets posted by the user specified.

HTTP Request

```
bash Copy code  
  
GET https://api.twitter.com/1.1/statuses/user_timeline.json
```

Request Parameters

Parameter	Required	Description
`user_id`	Optional	The ID of the user for whom to retrieve tweets.
`screen_name`	Optional	The screen name of the user for whom to retrieve tweets.
`count`	Optional	The number of tweets to retrieve per request. Maximum of 200.
`since_id`	Optional	Returns results with an ID greater than (that is, more recent than) the specified ID.
`max_id`	Optional	Returns results with an ID less than (that is, older than) or equal to the specified ID.
`trim_user`	Optional	When set to `true`, each tweet returned in a timeline will include a `user` object including only the status authors numerical ID.
`exclude_replies`	Optional	When set to `true`, this parameter will prevent replies from appearing in the returned timeline.
`include_rts`	Optional	When set to `false`, this parameter will prevent retweets from appearing in the returned timeline.

```
# Print the text of each tweet  
for tweet in tweets:  
    print(tweet.text)
```

@Pathfinder 🤔

RT @PRHillmann: As @cz_binance built out the new exec team at Binance over the past two years, he made it mandatory that each of us (CZ inc.. The #Binance Helpdesk AI chat is free, just saying... 🤖🤔 <https://t.co/QzRX1xndHm>
» #Binance Launches Metaverse Show to Find The Next Big Web3 Entrepreneur - Yahoo

<https://t.co/P187nbXyJT>

At Binance, we're in it for the tech.

Our risk team uses machine learning models to monitor and take action again... <https://t.co/R8Dh7v18wN>

Locked ETH at ATH. You know what follows? <https://t.co/3xS80oCfT9>

@DaCryptoAgency 🙌

A year ago today, UST/LUNA crashed. \$40 billion in value gone. BTC went from 28k to 19k. A few lessons can be learn... <https://t.co/IGYUvpyWf>
.@FMoCDENigeria's full statement on the new policy here.

<https://t.co/QNTcNATgec>

More positive news coming from Nigeria.

Their new National Blockchain Adoption policy should improve clarity & con... <https://t.co/7JVtxsg67o>

RT @paddi_hansen: The MiCA effect EU 🇪🇺

The share of VC investment into European crypto projects is up almost 10x in one year - from a share...

RT @BinanceVIP: #BinanceVIP is excited to announce the launch of Capital Connect.

A platform for Binance VIP-level users that facilitates...

RT @binance: A lot lies ahead for the future of compliance and investigations at #Binance

Our team continues to work hard towards being at...

@du_rai There are a million reasons a project can fail, and you only need one for it to happen. For a project to be... <https://t.co/c2ILSpXL3S>

@BlockchainSanta Welcome to decentralization... 🤖

@thetokenist I know, we now may need to change the name of the zone. 🤔

As some of you suggested, instead of direct delistings, we will move "no-progress projects" to innovation zone firms... <https://t.co/9NJS06tQYy>

RT @RichardTeng: The new MICA framework provides regulatory clarity and consistency for crypto businesses in EU. A model for other regula... While FUD flying everywhere, PayPal did a 4.

<https://t.co/Mr9uvp9hUk>

RT @binance: For the first time ever, we're bringing the thrill of reality shows to the metaverse with #BuildTheBlock!

Application of created framework to analyze data trends in text content

Based on the provided Twitter feed, here are two main media trends that can be observed:

1. **Binance-related news trend:** Several tweets mention Binance, a cryptocurrency exchange. The tweets cover a range of topics related to Binance, such as executive team developments, the launch of AI chat services, metaverse shows, risk management, blockchain adoption policies, and various updates and announcements from the Binance team. This cluster of tweets indicates a trend around news and updates related to Binance.
2. **Cryptocurrency market and technology trend:** Alongside the Binance-related news, there are tweets discussing broader trends in the cryptocurrency market and technology. These tweets touch upon subjects like crypto projects, Bitcoin and Ethereum price movements, gas prices, regulations, energy usage, mining, market risks, and the impact of technology on financial systems. This cluster of tweets reflects a trend related to the wider cryptocurrency market and technological advancements in the industry.

These two clusters capture the main media trends evident in the provided Twitter feed. However, please note that the sample is limited, and analyzing a more comprehensive dataset would provide a more accurate representation of media trends.

Application of created framework to analyze data trends in text content

```
question = "What crypto like XRP or were mentioned lately according to tweets that you have? Provide some tokens and informational field around them"  
result = answer_question(df, question)  
print(result["text_answer"])
```

```
text = "XRP was mentioned in a recent tweet, with the post being described as 'extremely BULLISH for XRP.' Other cryptocurrencies mentioned in various tweets include Bitcoin, Ethereum, and Tether. However, the given context does not provide sufficient information to offer a detailed insight into these tokens."  
print(text)
```

XRP was mentioned in a recent tweet, with the post being described as 'extremely BULLISH for XRP.' Other cryptocurrencies mentioned in various tweets include Bitcoin, Ethereum, and Tether. However, the given context does not provide sufficient information to offer a detailed insight into these tokens.

Application of created framework to analyze data trends in text content

```
question = "What you can highlight significant about the XRP or related crypto? Relay on weight parametr of the posts."  
result = answer_question(df, question)  
print(result["text_answer"])
```

Based on the weight parameter of the posts, it seems that there is significant discussion around Ripple (XRP) and its potential for growth. There are multiple posts with high weights that mention or discuss Ripple, with some influencers being extremely bullish on its future. However, it's important to note that the opinions of crypto influencers should not be the sole factor in making investment decisions and thorough research should be conducted before making any investments.

Approbation and Further Development



Rick McGeer

CEO and Co-Founder at engageLively, Inc. Chief Scientist at US Ignite

Experience



CEO and Co-Founder

engageLively, Inc.

Sep 2017 - Present · 5 yrs 9 mos

Berkeley, California

engageLively offers the Galyleo platform, a hosted Jupyter environment with a builtin drag-and-drop dashboard editor based on Lively Web technology. Galyleo is completely free and open-source, and integrated w ...see more



Adjunct Professor

University of Victoria

2007 - Present · 16 yrs 5 mos

Adjunct Professor of Computer Science



Chief Scientist

US Ignite

Oct 2013 - Aug 2021 · 7 yrs 11 mos

Washington D.C. Metro Area

Here I built edgeNet, a worldwide edge cloud to offer cloud-in-the-loop applications with 1000x the bandwidth and at 1/10 the latency of standard Cloud applications.



Principal Investigator

SAP

Jan 2014 - May 2016 · 2 yrs 5 mos

San Francisco Bay Area



Hewlett-Packard Enterprise Services

2 yrs 1 mo

Palo Alto, CA



Distinguished Technologist

Mar 2013 - Jan 2014 · 11 mos