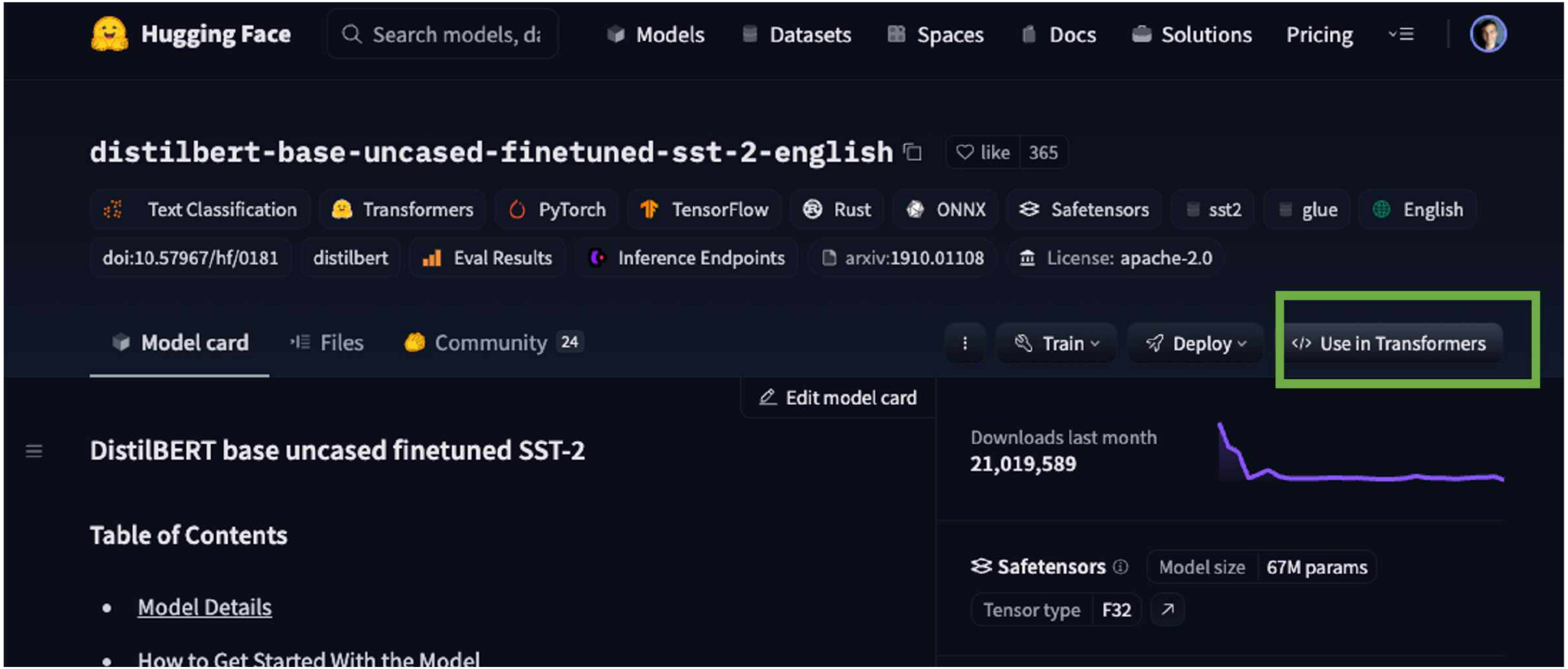
Pipelines with Hugging Face

WORKING WITH HUGGING FACE

Jacob H. Marquez
Lead Data Engineer

datacamp

Use in transformers



distilbert-base-uncased-finetuned-sst-2-english

like 365

Text Classification · Transformers · PyTorch · TensorFlow · Rust · ONNX · Safetensors · sst2 · glue · English · doi:10.57967/hf/0181 · distilbert · Eval Results · Inference Endpoints · arxiv:1910.01108 · License: apache-2.0

