

Text Generation with GPT

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Text Generation

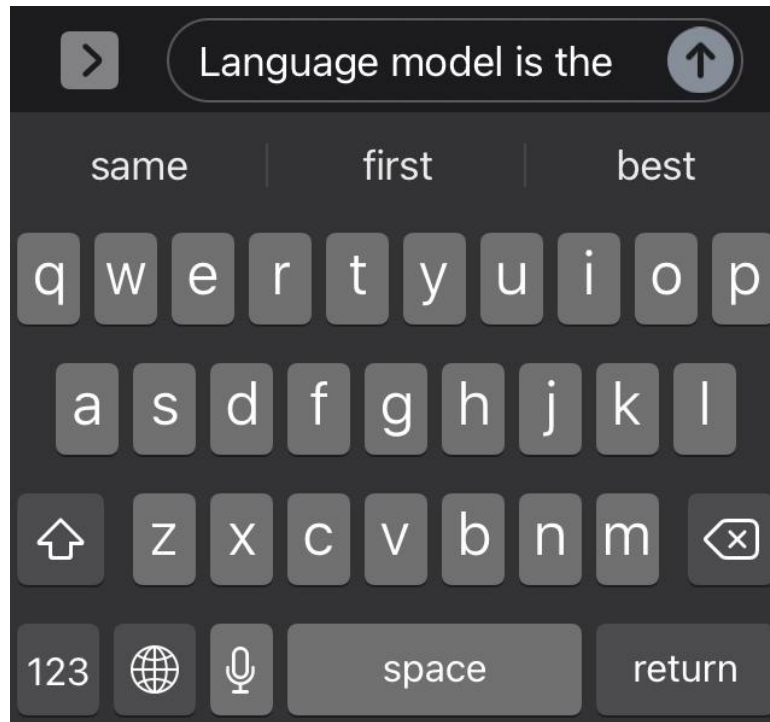
The task of text generation is |

to make a list of all of the characters in the text.

much more complex than the task of generating words to the same le...

the one that's most difficult for me to understand.

