

xt-summarization-transformer-model

January 31, 2024

0.1 Install Modules

```
[1]: # !pip install transformers==2.8.0
     # !pip install torch==1.4.0
```

0.2 Import Modules

```
[2]: import torch
     from transformers import T5Tokenizer, T5ForConditionalGeneration, T5Config
```

```
[3]: # initialize the pretrained model
     model = T5ForConditionalGeneration.from_pretrained('t5-small')
     tokenizer = T5Tokenizer.from_pretrained('t5-small')
     device = torch.device('cpu')
```

/usr/local/lib/python3.10/dist-packages/huggingface_hub/utils/_token.py:88:

UserWarning:

The secret `HF_TOKEN` does not exist in your Colab secrets.

To authenticate with the Hugging Face Hub, create a token in your settings tab (<https://huggingface.co/settings/tokens>), set it as secret in your Google Colab and restart your session.

You will be able to reuse this secret in all of your notebooks.

Please note that authentication is recommended but still optional to access public models or datasets.

warnings.warn(

config.json: 0%| | 0.00/1.21k [00:00<?, ?B/s]

model.safetensors: 0%| | 0.00/242M [00:00<?, ?B/s]

generation_config.json: 0%| | 0.00/147 [00:00<?, ?B/s]

tokenizer_config.json: 0%| | 0.00/2.32k [00:00<?, ?B/s]

spiece.model: 0%| | 0.00/792k [00:00<?, ?B/s]

tokenizer.json: 0%| | 0.00/1.39M [00:00<?, ?B/s]

You are using the default legacy behaviour of the <class 'transformers.models.t5.tokenization_t5.T5Tokenizer'>. This is expected, and simply means that the `legacy` (previous) behavior will be used so nothing

changes for you. If you want to use the new behaviour, set `legacy=False`. This should only be set if you understand what it means, and thoroughly read the reason why this was added as explained in <https://github.com/huggingface/transformers/pull/24565>. Special tokens have been added in the vocabulary, make sure the associated word embeddings are fine-tuned or trained.

```
[4]: # input text
text = """
Back in the 1950s, the fathers of the field, Minsky and McCarthy, described
    ↪artificial intelligence as any task performed by a machine that would have
    ↪previously been considered to require human intelligence.

That's obviously a fairly broad definition, which is why you will sometimes see
    ↪arguments over whether something is truly AI or not.

Modern definitions of what it means to create intelligence are more specific.
    ↪Francois Chollet, an AI researcher at Google and creator of the
    ↪machine-learning software library Keras, has said intelligence is tied to a
    ↪system's ability to adapt and improvise in a new environment, to generalise
    ↪its knowledge and apply it to unfamiliar scenarios.

"Intelligence is the efficiency with which you acquire new skills at tasks you
    ↪didn't previously prepare for," he said.

"Intelligence is not skill itself; it's not what you can do; it's how well and
    ↪how efficiently you can learn new things."

It's a definition under which modern AI-powered systems, such as virtual
    ↪assistants, would be characterised as having demonstrated 'narrow AI', the
    ↪ability to generalise their training when carrying out a limited set of
    ↪tasks, such as speech recognition or computer vision.

Typically, AI systems demonstrate at least some of the following behaviours
    ↪associated with human intelligence: planning, learning, reasoning,
    ↪problem-solving, knowledge representation, perception, motion, and
    ↪manipulation and, to a lesser extent, social intelligence and creativity.

AlexNet's performance demonstrated the power of learning systems based on
    ↪neural networks, a model for machine learning that had existed for decades
    ↪but that was finally realising its potential due to refinements to
    ↪architecture and leaps in parallel processing power made possible by Moore's
    ↪Law. The prowess of machine-learning systems at carrying out computer vision
    ↪also hit the headlines that year, with Google training a system to recognise
    ↪an internet favorite: pictures of cats.
```

```

The next demonstration of the efficacy of machine-learning systems that caught
↳the public's attention was the 2016 triumph of the Google DeepMind AlphaGo
↳AI over a human grandmaster in Go, an ancient Chinese game whose complexity
↳stumped computers for decades. Go has about possible 200 moves per turn
↳compared to about 20 in Chess. Over the course of a game of Go, there are so
↳many possible moves that are searching through each of them in advance to
↳identify the best play is too costly from a computational point of view.
↳Instead, AlphaGo was trained how to play the game by taking moves played by
↳human experts in 30 million Go games and feeding them into deep-learning
↳neural networks.
"""