DistilBERT base uncased finetuned SST-2

Table of Contents

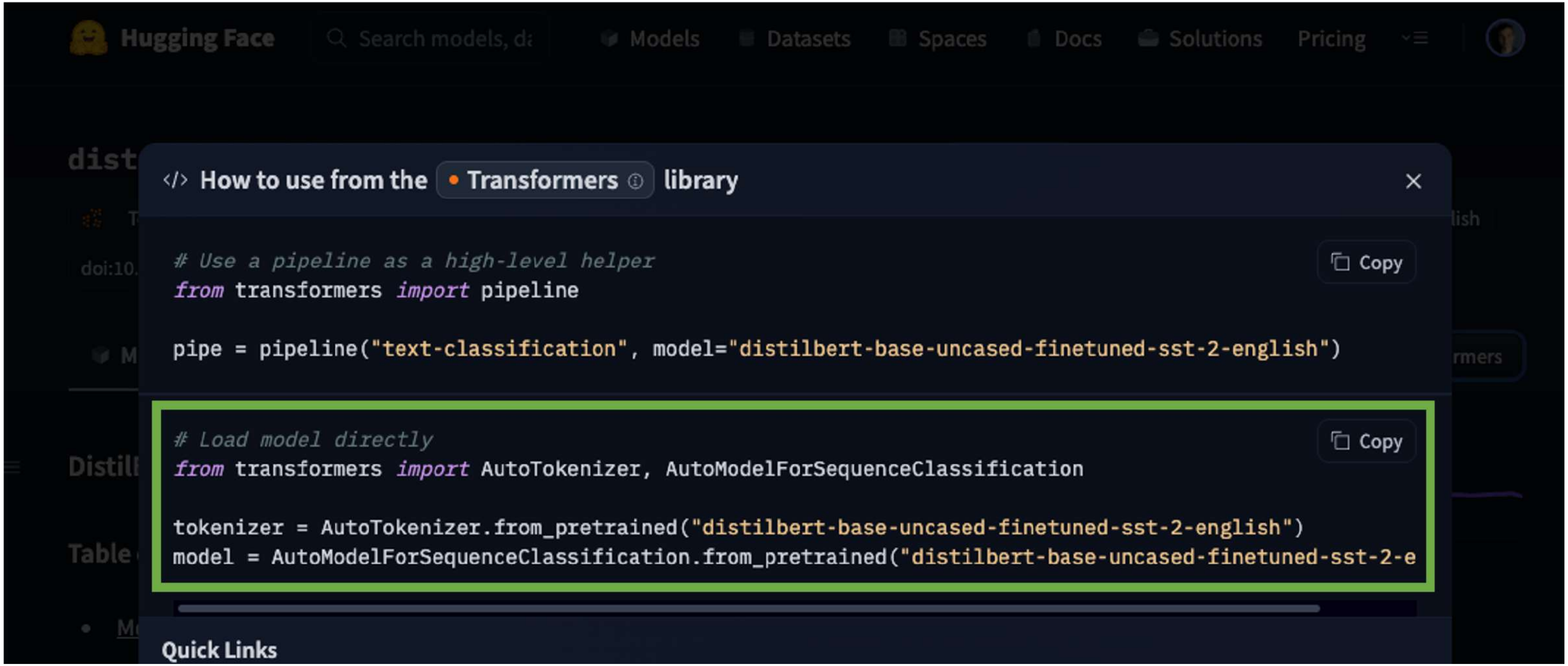
- Model Details
- How to Get Started With the Model

