Hello

I’m Matt

Natural Language Generation

Writing stuff by getting computers to write stuff.

NLG use-cases:

- Translation
- Speech recognition
- Chatbots/digital assistants
- Automated reporting
- Smart Compose
- AIDungeon
- Document Summary
- Music Generation :D

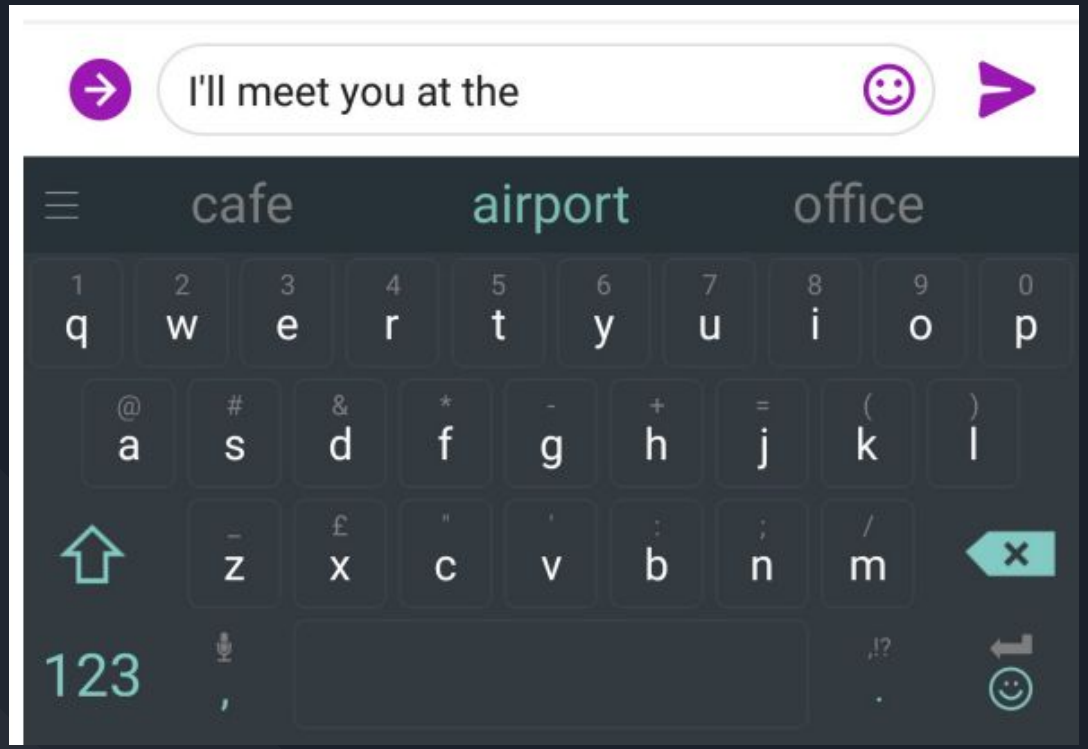
Background

An incredibly brief introduction to NLG.

