Hope to Skills

Lecture# 04

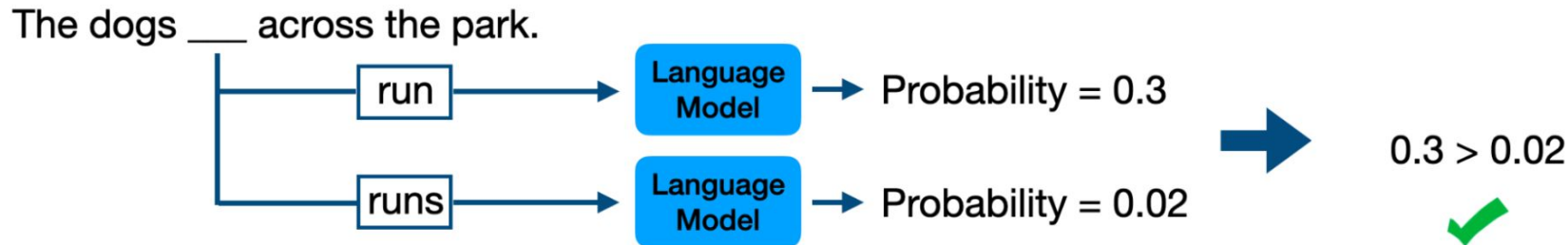Irfan Malik, Dr. Sheraz Naseer

Google Bard

- Bard is conversational AI chat service developed by Google.
- While ChatGPT relies on its pre-trained knowledge, Bard pulls information from the internet in real-time.
- Google Bard is powered by Google's very own and most advanced large language model (LLM) PaLM 2
- https://bard.google.com/

Claude

- Claude is a large language model (LLM) created by Anthropic.
- An AI research company, with the overarching purpose of being a helpful conversational assistant.
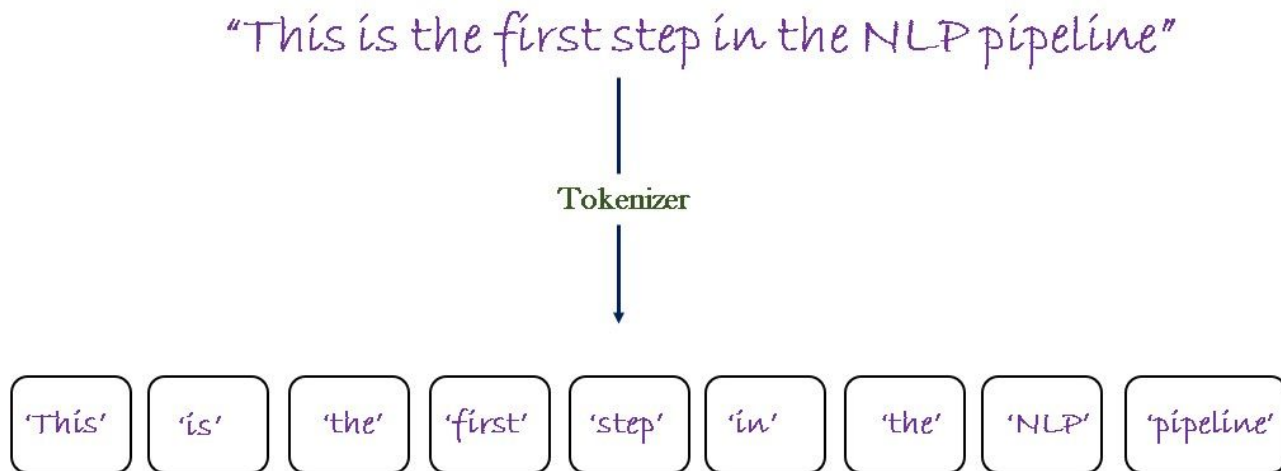- https://poe.com/Claude%2B

What is a Language Model?

Definition: A language model is an **artificial intelligence** model that predicts the **probability** of a sequence of **words** or **tokens** in a given **context**.

The dogs ___ across the park.

