Text Summarization Models

▾ Luhn's Heuristic Method

Summary for the text : Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out at Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. Kent Fire Chief Bill Myers said that 3 minutes after firefighters arrived at the scene, there was an explosion. It's not clear what caused it.The structure of the building was compromised after the explosion, so crews couldn't go inside it. They worked on extinguishing the fire from the outside, the fire chief said.Chief Myers said they are also having some water supply issues. According to the chief, fighting the fire was taxing the water supply, so they were trying to reduce their use. The chief said fire operations could stretch into Saturday.No one was hurt in the fire. It's unclear how the building was currently being used. The chief said no evacuations were issued. Kent State University issued an alert saying there is no threat to the campus but to avoid the downtown area.The cause of the fire is unknown.Named after the Williams Brothers in 1879, the Mill District of Kent, Ohio says the mill once produced hundreds of millions of pounds of flour. The iconic grain elevators are a well-known fixture in the city's skyline.

Source of the text : https://fox8.com/email-alerts/breaking-news-email-alerts/fire-breaks-out-at-in-kent-mill-district/

Importing library sumy

```
pip install sumy
```

```
    Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
    Collecting sumy
```

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```
    Requirement already satisfied: nltk>=3.0.2 in /usr/local/lib/python3.8/dist-packages (from sumy) (3.7)
    Collecting breadability>=0.1.20
      Downloading breadability-0.1.20.tar.gz (32 kB)
    Collecting pycountry>=18.2.23
      Downloading pycountry-22.3.5.tar.gz (10.1 MB)
         |████████████████████████████████| 10.1 MB 59.7 MB/s
      Installing build dependencies ... done
      Getting requirements to build wheel ... done
        Preparing wheel metadata ... done
    Collecting docopt<0.7,>=0.6.1
      Downloading docopt-0.6.2.tar.gz (25 kB)
    Requirement already satisfied: requests>=2.7.0 in /usr/local/lib/python3.8/dist-packages (from sumy) (2.23.0)
    Requirement already satisfied: chardet in /usr/local/lib/python3.8/dist-packages (from breadability>=0.1.20->sumy) (3.0.4)
    Requirement already satisfied: lxml>=2.0 in /usr/local/lib/python3.8/dist-packages (from breadability>=0.1.20->sumy) (4.9.1)
    Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (2022.6.2)
    Requirement already satisfied: click in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (7.1.2)
    Requirement already satisfied: joblib in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (1.2.0)
```

```
Requirement already satisfied: tqdm in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (4.64.1)
Requirement already satisfied: setuptools in /usr/local/lib/python3.8/dist-packages (from pycountry>=18.2.23->sumy) (57.4.0)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (2.10)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (2022.9.24)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (1.24.3)
Building wheels for collected packages: breadability, docopt, pycountry
  Building wheel for breadability (setup.py) ... done
  Created wheel for breadability: filename=breadability-0.1.20-py2.py3-none-any.whl size=21714 sha256=af9cfd0a53360c0bdd42ba2516f9c35650000f48af4bd151e9fb07201fa6bf8d
  Stored in directory: /root/.cache/pip/wheels/5f/0d/0c/2062d8c1758b4b1a2e42b4a63e6660d9ec2ba9463cfee9eeab
  Building wheel for docopt (setup.py) ... done
  Created wheel for docopt: filename=docopt-0.6.2-py2.py3-none-any.whl size=13723 sha256=5a5c6335725483f3d7465f92849decbeeffc39e264708538502234aa7794e561
  Stored in directory: /root/.cache/pip/wheels/56/ea/58/ead137b087d9e326852a851351d1debf4ada529b6ac0ec4e8c
  Building wheel for pycountry (PEP 517) ... done
  Created wheel for pycountry: filename=pycountry-22.3.5-py2.py3-none-any.whl size=10681845 sha256=6de8add6b17a71f5d925bd4cf898a201236bf0af99982a892f6b59526e8d2b82
  Stored in directory: /root/.cache/pip/wheels/e2/aa/0f/c224e473b464387170b83ca7c66947b4a7e33e8d903a679748
Successfully built breadability docopt pycountry
Installing collected packages: docopt, pycountry, breadability, sumy
Successfully installed breadability-0.1.20 docopt-0.6.2 pycountry-22.3.5 sumy-0.11.0
```