https://web.stanford.edu/class/cs224n/slides/cs224n-2022-lecture05-rnnlm.pdf

https://web.stanford.edu/class/cs224n/slides/cs224n-2022-lecture06-fancy-rnn.pdf

Language Models



Language Models

N-Grams

~~as the proctor started the clock, the~~ students opened their _____

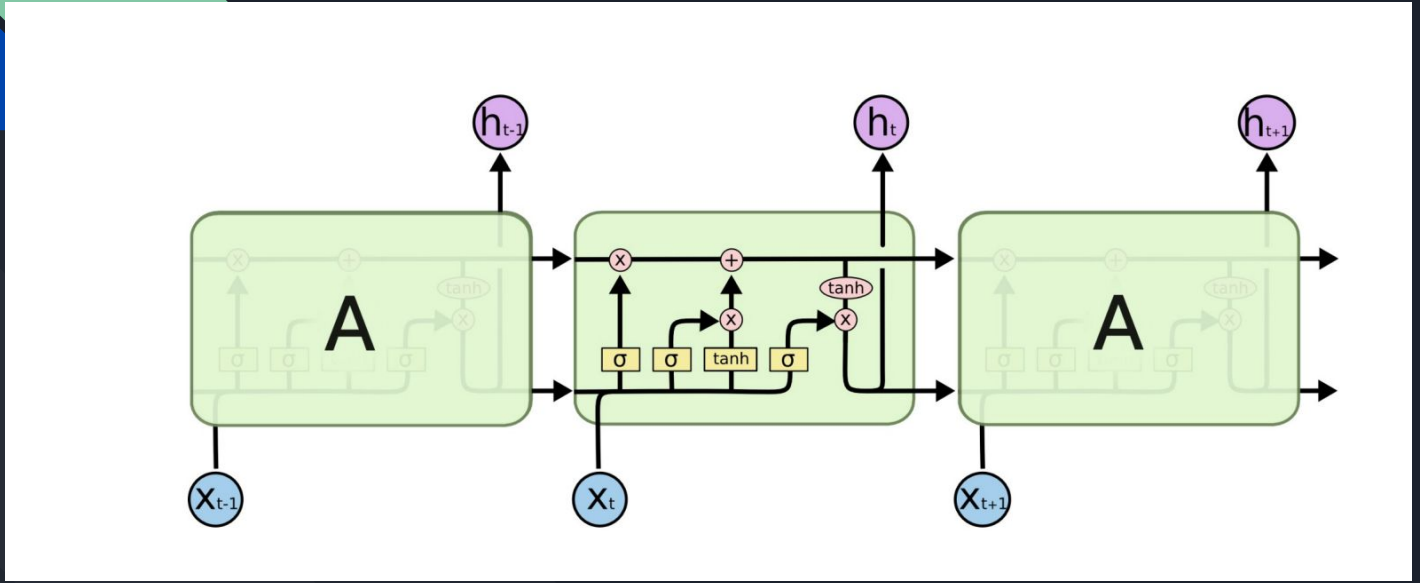
discard

condition on this

$$P(\boldsymbol{w}|\text{students opened their}) = \frac{\text{count}(\text{students opened their } \boldsymbol{w})}{\text{count}(\text{students opened their})}$$

