GPT-2 and better language models

Wojciech Kulikowski KNUM UW 2019

Teaser

TASK **Common Sense Reasoning**: resolution of an ambiguous pronoun

DATASET Winograd Schema Challenge

EXAMPLES *The trophy doesn't fit into the brown suitcase because it is too large.*

Correct answer: *it = trophy*
Model answer: it = trophy

The trophy doesn't fit into the brown suitcase because it is too small.

Correct answer: *it = suitcase*
Model answer: it = suitcase

Authors

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Rewon Child, David Luan, Dario Amodei, Ilya Sutskever

Approach

- Nothing revolutionary, lots of data and computing power
- Unsupervised learning
- Generating the most suitable following word
- Transformers (Generative Pretraining Transformer)
- Byte pair encoding

Dataset

CommonCrawl (old approach)

WebText (45M reddit links)

over 8 million documents for a total of 40 GB of text

Byte pair encoding

1. **Aaabdaaabac**
2. **ZabdZabac**
   3. Z=aa
4. **ZYdZYac**
   5. Y=ab
   6. Z=aa
7. **XdXac**
   8. X=ZY
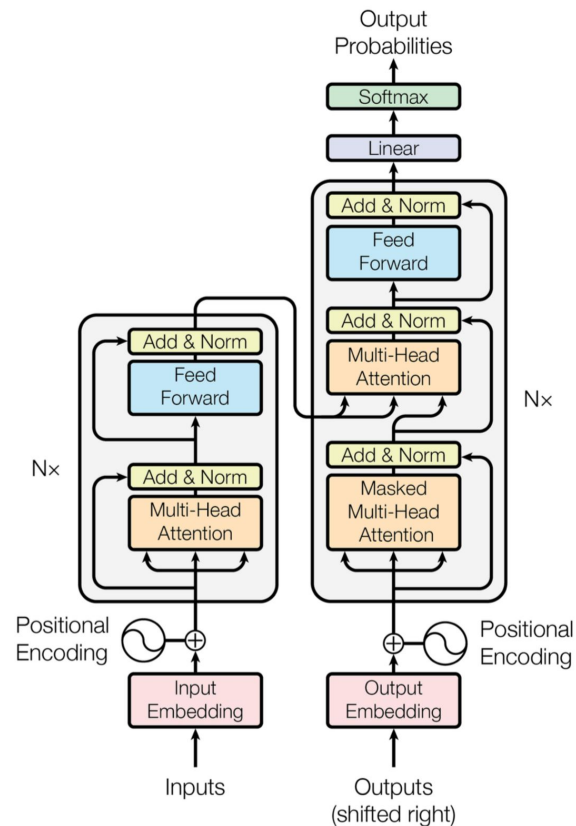   9. Y=ab
   10. Z=aa

Transformer overview

help

Figure 1: The Transformer - model architecture.