```python
import sumy
import nltk
nltk.download('punkt')
from sumy.summarizers.luhn import LuhnSummarizer
from sumy.nlp.tokenizers import Tokenizer
from sumy.parsers.plaintext import PlaintextParser
```

```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
```

```python
source_material = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out
```

```python
LANGUAGE = "english"
parser = PlaintextParser.from_string(source_material,Tokenizer(LANGUAGE))
```

```python
summarizer = LuhnSummarizer()
```

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```python
summary = ""
for sentence in testsummary:
  summary+=str(sentence)
print(summary)
```

```
The fire broke out at Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. Kent Fire Chief Bill Myers said that 3 minutes after firefighters arrived at t
```

Output: The fire broke out at Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. Kent Fire Chief Bill Myers said that 3 minutes after firefighters arrived at the scene, there was an explosion.According to the chief, fighting the fire was taxing the water supply, so they were trying to reduce their use.Kent State University issued an alert saying there is no threat to the campus but to avoid the downtown

area.The cause of the fire is unknown.Named after the Williams Brothers in 1879, the Mill District of Kent, Ohio says the mill once produced hundreds of millions of pounds of flour.

Evaluating using ROUGE METRICS

```
!pip install rouge
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting rouge
  Downloading rouge-1.0.1-py3-none-any.whl (13 kB)
Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from rouge) (1.15.0)
Installing collected packages: rouge
Successfully installed rouge-1.0.1
```

```
from rouge import Rouge
```

```
reference = " Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out at
```

```
ROUGE = Rouge()
ROUGE.get_scores(summary,reference)
```

```
[{'rouge-1': {'r': 0.5874125874125874, 'p': 1.0, 'f': 0.7400881010646432},
  'rouge-2': {'r': 0.5047169811320755,
   'p': 0.981651376146789,
   'f': 0.666666662181462},
  'rouge-l': {'r': 0.5874125874125874, 'p': 1.0, 'f': 0.7400881010646432}}]
```

▾ TEXT RANK

```
!pip install gensim
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: gensim in /usr/local/lib/python3.9/dist-packages (3.6.0)
                                              thon3.8/dist-packages (from gensim) (1.21.6)
                                              n3.8/dist-packages (from gensim) (1.15.0)
Requirement already satisfied: smart-open>=1.2.1 in /usr/local/lib/python3.8/dist-packages (from gensim) (5.2.1)
Requirement already satisfied: scipy>=0.18.1 in /usr/local/lib/python3.8/dist-packages (from gensim) (1.7.3)
```

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```
import gensim
from gensim.summarization import summarize
```

```
source_material = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out
```

```
summary = summarize(source_material,word_count=100)
```

```
print(summary)
```

```
Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District.
The fire broke out at Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. Kent Fire Chief Bill Myers said that 3 minutes after firefighters arrived at t
It's not clear what caused it.The structure of the building was compromised after the explosion, so crews couldn't go inside it.
They worked on extinguishing the fire from the outside, the fire chief said.Chief Myers said they are also having some water supply issues.
```

Ouput: Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic

Mill District. The fire broke out at Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. Kent Fire Chief Bill Myers said

that 3 minutes after firefighters arrived at the scene, there was an explosion. It's not clear what caused it.The structure of the building was

compromised after the explosion, so crews couldn't go inside it. They worked on extinguishing the fire from the outside, the fire chief said.Chief

Myers said they are also having some water supply issues.