Language Models

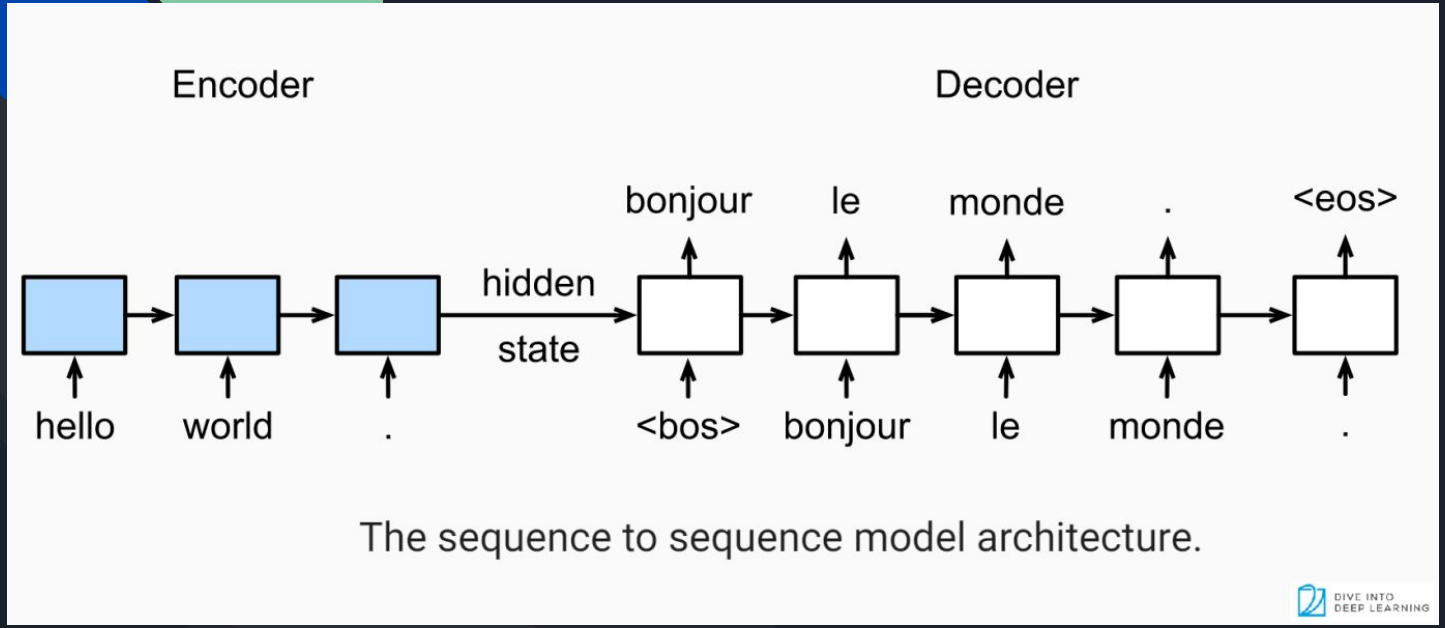
RNN / LSTM



Language Models

Encoder / Decoder: Seq2Seq

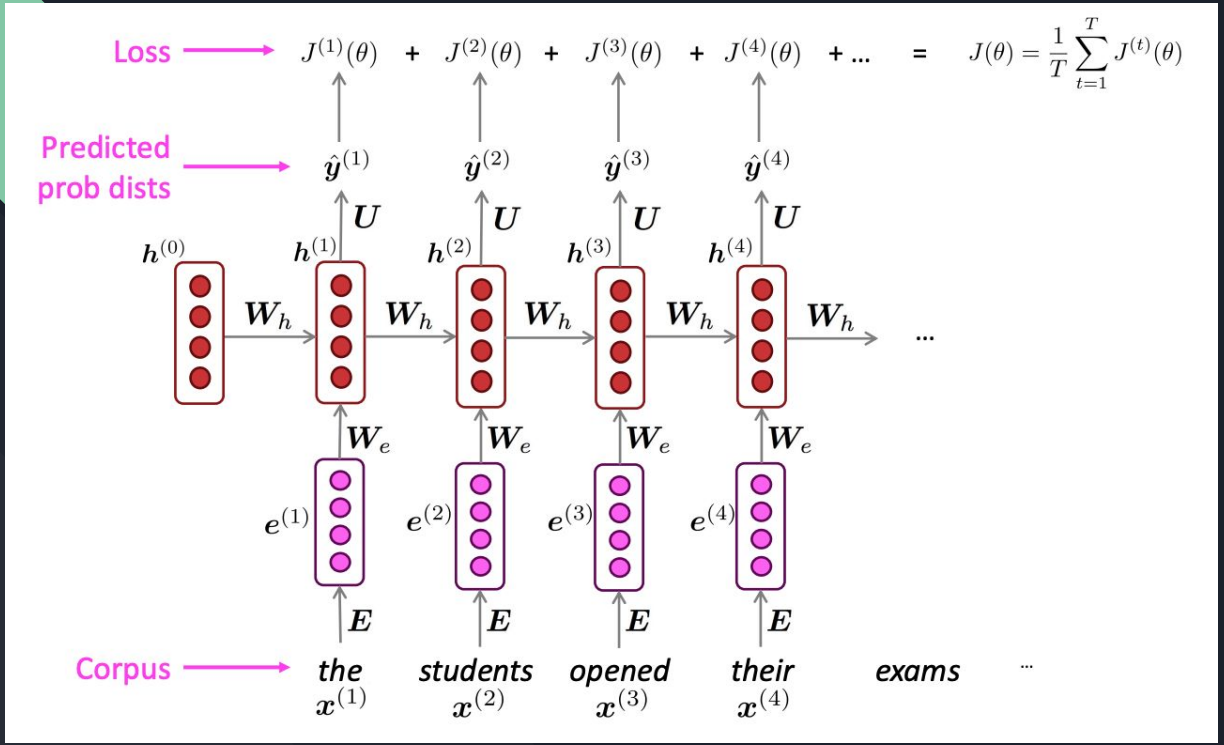
https://www.linkedin.com/pulse/anatomy-sequence-to-sequence-machine-translation-rnn-gru-sobh-phd/



The sequence to sequence model architecture.