run → Language Model → Probability = 0.3

runs → Language Model → Probability = 0.02

→ 0.3 > 0.02 ✔

Tokenization

Definition: Tokenization is the process of **breaking down** text into **smaller units** called tokens, which can be **words**, **phrases**, or **even characters**.
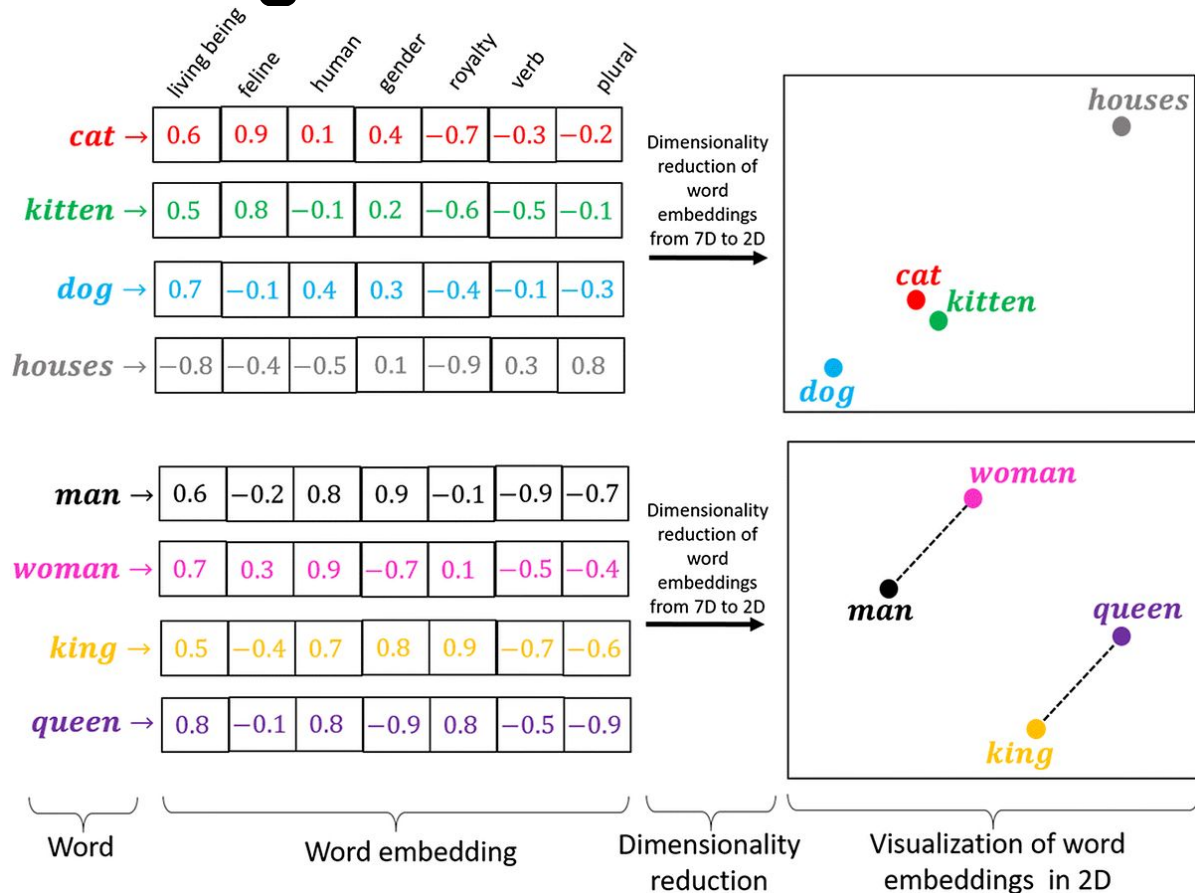
"This is the first step in the NLP pipeline"

Tokenizer

'This' 'is' 'the' 'first' 'step' 'in' 'the' 'NLP' 'pipeline'

Tokens in Language Models

Definition: Tokens are the fundamental **units** of text used by language models. They can be as short as a **single character** or as long as a **word** or **phrase.**
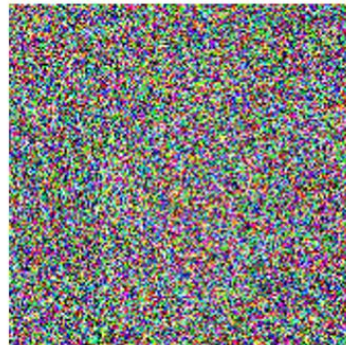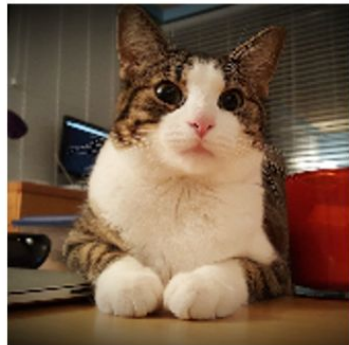
Importance: Language models process text at the token level, allowing them to analyze and generate text based on the context and relationships between individual tokens.

Embeddings from Tokens

	living being	feline	human	gender	royalty	verb	plural
cat →	0.6	0.9	0.1	0.4	−0.7	−0.3	−0.2
kitten →	0.5	0.8	−0.1	0.2	−0.6	−0.5	−0.1
dog →	0.7	−0.1	0.4	0.3	−0.4	−0.1	−0.3
houses →	−0.8	−0.4	−0.5	0.1	−0.9	0.3	0.8

Dimensionality reduction of word embeddings from 7D to 2D

man →	0.6	−0.2	0.8	0.9	−0.1	−0.9	−0.7
woman →	0.7	0.3	0.9	−0.7	0.1	−0.5	−0.4
king →	0.5	−0.4	0.7	0.8	0.9	−0.7	−0.6
queen →	0.8	−0.1	0.8	−0.9	0.8	−0.5	−0.9

Dimensionality reduction of word embeddings from 7D to 2D

Word

Word embedding

Dimensionality reduction

Visualization of word embeddings in 2D

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Diffusion Models

Forward

Backward

Introduction to Stable Diffusion

- A cutting-edge image generation tool utilizing stable diffusion models.

- Generates realistic and high-quality images through advanced diffusion techniques.

- Allows users to explore the possibilities of image generation by controlling diffusion parameters.

- Used in various fields including art, design, and computer vision for diverse image generation tasks.

Introduction to Stable Diffusion [(Try it)](#)