Downloads last month
21,019,589

Safetensors · Model size 67M params · Tensor type F32

[1] https://huggingface.co/distilbert-base-uncased-finetuned-sst-2-english

Use in transformers

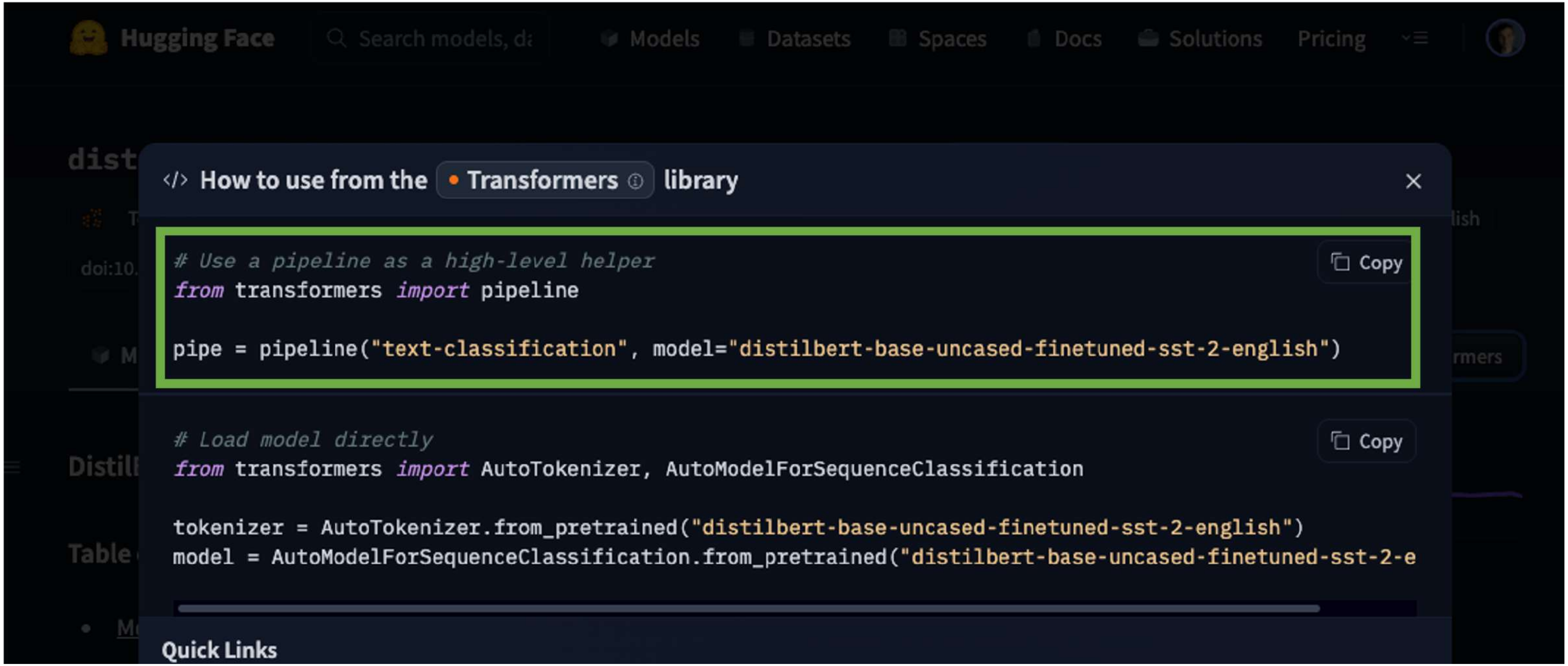


```python
# Use a pipeline as a high-level helper
from transformers import pipeline

pipe = pipeline("text-classification", model="distilbert-base-uncased-finetuned-sst-2-english")
```

```python
# Load model directly
from transformers import AutoTokenizer, AutoModelForSequenceClassification

tokenizer = AutoTokenizer.from_pretrained("distilbert-base-uncased-finetuned-sst-2-english")
model = AutoModelForSequenceClassification.from_pretrained("distilbert-base-uncased-finetuned-sst-2-e
```