Language model



https://lena-voita.github.io/nlp_course/language_modeling.html

Application

Text generation

Summarisation

Dialog systems

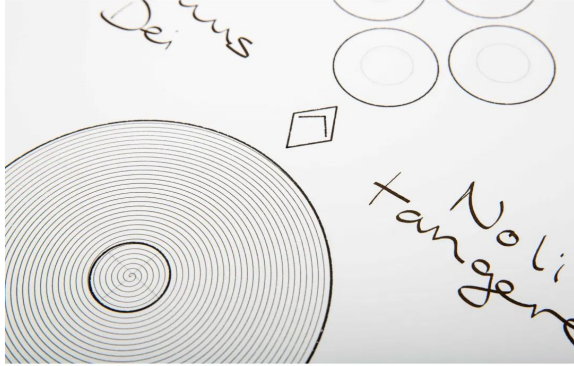
Translation

<https://beta.openai.com/>

<https://github.com/elyase/awesome-gpt3>

<https://awesomeopensource.com/projects/gpt-2>

Application - Text generation



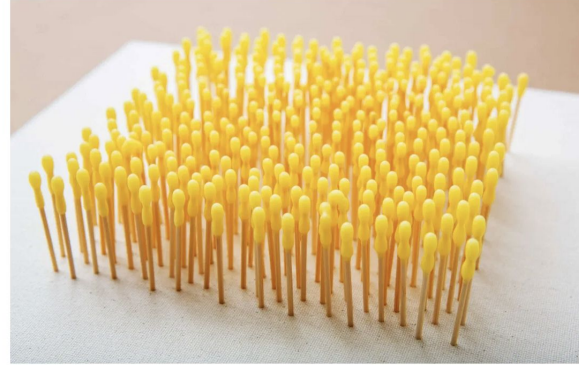
Barnoslav Kindz

Australian 1932-1999

The Final Word 1972

Ink, graphite on paper

The drawing is an example of the artist's use of mathematical and geometric forms in his works of art. In the center is a circular shape with a graphite cross in the center from which a spiral emanates, surrounded by a large circle. Above that circle are four smaller circles; each of those circles has a graphite circle inside it. The four smaller circles are arranged in a way that is similar to the way that the points of a compass are arranged. Below the four circles is a diamond, which has an inverted "V" shape inside of it. Then there is a circle of small squares, and above that another circle with a graphite cross on top and a graphite number 3 in the center. Then there are four circles within circles and three graphite dots on the right. Written on the left side is "Domus Dei" ("house of God"), and on the right side "Noli tangere" ("do not touch"). Surrounding the entire drawing is a rectangle with an X on the left.



Rachellette Carneday

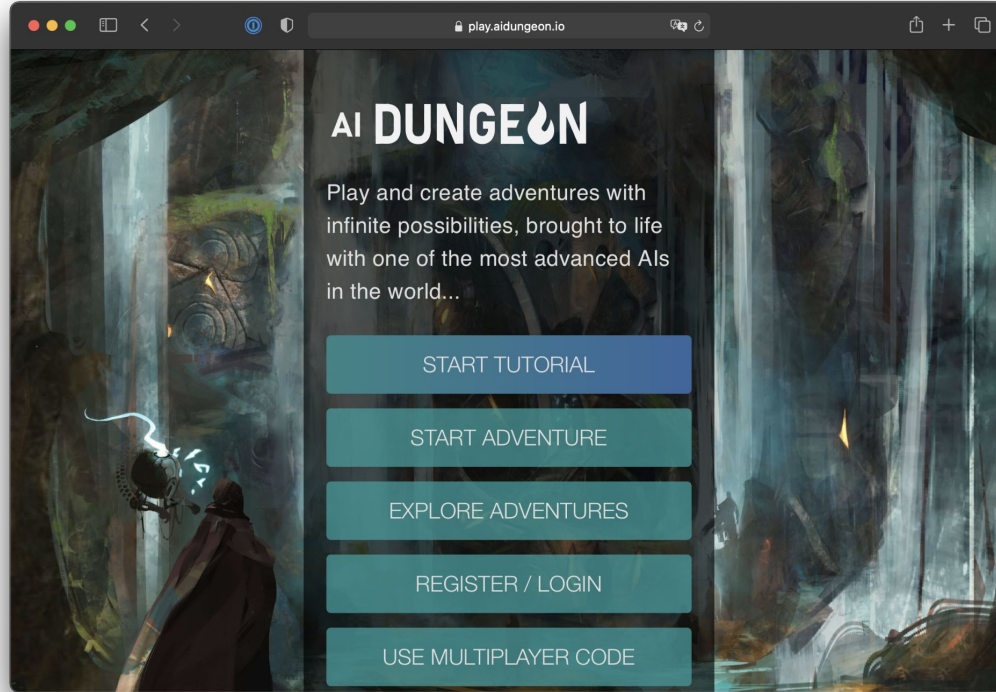
American, 1992 -

The Final Resting Place of the Queen Bee 2018

Toothpicks, beeswax on canvas

This sculpture consists of toothpicks stuck in a canvas. The toothpicks are dipped in beeswax, giving them a golden color. The artwork is a commentary on the plight of bees and the canvas represents the bee hive during colony collapse disorder, in which the bees simply disappear from the hive, leaving the queen behind in an empty space. This sculpture was created as a form of activism and in support of bee colonies worldwide. The toothpicks represent the empty, dead bodies of the bees. As such, this sculpture is a potent symbol of the plight of the bee colonies. The artist hopes the work can help viewers envision the devastation that has occurred in bee colonies and encourage activism. They want to awaken viewers to the fact that bees are dying, and if bees are dying, the food supply is at risk. The bees in the colony play a vital role in pollination, fertilization, and growth of plants. They encourage viewers to imagine what would happen without bees.