```
!pip install rouge
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: rouge in /usr/local/lib/python3.8/dist-packages (1.0.1)
Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from rouge) (1.15.0)
```

```
from rouge import Rouge
```

```
reference ="Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out at St
```

```
ROUGE = Rouge()
ROUGE.get_scores(summary,reference)
```

```
[{'rouge-1': {'r': 0.5944055944055944, 'p': 1.0, 'f': 0.7456140304112804},
  'rouge-2': {'r': 0.5188679245283019, 'p': 1.0, 'f': 0.683229809166313},
  'rouge-l': {'r': 0.5944055944055944, 'p': 1.0, 'f': 0.7456140304112804}}]
```

Latent Semantic Analysis

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```
!pip install sumy
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: sumy in /usr/local/lib/python3.8/dist-packages (0.11.0)
Requirement already satisfied: nltk>=3.0.2 in /usr/local/lib/python3.8/dist-packages (from sumy) (3.7)
Requirement already satisfied: docopt<0.7,>=0.6.1 in /usr/local/lib/python3.8/dist-packages (from sumy) (0.6.2)
Requirement already satisfied: requests>=2.7.0 in /usr/local/lib/python3.8/dist-packages (from sumy) (2.23.0)
Requirement already satisfied: breadability>=0.1.20 in /usr/local/lib/python3.8/dist-packages (from sumy) (0.1.20)
Requirement already satisfied: pycountry>=18.2.23 in /usr/local/lib/python3.8/dist-packages (from sumy) (22.3.5)
Requirement already satisfied: chardet in /usr/local/lib/python3.8/dist-packages (from breadability>=0.1.20->sumy) (3.0.4)
Requirement already satisfied: lxml>=2.0 in /usr/local/lib/python3.8/dist-packages (from breadability>=0.1.20->sumy) (4.9.1)
Requirement already satisfied: tqdm in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (4.64.1)
Requirement already satisfied: joblib in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (1.2.0)
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (2022.6.2)
Requirement already satisfied: click in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (7.1.2)
Requirement already satisfied: setuptools in /usr/local/lib/python3.8/dist-packages (from pycountry>=18.2.23->sumy) (57.4.0)
```

```
    Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (1.24.3)
    Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (2022.9.24)
    Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (2.10)
```

```python
import sumy
import nltk
nltk.download('punkt')
from sumy.summarizers.lsa import LsaSummarizer
from sumy.nlp.tokenizers import Tokenizer
from sumy.parsers.plaintext import PlaintextParser
```

```
    [nltk_data] Downloading package punkt to /root/nltk_data...
    [nltk_data]   Package punkt is already up-to-date!
```

```python
source_material = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out
```

```python
LANGUAGE = "english"
parser = PlaintextParser.from_string(source_material,Tokenizer(LANGUAGE))
```

```python
summarizer = LsaSummarizer()
```

```python
testsummary = summarizer(parser.document,sentences_count=4)
```

```python
summary = ""
for sentence in testsummary:
  summary+=str(sentence)
print(summary)
```

```
    Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District.The fire broke out at Star of th
```

Output : Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the in the
Historic Mill District.The fire broke out at Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. Kent Fire Chief Bill Myers
said that 3 minutes after firefighters arrived at the scene, there was an explosion.It's not clear what caused it.The structure of the building was
e building was currently being used.

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```python
!pip install rouge
```

```
    Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
    Requirement already satisfied: rouge in /usr/local/lib/python3.8/dist-packages (1.0.1)
    Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from rouge) (1.15.0)
```

```python
from rouge import Rouge
```

```python
reference = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out at St
```

```python
ROUGE = Rouge()
ROUGE.get_scores(summary,reference)
```

```
[{'rouge-1': {'r': 0.5314685314685315, 'p': 1.0, 'f': 0.6940639224086237},
  'rouge-2': {'r': 0.44339622641509435,
   'p': 0.9894736842105263,
   'f': 0.6123778458890812},
  'rouge-l': {'r': 0.5314685314685315, 'p': 1.0, 'f': 0.6940639224086237}}]
```

Kullback-Leibler Sum