[1] https://huggingface.co/distilbert-base-uncased-finetuned-sst-2-english

Use in transformers



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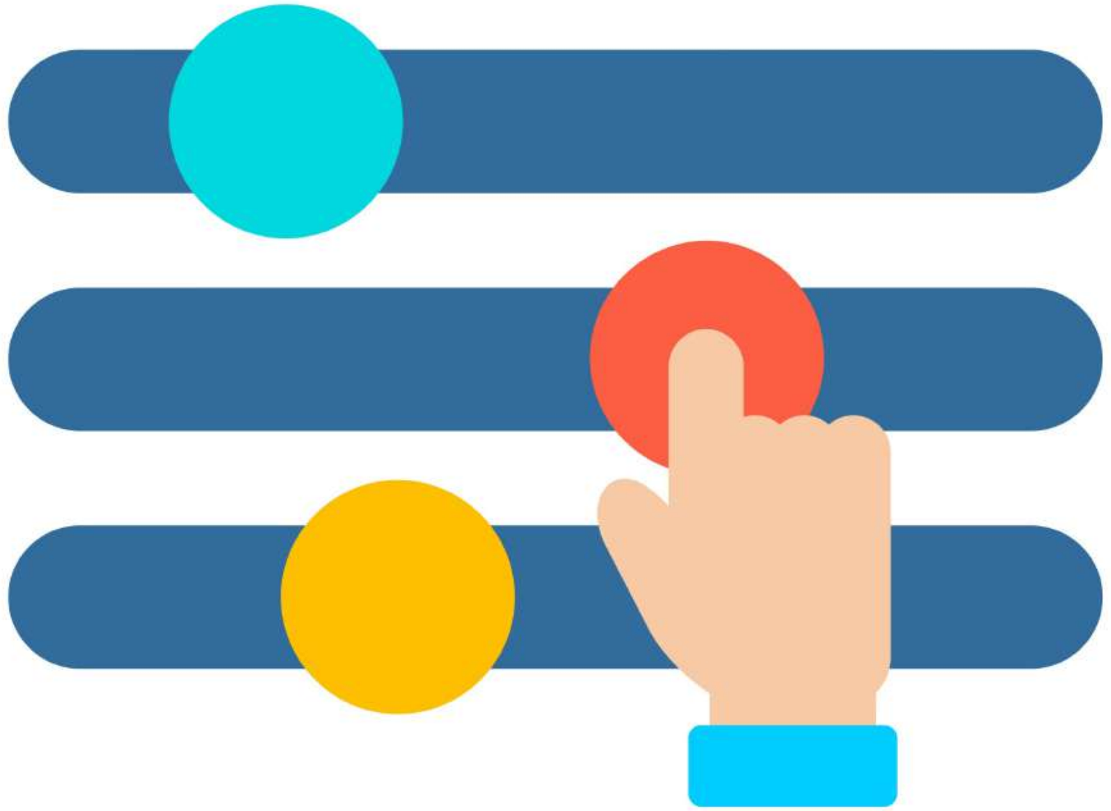
[1] https://huggingface.co/distilbert-base-uncased-finetuned-sst-2-english

Auto classes

- General class for using:
  - Models
  - Tokenizers
  - Configurations
  - Processors
  - Feature extractors
- Flexible and direct
- More control for ML tasks



[1] https://huggingface.co/docs/transformers/model_doc/auto

AutoModels

- Auto classes to directly download a model
- AutoModel class for each type of task

```
from transformers import AutoModelForSequenceClassification
model = AutoModelForSequenceClassification.from_pretraineed(
  "distilbert-base-uncased-finetuned-sst-2-english"
)
```

AutoTokenizers

- Prepare text input data
- Recommended to use the tokenizer paired with the model

```
from transformers import AutoTokenizer
tokenizer = AutoTokenizer.from_pretrained(
    "distilbert-base-uncased-finetuned-sst-2-english"
)
```

The pipeline module

- Contains all task-specific steps
- Best for quickly performing tasks
- Great for getting started

```python
from transformers import pipeline
```