Language Models

Teacher Forcing



The Recent Past / Present

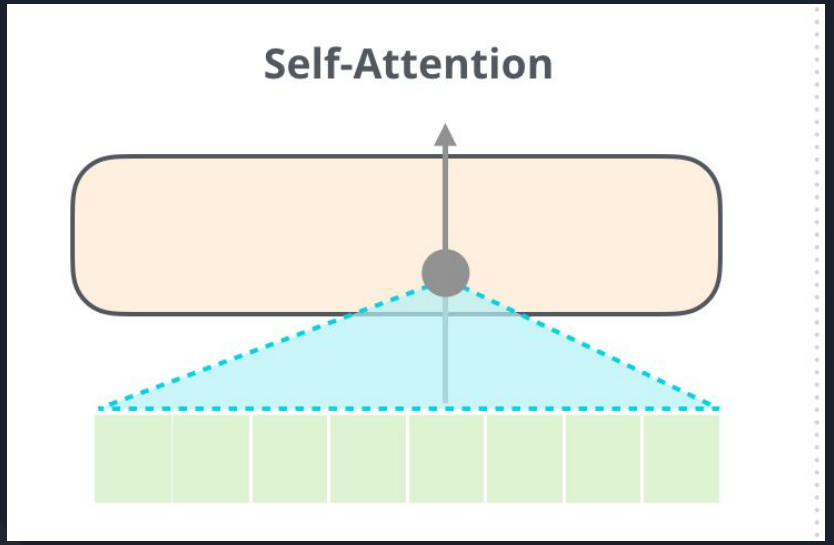
Decoupling encoding from decoding

https://jalammar.github.io/illustrated-gpt2/

Encoders

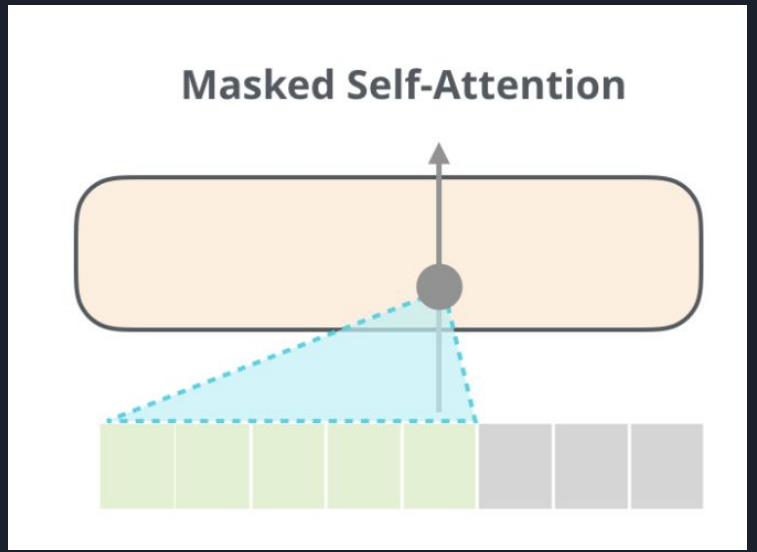
BERT and pals

(twitter.com/bertsesame)



Decoders

You down with GPT? Yeah, you know me.