```
!pip install sumy
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: sumy in /usr/local/lib/python3.8/dist-packages (0.11.0)
Requirement already satisfied: requests>=2.7.0 in /usr/local/lib/python3.8/dist-packages (from sumy) (2.23.0)
Requirement already satisfied: breadability>=0.1.20 in /usr/local/lib/python3.8/dist-packages (from sumy) (0.1.20)
Requirement already satisfied: pycountry>=18.2.23 in /usr/local/lib/python3.8/dist-packages (from sumy) (22.3.5)
Requirement already satisfied: nltk>=3.0.2 in /usr/local/lib/python3.8/dist-packages (from sumy) (3.7)
Requirement already satisfied: docopt<0.7,>=0.6.1 in /usr/local/lib/python3.8/dist-packages (from sumy) (0.6.2)
Requirement already satisfied: lxml>=2.0 in /usr/local/lib/python3.8/dist-packages (from breadability>=0.1.20->sumy) (4.9.1)
Requirement already satisfied: chardet in /usr/local/lib/python3.8/dist-packages (from breadability>=0.1.20->sumy) (3.0.4)
Requirement already satisfied: joblib in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (1.2.0)
Requirement already satisfied: click in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (7.1.2)
Requirement already satisfied: tqdm in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (4.64.1)
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.8/dist-packages (from nltk>=3.0.2->sumy) (2022.6.2)
Requirement already satisfied: setuptools in /usr/local/lib/python3.8/dist-packages (from pycountry>=18.2.23->sumy) (57.4.0)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (2022.9.24)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (1.24.3)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.8/dist-packages (from requests>=2.7.0->sumy) (2.10)
```

```
import sumy
import nltk
nltk.download('punkt')
from sumy.summarizers.kl import KLSummarizer
```

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```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```

```
source_material = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke ou
```

```
LANGUAGE = 'english'
parser = PlaintextParser.from_string(source_material,Tokenizer(LANGUAGE))
```

```
summarizer = KLSummarizer()
```

```
testsummary = summarizer(parser.document,sentences_count=6)
```

```
summary = ""
for sentence in testsummary:
  summary+=str(sentence)
print(summary)
```

    They worked on extinguishing the fire from the outside, the fire chief said.Chief Myers said they are also having some water supply issues.According to the chief, fighting the fir

Output : They worked on extinguishing the fire from the outside, the fire chief said.Chief Myers said they are also having some water supply issues.According to the chief, fighting the fire was taxing the water supply, so they were trying to reduce their use.The chief said fire operations could stretch into Saturday.No one was hurt in the fire.It's unclear how the building was currently being used.The chief said no evacuations were issued.The iconic grain elevators are a well-known fixture in the city's skyline.

```
!pip install rouge
```

    Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
    Requirement already satisfied: rouge in /usr/local/lib/python3.8/dist-packages (1.0.1)
    Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from rouge) (1.15.0)

```
from rouge import Rouge
```

```
reference = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke out at St
```

```
ROUGE = Rouge()
ROUGE.get_scores(summary,reference)
```

    [{'rouge-1': {'r': 0.42657342657342656, 'p': 1.0, 'f': 0.5980392114941369},
      'rouge-2': {'r': 0.37264150943396224, 'p': 0.9875, 'f': 0.5410958864327267},
      'rouge-l': {'r': 0.42657342657342656, 'p': 1.0, 'f': 0.5980392114941369}}]

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T5 Transformer Model

```
!pip install transformers
!pip install sentencepiece
```

    Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
    Collecting transformers
      Downloading transformers-4.25.1-py3-none-any.whl (5.8 MB)
        |████████████████████████████████| 5.8 MB 23.7 MB/s
    Requirement already satisfied: filelock in /usr/local/lib/python3.8/dist-packages (from transformers) (3.8.0)
    Requirement already satisfied: requests in /usr/local/lib/python3.8/dist-packages (from transformers) (2.23.0)
    Collecting huggingface-hub<1.0,>=0.10.0
      Downloading huggingface_hub-0.11.1-py3-none-any.whl (182 kB)
        |████████████████████████████████| 182 kB 62.3 MB/s
    Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.8/dist-packages (from transformers) (21.3)