Application - Text generation



<https://play.aidungeon.io/main/landing>

Application - Dialog systems



Application - Translation

```
// Here are the 2 description:code pairs used to give GPT-3
some context for how to provide a response

// sample 1
description: a red button that says stop
code: <button style={{color: 'white', backgroundColor:
'red'}}>Stop</button>

//sample 2
description: a blue box that contains 3 yellow circles with
red borders
code: <div style={{backgroundColor: 'blue', padding: 20}}><div
style={{backgroundColor: 'yellow', border: '5px solid red',
borderRadius: '50%', padding: 20, width: 100, height: 100}}>
</div><div style={{backgroundColor: 'yellow', borderWidth: 1,
border: '5px solid red', borderRadius: '50%', padding: 20,
width: 100, height: 100}}></div><div style={{backgroundColor:
'yellow', border: '5px solid red', borderRadius: '50%',
padding: 20, width: 100, height: 100}}></div></div>
```

carbon
carbon.now.sh

<https://twitter.com/sharifshameem/status/1282676454690451457>

Application - Summarisation

Richard Dawkins: The meaning of life is simply to perpetuate the species. Human beings are vehicles for propagating DNA. No goals, no purpose, no meaning.

Rumi: The meaning of life is to be in love with God and to be one with the creation.

Mahatma Gandhi: The meaning of life is to serve humanity

Adolf Hitler: The meaning of life is to stay alive.

Stephen Hawking: The meaning of life is to reveal one's understanding of the universe. The cosmos might not be able to tell you a meaning of life but it does give you the gift of life.

Bertrand Russel: The meaning of life is a matter of personal taste.

David Hume: The meaning of life is a small crack on the surface of the stone that keeps a bird from flying out.

Ludwig Wittgenstein: The meaning of life is our responses to the things around us.

Albert Camus: The meaning of life is to give meaning to life.

<https://twitter.com/paraschopra/status/1284423233047900161>

GPT

GPT = Generative Pre-trained Transformer

Model	Size, billion parameters	Context, tokens	Dataset size, gb
GPT-3	175	2048	570
GPT-2	1,5	1024	40
GPT		512	

GPT - How it works

1. Word embeddings
2. Transformers
3. Transformers in GPT
4. Fine-tuning

Tokenization

Text

Tokenization

"Hello I love you"

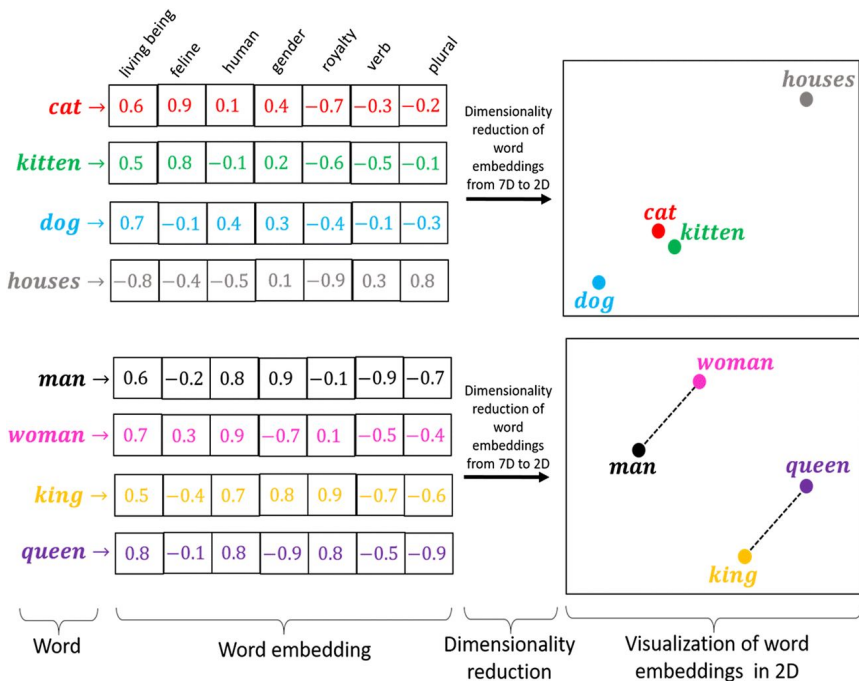


"Hello", "I", "love", "you"