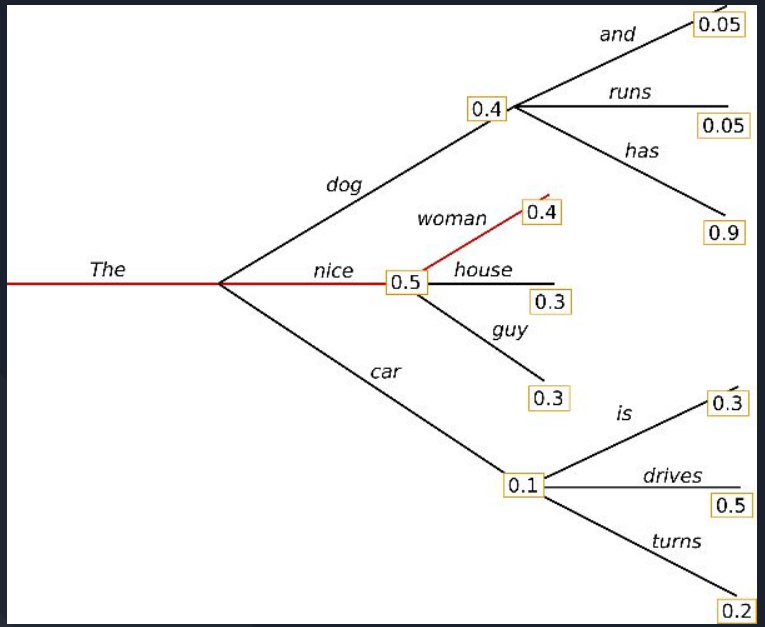


Under the hood

https://huggingface.co/blog/how-to-generate

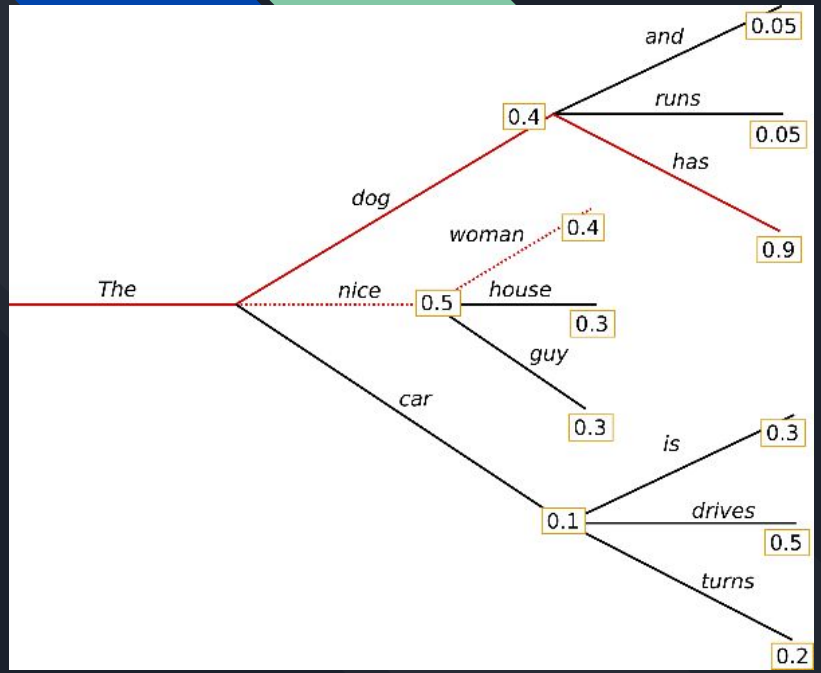
Decoding

Greedy Search



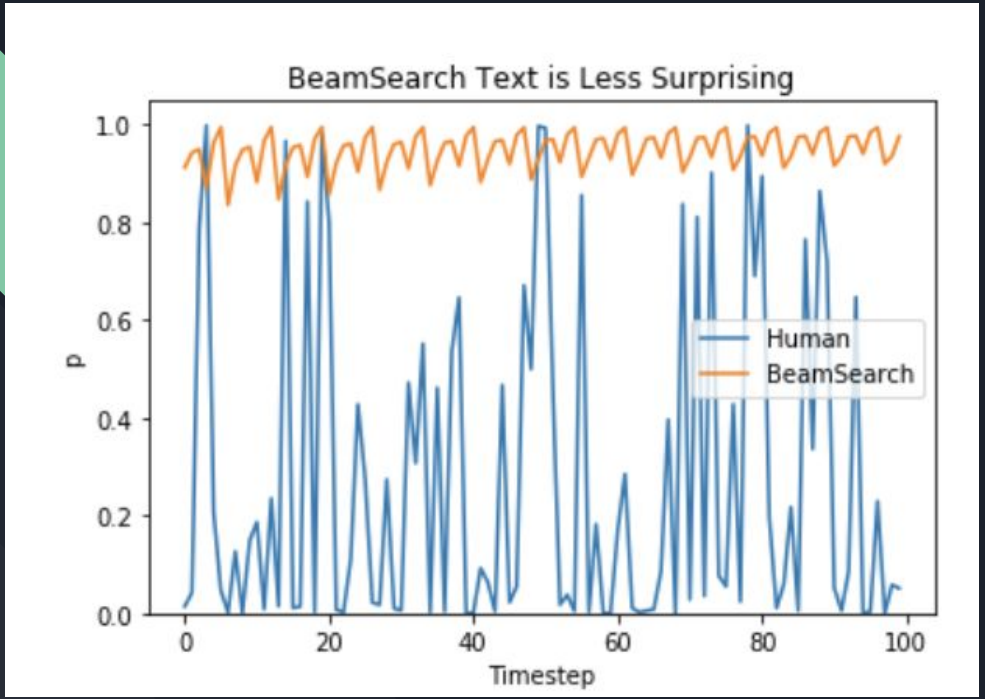
Beam Search

Better than greedy for a lot of things!