Task pipelines

```
from transformers import (
  SummarizationPipeline,
  TextClassifiationPipeline,
  AudioClassificationPipeline,
  ImageSegmentationPipeline
)
```

- Task-specific pipeline for each task
- Leverage Auto classes
- Download model and relevant processing

[1] https://huggingface.co/docs/transformers/main_classes/pipelines

Creating a pipeline

```
my_pipeline = pipeline(task="text-classification")
```

```
my_pipeline = pipeline(model="distilbert-base-uncased-finetuned-sst-2-english")
```

```
my_pipeline = pipeline(
  task="text-classification",
  model="distilbert-base-uncased-finetuned-sst-2-english"
)
```

Creating a pipeline

```
my_pipeline = pipeline(task="text-classification")
```

```
No model was supplied, default to distilbert-base-uncased-finetuned-sst-2-english
```

pipeline with Auto classes

```
from transformers import pipeline, AutoModelForSequenceClassification

model = AutoModelForSequenceClassification.from_pretrained(
  "distilbert-base-uncased-finetuned-sst-2-english"
)

my_pipeline = pipeline(model=model)
```

Using the pipeline

```python
from transformers import pipeline

my_pipeline = pipeline(task="text-classification",
                       model="distilbert-base-uncased-finetuned-sst-2-english")
```

```python
input = "Hi, welcome to this awesome course!"

my_pipeline(input)
```

```
[{'label': 'POSITIVE', 'score': 0.9998550415039062}]
```

Let's practice!

WORKING WITH HUGGING FACE

NLP and tokenization

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Jacob H. Marquez
Lead Data Engineer