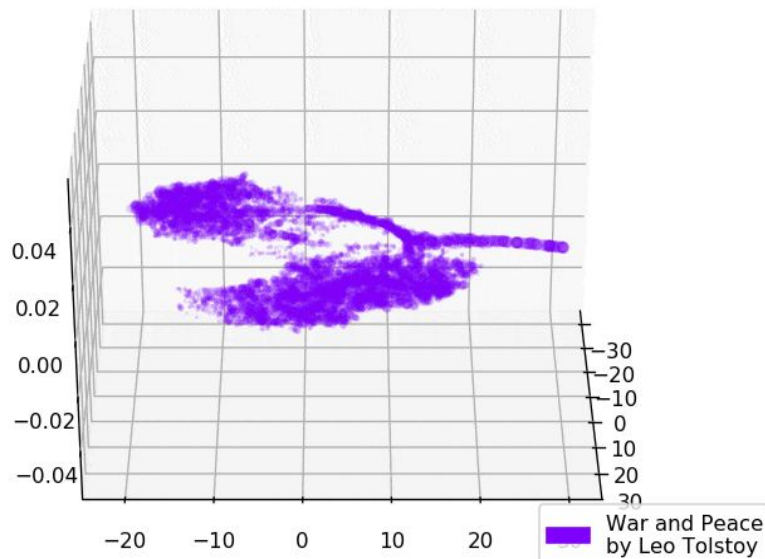
"love", "Hello", "I", "you"

"I", "love", "Hello", "you"