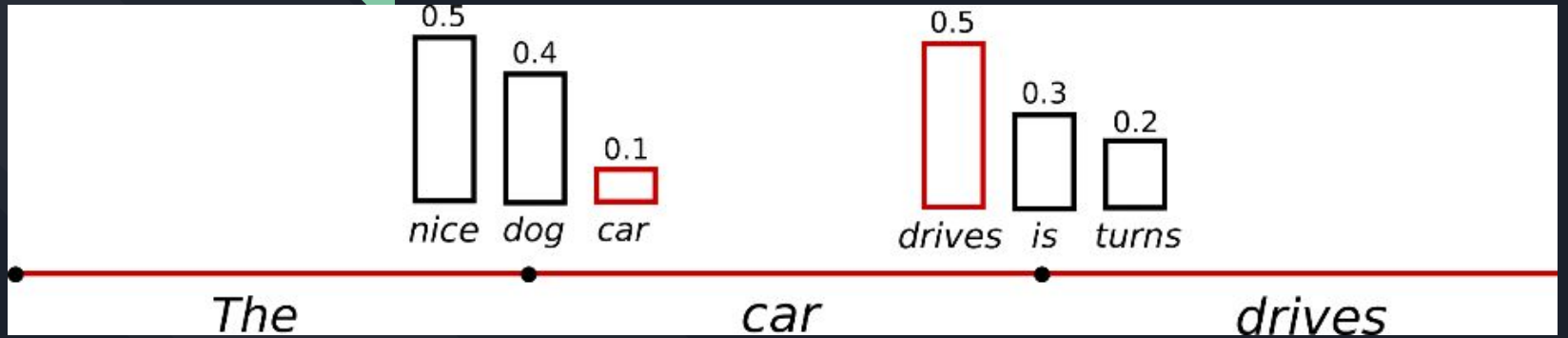
https://demo.allennlp.org/next-token-lm

The problems with Beam Search



Sampling

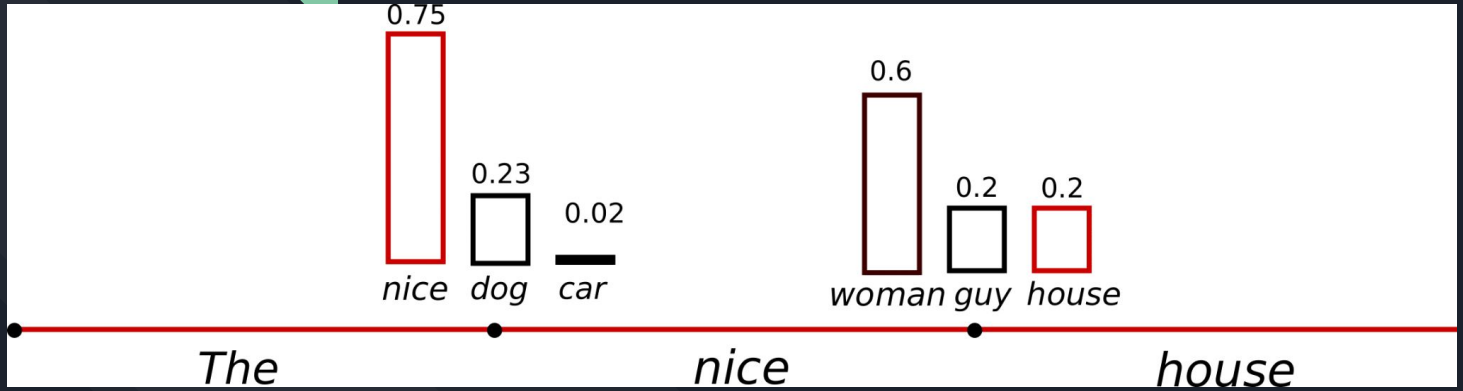
To the… rescue? Limit? Nth?



Sampling

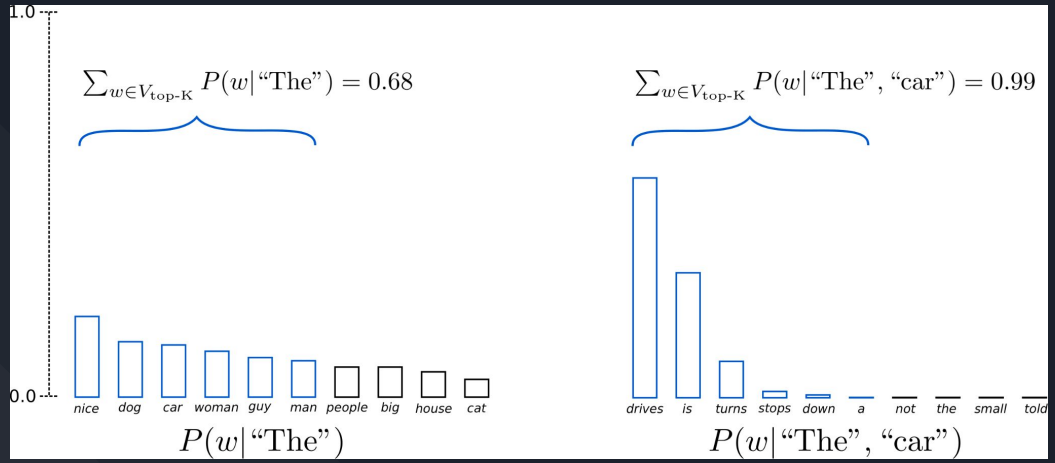
Can be kind of, um, random.

So lower the temperature!