Use cases

Demo screenshots (live at KAC)

```
python main.py --text "University of Warsaw has been announced to be the best univers
ity in the World. Mathemtics, Informatics and Mechanics faculty is trully amazing in
data structures and algorithms."
Namespace(batch_size=-1, length=-1, nsamples=1, quiet=False, temperature=0.7, text='U
niversity of Warsaw has been announced to be the best university in the World. Mathem
tics, Informatics and Mechanics faculty is trully amazing in data structures and algo
rithms.', top_k=40, unconditional=False)
University of Warsaw has been announced to be the best university in the World. Mathe
mtics, Informatics and Mechanics faculty is trully amazing in data structures and alg
orithms.
100%|████████████████████████████████████████| 512/512 [00:3
3<00:00, 13.05it/s]
==================================== SAMPLE 1 ==================================
=====


At the end of this year, Mathemtics will be making it very clear that it is a place t
o build a great data pipeline for the global data science community. Mathemtics is al
so now hosting an IT meetup in order to share the best and brightest in the data scie
nce community.

Mathemtics' data management system is based on the same principles of software engine
ering that we apply to data science, and we are excited to welcome our newest generat
ion of data scientists.

Mathemtics is a data science platform that uses machine learning, machine learning al
gorithms, machine learning algorithms, machine learning algorithms and machine learni
ng algorithms as a way to implement machine learning in data. This is a great way to
start the data science revolution and help accelerate the development of new technolo
gies. Every year the number of participants grows and the number of new data scientis
ts increases.

We look forward to welcoming you to Mathemtics.
```

```
gpt-2-Pytorch — fish /Users/wojciech.kulikowski/Projects/gpt-2-Pytorch — python3.7 /usr/local/Cellar/pipenv/2018.11.26_2/libex...

[python main.py --text "University of Warsaw has been announced to be the best univers]
ity in the World. Mathematics, Informatics and Mechanics faculty is truly amazing in
data structures and algorithms."
Namespace(batch_size=-1, length=-1, nsamples=1, quiet=False, temperature=0.7, text='U
niversity of Warsaw has been announced to be the best university in the World. Mathem
atics, Informatics and Mechanics faculty is truly amazing in data structures and algo
rithms.', top_k=40, unconditional=False)
University of Warsaw has been announced to be the best university in the World. Mathe
matics, Informatics and Mechanics faculty is truly amazing in data structures and alg
orithms.
100%|███████████████████████████████████████| 512/512 [00:33<00:00, 15.49it/s]
===================================== SAMPLE 1 =================================
=====
 These are all the best institutions in the world.

The University of Warsaw is an exceptional university. With a large number of graduat
e students and a large budget, it is a perfect place to apply for PhDs.

The University of Warsaw is also one of the best universities in the world. In the co
untry, this is the best study environment in the world. It offers excellent training
and well-rounded teaching.

We have some very good professors in the University of Warsaw. In particular, we have
 two very good professors in the Faculty of Natural Sciences. The professors are well
 known and well regarded.

We also have a great team of professors at the University of Poland. We are very good
 at making sure that we do well on the university's courses.

If the University of Warsaw is to win the title of Best University in the World, we h
ave to make sure that we are able to achieve this.

With the help of our students, the University of Warsaw will become a global leader i
n international education.
```

```
python main.py --text "In a large bowl, sift together the flour, baking powder, salt
and sugar. Make a well in the center and pour in the milk, egg and melted butter; mix
 until smooth."
Namespace(batch_size=-1, length=-1, nsamples=1, quiet=False, temperature=0.7, text='I
n a large bowl, sift together the flour, baking powder, salt and sugar. Make a well i
n the center and pour in the milk, egg and melted butter; mix until smooth.', top_k=4
0, unconditional=False)
In a large bowl, sift together the flour, baking powder, salt and sugar. Make a well
in the center and pour in the milk, egg and melted butter; mix until smooth.
100%|████████████████████████████| 512/512 [00:34<00:00, 12.14it/s]
================================== SAMPLE 1 =======================================
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 Add the remaining ingredients and mix until well combined. Fold in the cheese and re
frigerate for at least 3 hours.<|endoftext|>The first thing you need to do when you f
ind yourself in a relationship with a woman is to get her to give you a second opinio
n on the situation. She may understand your point of view, but it is your responsibil
ity to hear from her in a way that she can understand what you are trying to say.

When you're in a crisis, it is important to let her know that you think she is right
and that she is in the right place at the right time. A very common response to a wom
an's initial response is to say, "I'm sorry, I don't really understand you. I see it
as your fault." If she feels that you are not being fair or fair enough, she may feel
 that she needs you to listen to her.

If she gives you an honest answer, you can try to keep her in the place she is in. Sh
e may feel she needs to give you some direction. If you're willing to listen, she may
 feel like she needs you to listen. She may feel that she needs you to help her get h
er to follow through on what you're trying to say, so that she can understand what yo
u are trying to say.

This helps to ensure that when you find yourself in a situation where you feel like y
ou need to hear from her, you are not only in the right place, but you are helping to
 alleviate her pain.
```

Links

Paper

https://github.com/openai/gpt-2

Attention is all you need

What is transformer?