```
     Requirement already satisfied: numpy>=1.17 in /usr/local/lib/python3.8/dist-packages (from transformers) (1.21.6)
     Requirement already satisfied: tqdm>=4.27 in /usr/local/lib/python3.8/dist-packages (from transformers) (4.64.1)
     Requirement already satisfied: regex!=2019.12.17 in /usr/local/lib/python3.8/dist-packages (from transformers) (2022.6.2)
     Requirement already satisfied: pyyaml>=5.1 in /usr/local/lib/python3.8/dist-packages (from transformers) (6.0)
     Collecting tokenizers!=0.11.3,<0.14,>=0.11.1
       Downloading tokenizers-0.13.2-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (7.6 MB)
          |████████████████████████████████| 7.6 MB 64.0 MB/s
     Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.8/dist-packages (from huggingface-hub<1.0,>=0.10.0->transformers) (4.4.0)
     Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.8/dist-packages (from packaging>=20.0->transformers) (3.0.9)
     Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.8/dist-packages (from requests->transformers) (2.10)
     Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.8/dist-packages (from requests->transformers) (2022.9.24)
     Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.8/dist-packages (from requests->transformers) (1.24.3)
     Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.8/dist-packages (from requests->transformers) (3.0.4)
     Installing collected packages: tokenizers, huggingface-hub, transformers
     Successfully installed huggingface-hub-0.11.1 tokenizers-0.13.2 transformers-4.25.1
     Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
     Collecting sentencepiece
       Downloading sentencepiece-0.1.97-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (1.3 MB)
          |████████████████████████████████| 1.3 MB 31.9 MB/s
     Installing collected packages: sentencepiece
     Successfully installed sentencepiece-0.1.97
```

```python
import torch
import json
from transformers import T5Tokenizer, T5Config, T5ForConditionalGeneration
```

```python
source_material = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill District. The fire broke ou
```

```python
device = torch.device('cpu')
```

```python
summarizer = T5ForConditionalGeneration.from_pretrained('t5-base')
tokenizer = T5Tokenizer.from_pretrained('t5-base')
```

```
     Downloading: 100%                                          1.20k/1.20k [00:00<00:00, 16.4kB/s]

     Downloading: 100%                                          892M/892M [00:12<00:00, 78.1MB/s]

                                                                :00, 912kB/s]
     Automatic saving failed. This file was updated remotely or in another tab.    Show diff
                                         enization_t5.py:163: FutureWarning: This tokenizer was incorrectly instantiated with a
     For now, this behavior is kept to avoid breaking backwards compatibility when padding/encoding with `truncation is True`.
     - Be aware that you SHOULD NOT rely on t5-base automatically truncating your input to 512 when padding/encoding.
     - If you want to encode/pad to sequences longer than 512 you can either instantiate this tokenizer with `model_max_length` or pass `max_length` when er
     - To avoid this warning, please instantiate this tokenizer with `model_max_length` set to your preferred value.
       warnings.warn(
```

```python
updated_material = "summarize:" + source_material
```

```python
tokenized_material = tokenizer.encode(updated_material, return_tensors="pt").to(device)
```