Word embeddings



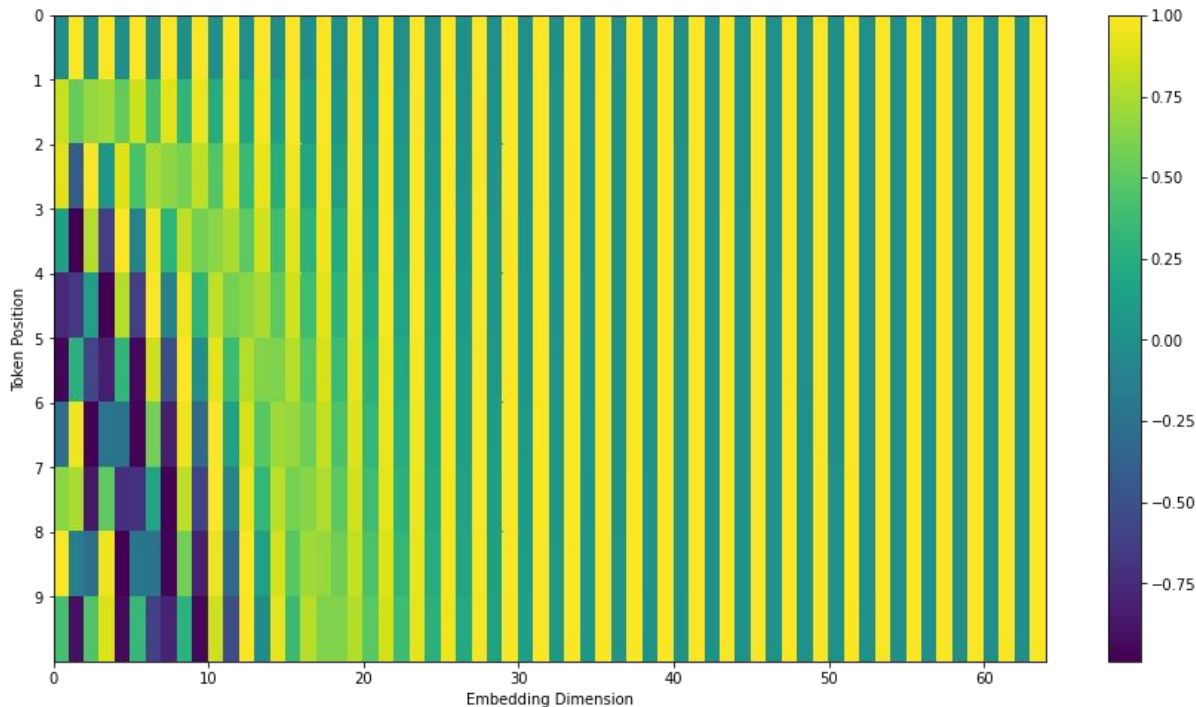
Visualizing Word Embeddings using t-SNE



https://lena-voita.github.io/nlp_course/word_embeddings.html

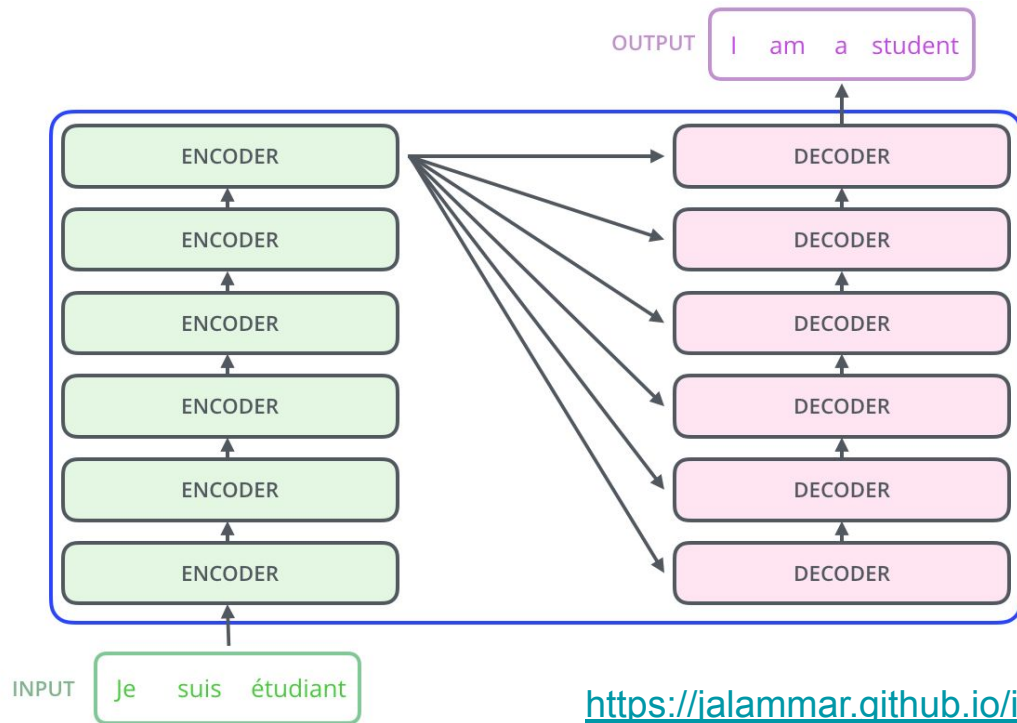
https://www.tensorflow.org/tutorials/text/word_embeddings