Top K Sampling

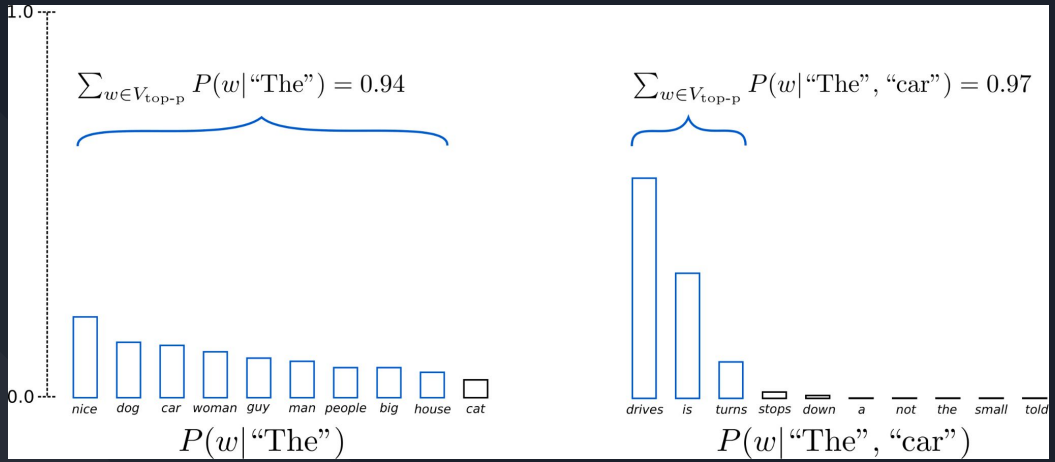
Simple and effective

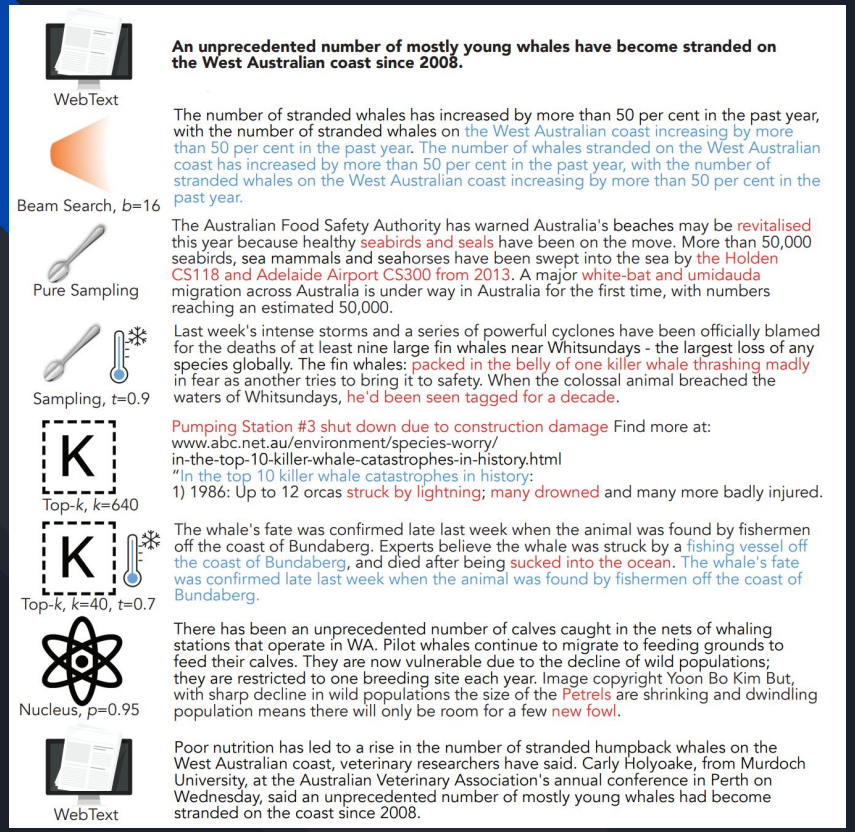


Nucleus Sampling

Aka Top P sampling

Less simple; also effective





"NATURAL LANGUAGE DOES NOT MAXIMIZE PROBABILITY"

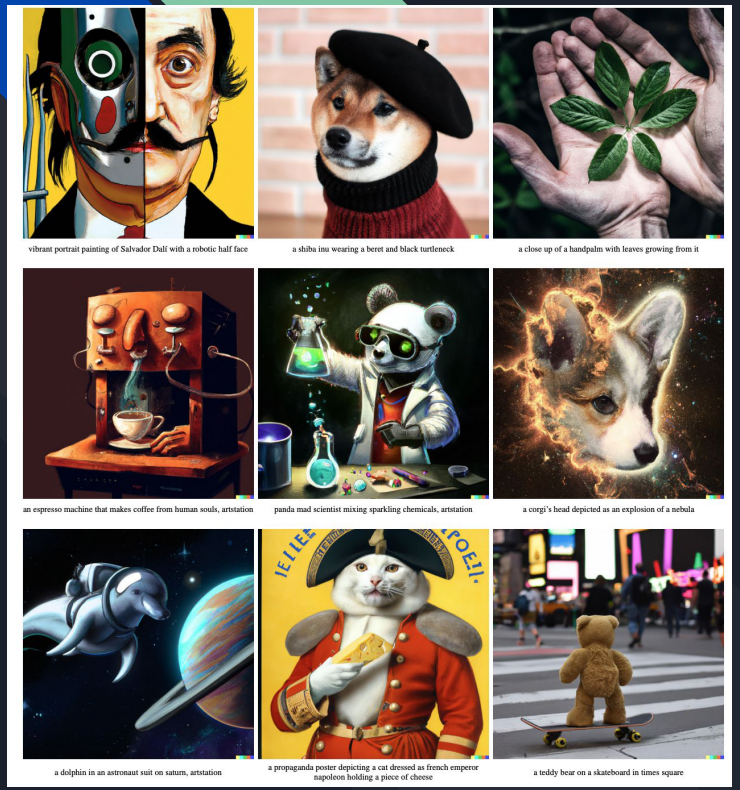
The Curious Case of Natural Language *De*Generation

https://arxiv.org/pdf/1904.09751.pdf

THE FUTURE

Wouldn’t that be nice?

Multimodality!