Hugging Face and NLP

Natural
Language
Processing

Hugging Face and NLP

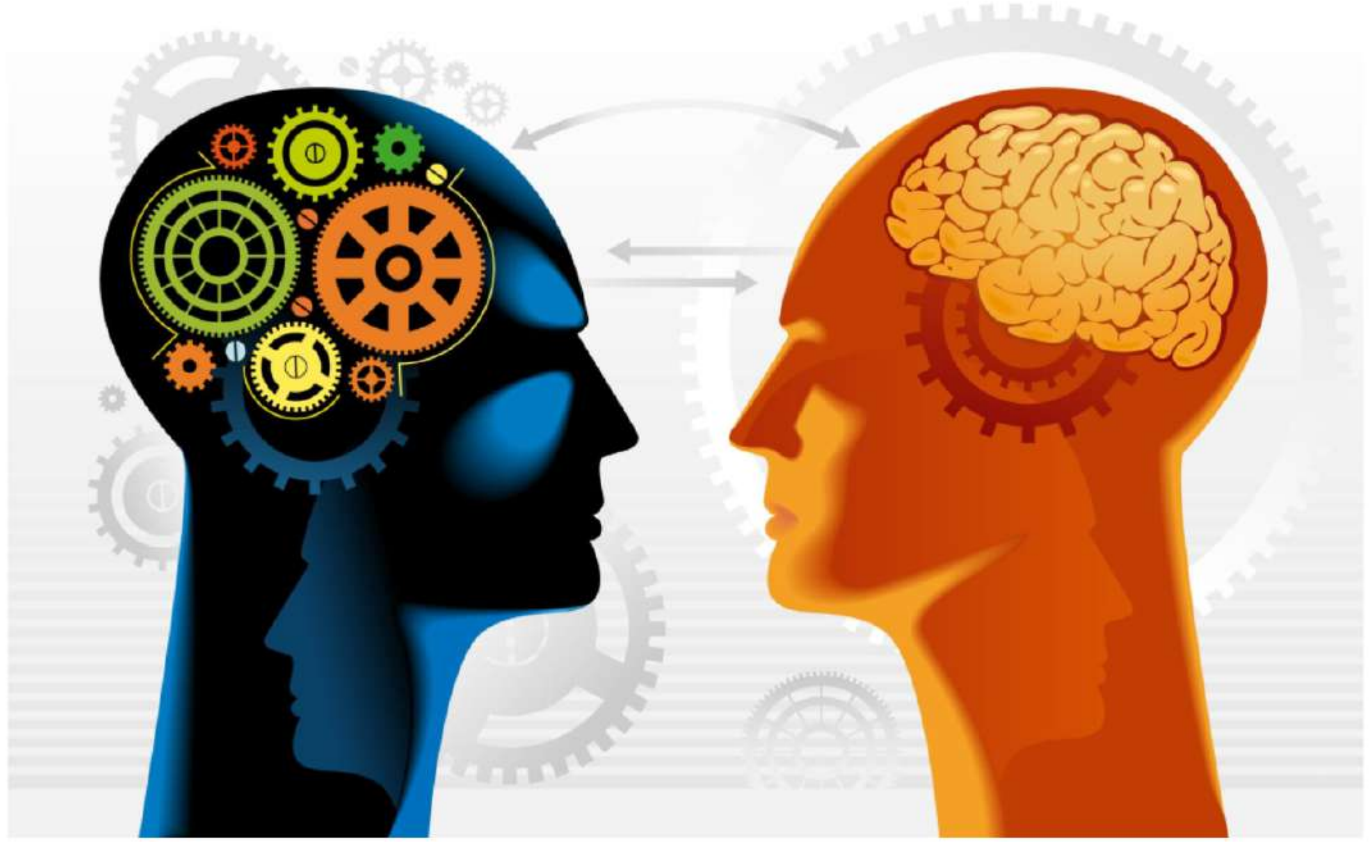
Natural Language Processing

Computer Vision

Audio

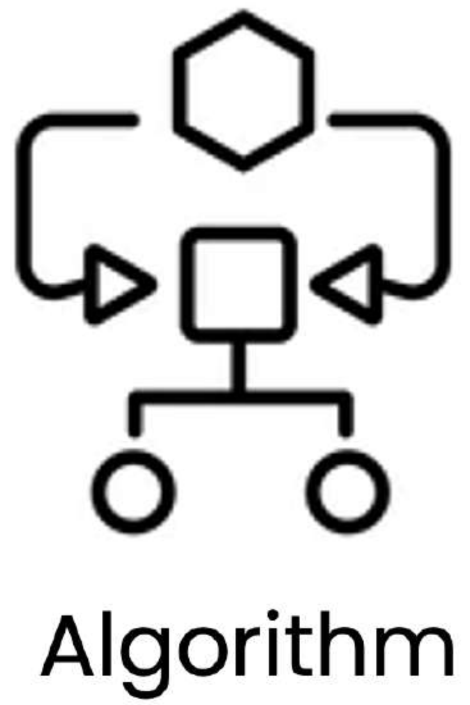
Natural language processing (NLP)

- Subfield of AI
- Enable computers to understand, interpret, and generate human language



Natural language processing

- Subfield of AI
- Enable computers to understand, interpret, and generate human language
- Algorithms, models, and transformers
- Understand words, semantics, contextual nuances



Tokenization

- Converting a sequence into smaller parts
- Numerical form

Sentence: "I am the instructor for this video."

Tokens

["I", "am", the", "instructor", ..., "video", "."]

Numerical Form

"I" = [0.232, 0.545, 0.876, ..., 0.385]