```

```

[5]: ## preprocess the input text
preprocessed_text = text.strip().replace('\n', '')
t5_input_text = 'summarize: ' + preprocessed_text

```

```

[6]: t5_input_text

```

```

[6]: 'summarize: Back in the 1950s, the fathers of the field, Minsky and McCarthy,
described artificial intelligence as any task performed by a machine that would
have previously been considered to require human intelligence. That's obviously
a fairly broad definition, which is why you will sometimes see arguments over
whether something is truly AI or not. Modern definitions of what it means to
create intelligence are more specific. Francois Chollet, an AI researcher at
Google and creator of the machine-learning software library Keras, has said
intelligence is tied to a system's ability to adapt and improvise in a new
environment, to generalise its knowledge and apply it to unfamiliar
scenarios. "Intelligence is the efficiency with which you acquire new skills at
tasks you didn't previously prepare for," he said. "Intelligence is not skill
itself; it's not what you can do; it's how well and how efficiently you can
learn new things. "It's a definition under which modern AI-powered systems, such
as virtual assistants, would be characterised as having demonstrated 'narrow
AI', the ability to generalise their training when carrying out a limited set
of tasks, such as speech recognition or computer vision. Typically, AI systems
demonstrate at least some of the following behaviours associated with human
intelligence: planning, learning, reasoning, problem-solving, knowledge
representation, perception, motion, and manipulation and, to a lesser extent,
social intelligence and creativity. AlexNet's performance demonstrated the power
of learning systems based on neural networks, a model for machine learning that
had existed for decades but that was finally realising its potential due to
refinements to architecture and leaps in parallel processing power made possible
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computer vision also hit the headlines that year, with Google training a system
to recognise an internet favorite: pictures of cats. The next demonstration of
the efficacy of machine-learning systems that caught the public's attention was
the 2016 triumph of the Google DeepMind AlphaGo AI over a human grandmaster in
Go, an ancient Chinese game whose complexity stumped computers for decades. Go

```

has about possible 200 moves per turn compared to about 20 in Chess. Over the course of a game of Go, there are so many possible moves that are searching through each of them in advance to identify the best play is too costly from a computational point of view. Instead, AlphaGo was trained how to play the game by taking moves played by human experts in 30 million Go games and feeding them into deep-learning neural networks.'

```
[7]: len(t5_input_text.split())
```

```
[7]: 410
```

```
[8]: tokenized_text = tokenizer.encode(t5_input_text, return_tensors='pt',  
    ↪max_length=512).to(device)
```

Truncation was not explicitly activated but `max_length` is provided a specific value, please use `truncation=True` to explicitly truncate examples to max length. Defaulting to 'longest_first' truncation strategy. If you encode pairs of sequences (GLUE-style) with the tokenizer you can select this strategy more precisely by providing a specific strategy to `truncation`.

0.3 Summarize

```
[9]: summary_ids = model.generate(tokenized_text, min_length=30, max_length=120)  
summary = tokenizer.decode(summary_ids[0], skip_special_tokens=True)
```

```
[10]: summary
```

```
[10]: "artificial intelligence is a definition of how it means to create intelligence.  
it's a definition of how AI-powered systems are characterised as having  
demonstrated 'narrow AI' the technology is a model for machine learning that had  
existed for decades."
```

```
[10]:
```