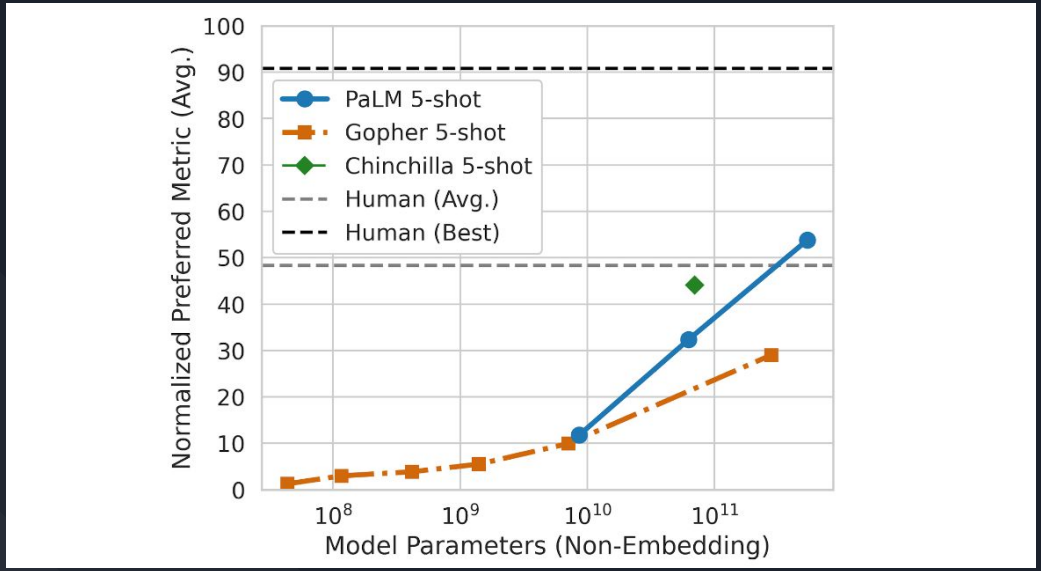
CLIP! Dall-E! Dall-E 2!

https://cdn.openai.com/papers/dall-e-2.pdf

https://openai.com/dall-e-2/#demos

PaLM

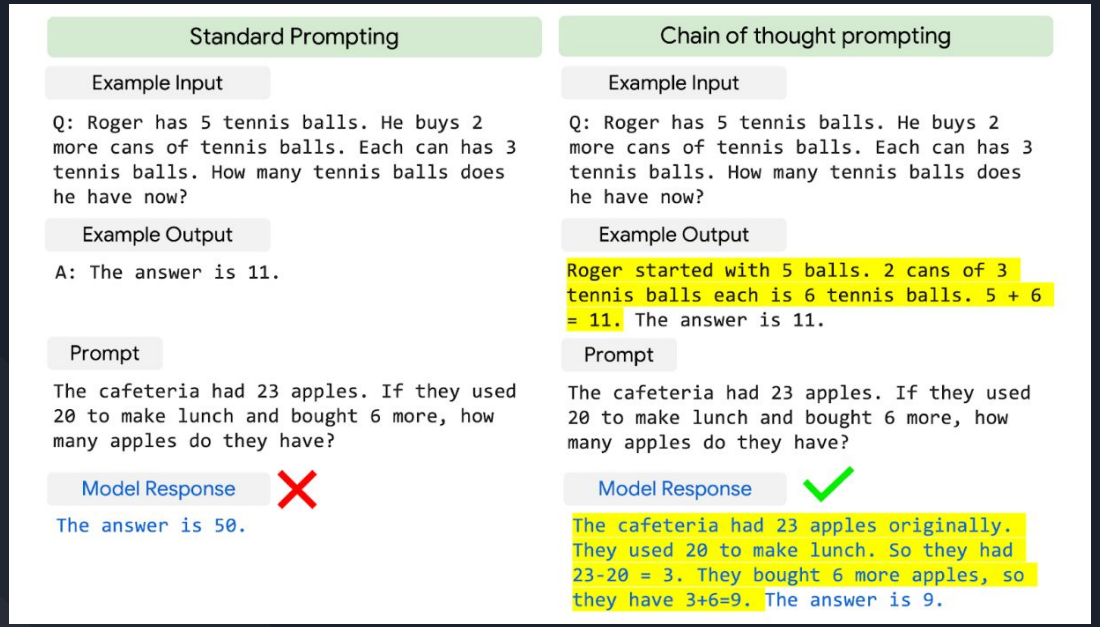
SIZE = few/0-shot learning and extreme cross-task/domain generalization!



https://ai.googleblog.com/2022/04/pathways-language-model-palm-scaling-to.html

PaLM

Chain of Thought Prompting Elicits Reasoning in Large Language Models



https://arxiv.org/pdf/2201.11903.pdf

NLG for FUN

NLG Exploration

Or: “I want to live in the Uncanny Valley between sense and nonsense.”

@new_ai_rtists

Model: GPT-2

Dataset/Corpus: 10,000 most popular musical artist names, scraped from the Last.fm API.

Bot: A “quiz” to see if readers can correctly tell the difference between AI-gen “artists” and real recording artists.

MtGPT2

Extremely normal Magic: the Gathering cards

MtGPT2

Models: GPT-2 for NLG; Latent2Visions (CLIP + Taming Transformers) for images

Dataset/Corpus: Text is scraped from MTGJSON

MULTIMODALITY: Based on @advadnoun ‘s pioneering work combining OpenAI’s CLIP with various GANs, we can use text as a prompt for image synthesis.

Q+A