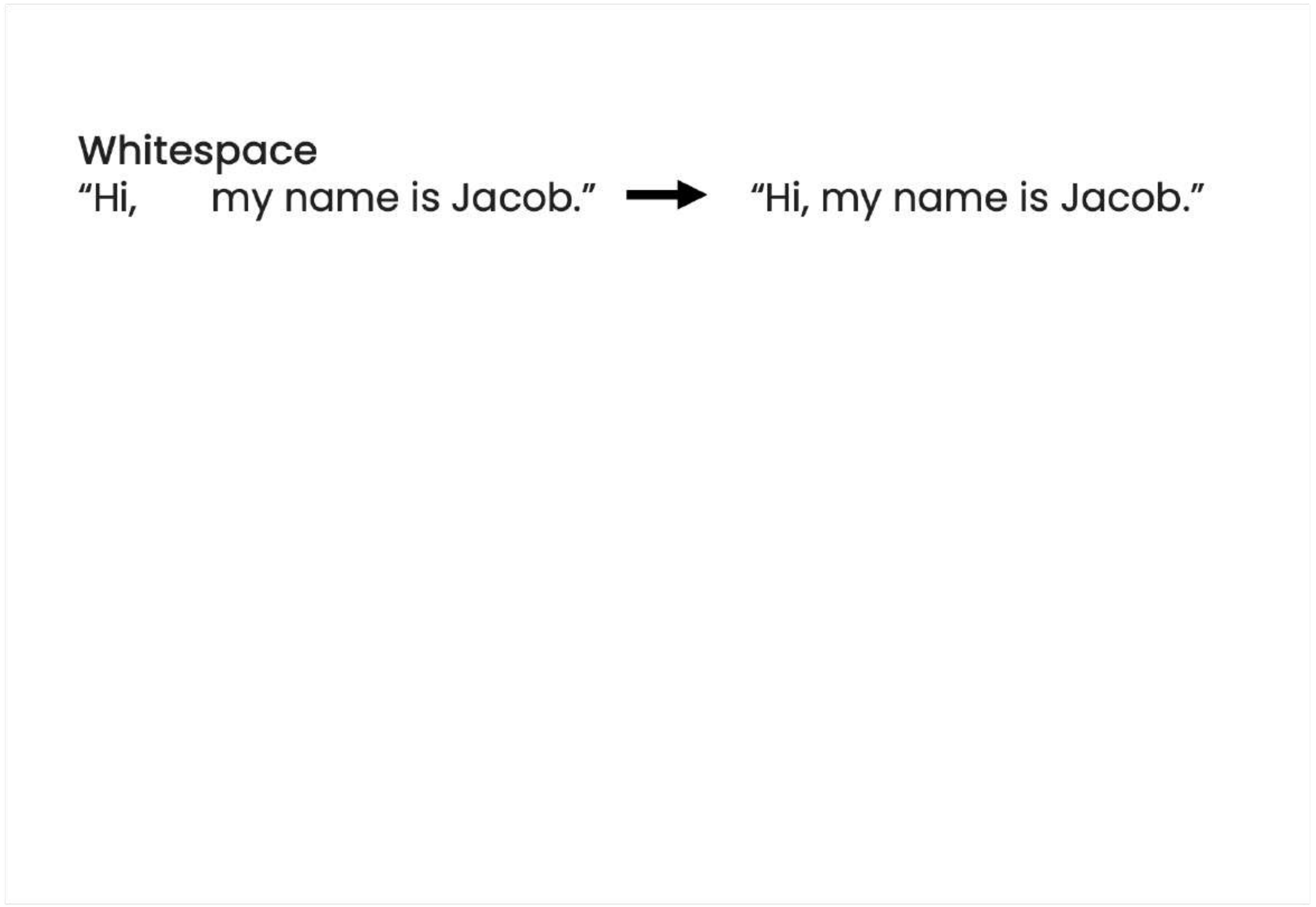
Tokenization

- Converting a sequence into smaller parts
- Numerical form
- Components:
  - Normalization: transforming and cleaning
  - Pre-tokenization: splitting into smaller tokens
  - Tokenization model

- Tokenization is one of the first steps of NLP
- Supports the model in building contextual knowledge