```python
print(tokenized_material)
```

```
tensor([[21603,     10,    371,    521,   2687,     11,      3,      9,    508,   3681,
            526,     13,   7269,    228,     36,    894,     16,      8,  14599,    616,
           1701,     38,   4627,      7,   1279,     12,   1215,   1222,     76,   1273,
              3,      9,   3805,   1472,     16,      8,  19923,   4185,   3570,      5,
             37,   1472,   8238,     91,     44,   2042,     13,      8,   1244,   4185,
             53,    638,      5,    740,     44,    898,    357,    445,   2336,   1887,
            131,    274,    668,      3,      9,      5,     51,      5,  14599,   3655,
           5116,   3259,    499,    277,    243,     24,    220,    676,    227,  29764,
           4363,     44,      8,   3112,      6,    132,     47,     46,  16813,      5,
             94,     22,      7,     59,    964,    125,   2953,     34,      5,    634,
           1809,     13,      8,    740,     47,  22001,    227,      8,  16813,      6,
             78,   4627,      7,   2654,     22,     17,    281,   1096,     34,      5,
            328,   1279,     30,   1215,   1222,     76,   1273,     53,      8,   1472,
             45,      8,   1067,      6,      8,   1472,   5752,    243,      5,   3541,
             23,     15,     89,    499,    277,    243,     79,     33,     92,    578,
            128,    387,   1899,    807,      5,   2150,     12,      8,   5752,      6,
           6237,      8,   1472,     47,   1104,     53,      8,    387,   1899,      6,
             78,     79,    130,   1119,     12,   1428,     70,    169,      5,     37,
           5752,    243,   1472,   2673,    228,   6606,    139,   1856,      5,   4168,
             80,     47,   4781,     16,      8,   1472,      5,     94,     22,      7,
          19363,    149,      8,    740,     47,   1083,    271,    261,      5,     37,
           5752,    243,    150,  29967,      7,    130,   4683,      5,  14599,   1015,
            636,   4683,     46,   5685,   2145,    132,     19,    150,   5888,     12,
              8,   4730,     68,     12,   1792,      8,   7092,    616,      5,    634,
           1137,     13,      8,   1472,     19,   7752,      5,  23954,     26,    227,
              8,   6060,  17491,     16,    507,   4440,      6,      8,   4185,   3570,
             13,  14599,      6,   6167,    845,      8,   3293,    728,   2546,   3986,
             13,   4040,     13,   7051,     13,   7055,      5,     37,  10331,   8273,
          19967,      7,     33,      3,      9,    168,     18,   5661,  20420,     16,
              8,    690,     22,      7,   5796,    747,      5,      1]])
```

```python
tokenized_summary = summarizer.generate(tokenized_material,
                      num_beams=5,
                      no_repeat_ngram_size=2,
                      min_length=100,
                      max_length=120,
                      early_stopping=True)
```

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```
tensor([[     0,      8,   1472,   8238,     91,     44,      8,   2042,     13,      8,
           1244,   4185,     53,    638,      5,    740,     44,    898,    357,    445,
           2336,   1887,    131,    274,    668,      3,      9,      5,     51,      5,
             34,     31,      7,  19363,    149,      8,    740,     47,   1083,    271,
            261,      3,      5,    150,     80,     47,   4781,     16,      8,      3,
          21020,      6,     11,    150,  29967,      7,     43,    118,   4683,     21,
              8,   5441,   3293,   3939,     13,  14599,      6,      3,     32,    107,
             23,     32,      6,    213,      8,   3293,    728,   2546,   3986,     13,
           4040,     13,   7051,     13,   7055,      5,      8,  10331,   8273,  19967,
              7,     33,    168,     18,   5661,  20420,     16,    690,     22,      7,
           5796,    747,      5,      1]])
```

```python
summary = tokenizer.decode(tokenized_summary[0], skip_special_tokens=True)
```

```
print(summary)
```

    the fire broke out at the Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. it's unclear how the building was currently being used. no one was hurt in

Output: the fire broke out at the Star of the West Milling Co. building at 162 N Water Street just before 9 a.m. it's unclear how the building was currently being used. no one was hurt in the blaze, and no evacuations have been issued for the historic mill district of Kent, ohio, where the mill once produced hundreds of millions of pounds of flour. the iconic grain elevators are well-known fixture in city's skyline.

```
!pip install rouge
```

    Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
    Requirement already satisfied: rouge in /usr/local/lib/python3.8/dist-packages (1.0.1)
    Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from rouge) (1.15.0)

```
from rouge import Rouge
```

```
reference = "Flames and a large plume of smoke could be seen in the Kent area Friday as crews worked to extinguish a massive fire in the Historic Mill Distr
```

```
ROUGE = Rouge()
ROUGE.get_scores(summary,reference)
```

    [{'rouge-1': {'r': 0.34265734265734266,
       'p': 0.8448275862068966,
       'f': 0.4875621849488874},
      'rouge-2': {'r': 0.2358490566037736,
       'p': 0.6756756756756757,
       'f': 0.34965034581446525},
      'rouge-l': {'r': 0.3356643356643357,
       'p': 0.8275862068965517,
       'f': 0.4776119361926685}}]

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