Positional encodings



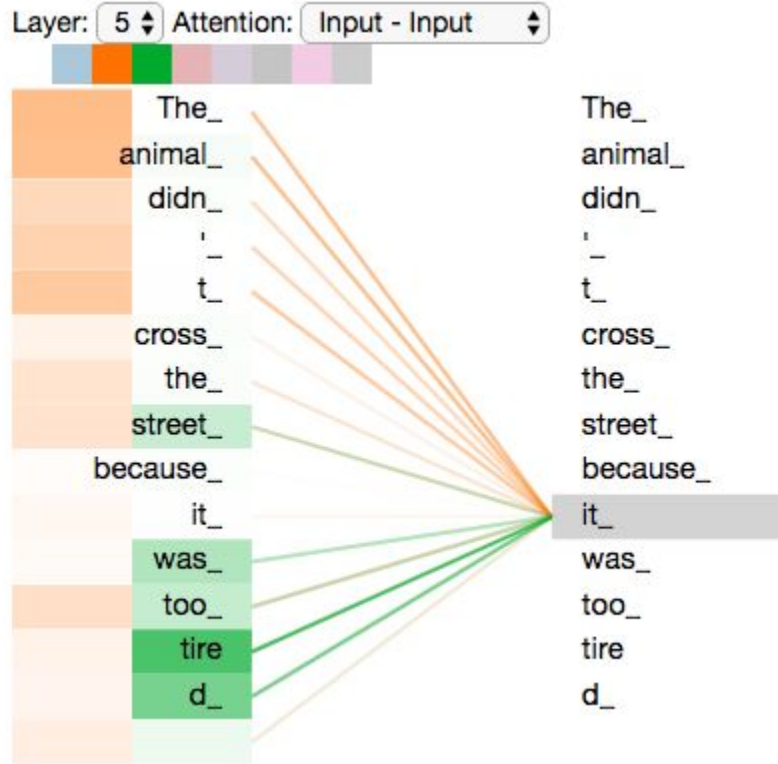
<https://arxiv.org/abs/1706.03762>

Transformers

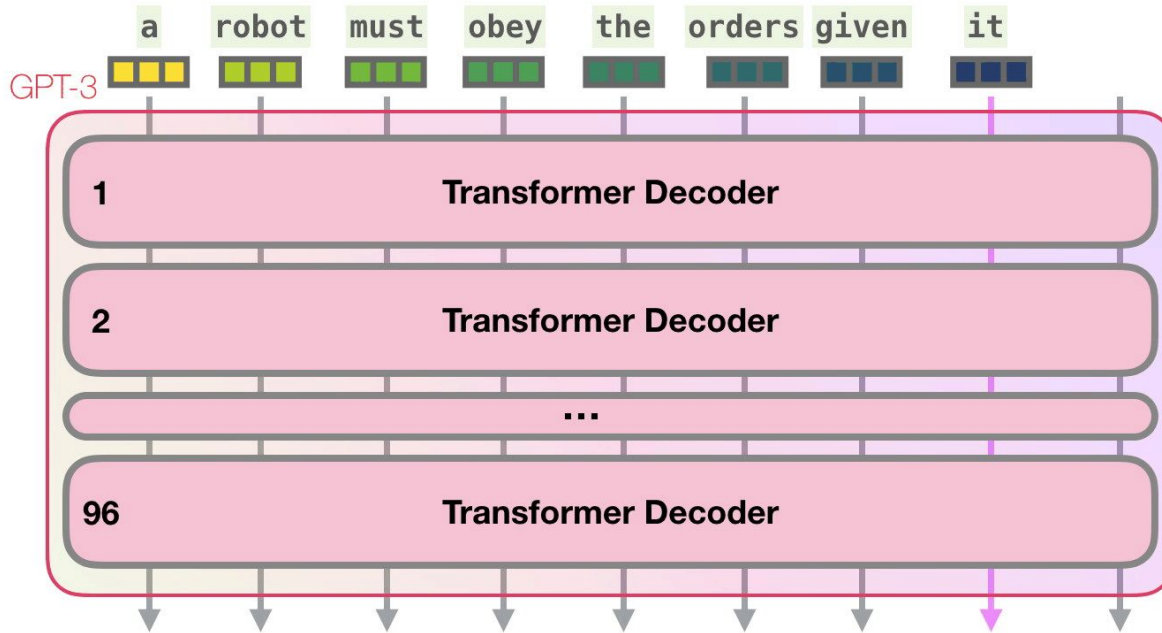


<https://jalammar.github.io/illustrated-transformer/>

Attention

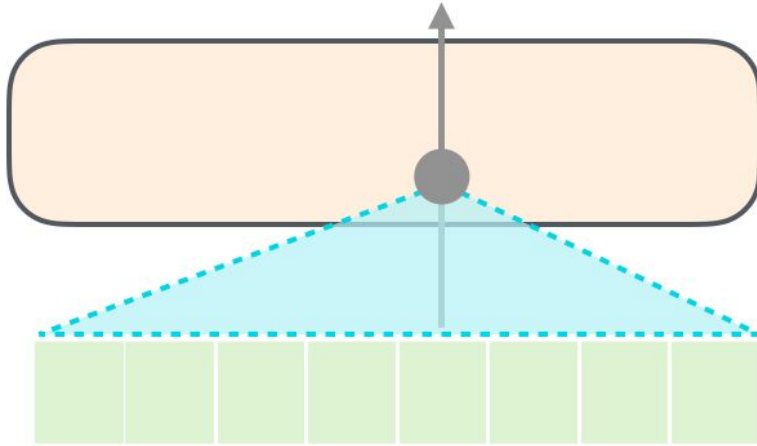


Transformer blocks in GPT

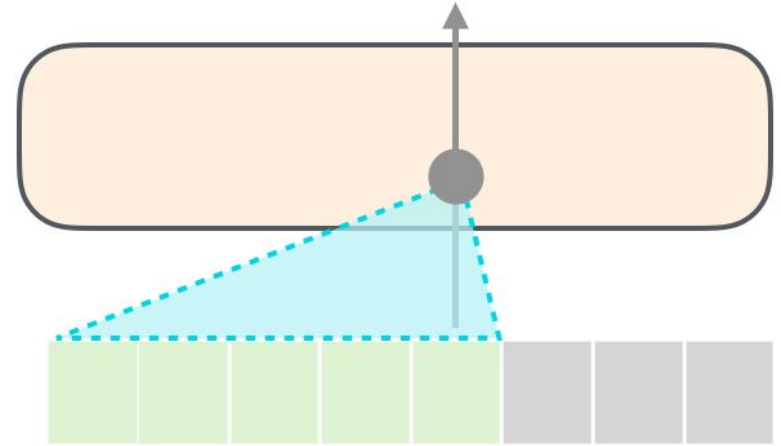


Transformer blocks in GPT

Self-Attention



Masked Self-Attention



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

<http://jalammar.github.io/how-gpt3-works-visualizations-animations/>

Fine-tuning

- Train from scratch

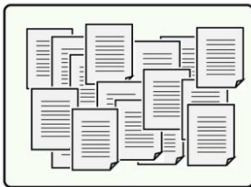
What they will know:



May be not enough to
learn relationships
between words

- Take pretrained (Word2Vec, GloVe)

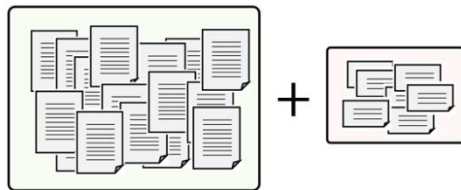
What they will know:



Know relationships between words,
but are **not** specific to the task

- Initialize with pretrained, then fine-tune

What they will know:



Know relationships between
words and adapted for the task

“**Transfer**” knowledge from a huge unlabeled corpus to your task-specific model

https://lena-voita.github.io/nlp_course/transfer_learning.html

Reading list

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

<https://jalammar.github.io/>

<https://elvissaravia.substack.com/p/learn-about-transformers-a-recipe>

https://lena-voita.github.io/nlp_course.html