TALLER 3

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1. In your own words, describe what vector embeddings are and what they are useful for.

R/

Vector embeddings are a way of representing words or elements in a mathematical space where relationships between them are efficiently captured. Is like every word become a vector.

These Vectors are designed so that similar words have vectors that are close to each other in that space, meaning they share similar characteristics and contexts. This is useful because it allows computers to understand the similarities and relationships between words.

Vector embeddings are like special numerical codes that help computers understand how words and elements relate to each other, which is crucial in many artificial intelligence applications such as machine translation, online search, and text processing.

1. What do you think is the best distance criterion to estimate how far two embeddings (vectors) are from each other? Why?

R/

It acctualy deppends of the case, for example, if you want it for text and natural language cosine similarity is very used, because is more important the direction of the vector than the magnitude, but for every case the answer is different

1. Let Let us build a Q&A (question answering) system! For this, consider the following steps:

a. Pick whatever text you like, in the order of 20+ paragraphs.

b. Split that text into meaningful chunks/pieces.

c. Implement the embedding generation logic. Which tools and approaches would help you generate

them easily and high-level?

d. For every question asked by the user, return a sorted list of the N chunks/pieces in your text that

relate the most to the question. Do results make sense?

This is the text:

“In a rapidly evolving world driven by innovation and technology, the role of artificial intelligence (AI) has emerged as a pivotal force reshaping industries and societies.

The multifaceted applications of AI span from enhancing healthcare diagnostics to optimizing supply chain logistics, transcending traditional boundaries.

Within the realm of healthcare, AI-powered algorithms analyze complex medical data, thereby fostering precision medicine and augmenting the quality of patient care.

Education, too, witnesses the transformative influence of AI, as adaptive learning platforms tailor educational content to individual student needs.

Transportation systems, on the path to autonomy, are ushering in an era of reduced congestion, improved road safety, and sustainable mobility.

The envisaged future of AI-driven autonomous vehicles promises not only convenience but also substantial environmental benefits, as emissions are curtailed.

Virtual personal assistants, such as Siri and Alexa, exemplify AI's integration into daily life, simplifying tasks and enhancing productivity.

Agriculture, an industry often overlooked, is experiencing a revolution with AI-driven drones and sensors optimizing crop management for increased yields.

In the manufacturing sector, predictive maintenance facilitated by AI minimizes downtimes, streamlining production processes and reducing costs.

The financial landscape is witnessing a paradigm shift with AI, bolstering risk assessment, fraud detection, and investment strategies.

AI's contribution extends to environmental stewardship, with predictive analytics aiding in disaster preparedness and climate change mitigation.

Cybersecurity, an imperative in our digital age, benefits from AI's ability to proactively detect and mitigate cyber threats, safeguarding sensitive data.

AI-powered language translation transcends language barriers, fostering global communication and cultural exchange.

Health monitoring devices empowered by AI empower individuals to take charge of their well-being, promoting healthier lifestyles.

Entertainment, a realm of leisure and creativity, harnesses AI for personalized content recommendations, enriching user experiences.

The customer service landscape is elevated by AI-driven chatbots and virtual agents, providing efficient, round-the-clock assistance.

Scientific research sees AI as an indispensable ally, accelerating the analysis of vast datasets and driving discoveries across disciplines.

Automation, a hallmark of AI, liberates human resources from repetitive tasks, fostering innovation and strategic thinking.

Ethical considerations in AI development are paramount, guiding responsible innovation that benefits society while preserving our moral compass.

As AI technology advances, its boundless potential to shape our future beckons, promising an era of unprecedented progress, efficiency, and possibility.”

When the code is executed I get this answers:

Q/ Does IA help in cybersecurity?

A/ Chunk 1: Cybersecurity, an imperative in our digital age, benefits from AI's ability to proactively detect and mitigate cyber threats, safeguarding sensitive data.

Chunk 2: AI-powered language translation transcends language barriers, fostering global communication and cultural exchange.

Chunk 3: Virtual personal assistants, such as Siri and Alexa, exemplify AI's integration into daily life, simplifying tasks and enhancing productivity.

Chunk 4: The multifaceted applications of AI span from enhancing healthcare diagnostics to optimizing supply chain logistics, transcending traditional boundaries.

Chunk 5: The customer service landscape is elevated by AI-driven chatbots and virtual agents, providing efficient, round-the-clock assistance.

Q/ What is the importance of AI?

A/ Chunk 1: In a rapidly evolving world driven by innovation and technology, the role of artificial intelligence (AI) has emerged as a pivotal force reshaping industries and societies.

Chunk 2: AI-powered language translation transcends language barriers, fostering global communication and cultural exchange.

Chunk 3: Education, too, witnesses the transformative influence of AI, as adaptive learning platforms tailor educational content to individual student needs.

Chunk 4: Cybersecurity, an imperative in our digital age, benefits from AI's ability to proactively detect and mitigate cyber threats, safeguarding sensitive data.

Chunk 5: The multifaceted applications of AI span from enhancing healthcare diagnostics to optimizing supply chain logistics, transcending traditional boundaries.

I think this model can respond well, but sometimes it doesn’t find the best chuck for the question I gave it, it could be better.

1. What do you think that could make these types of systems more robust in terms of semantics and functionality?

R/ I think that increasing the variety and volume of the training data may increase the performance of the model because it can understand better the language of the text, other way is using the contextual embedding, because it improves semantic understanding. These embeddings consider the surrounding words and context, making them better suited for tasks that require a deep understanding of meaning and context.