Normalization

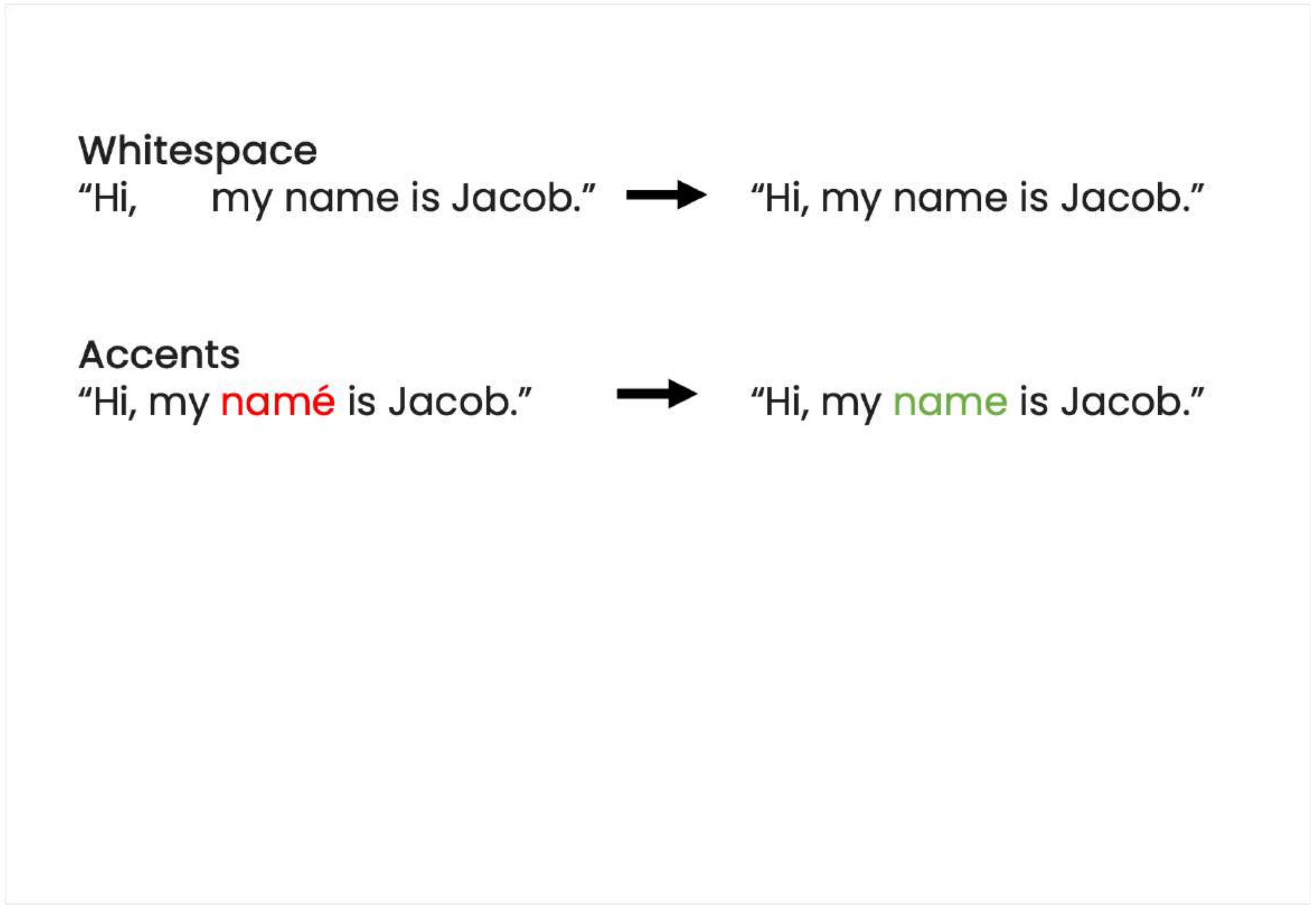
- Cleaning text
- Removing whitespaces



Whitespace
“Hi,   my name is Jacob.” $\longrightarrow$ “Hi, my name is Jacob.”

Normalization

- Cleaning text
- Removing whitespaces
- Accents



Whitespace

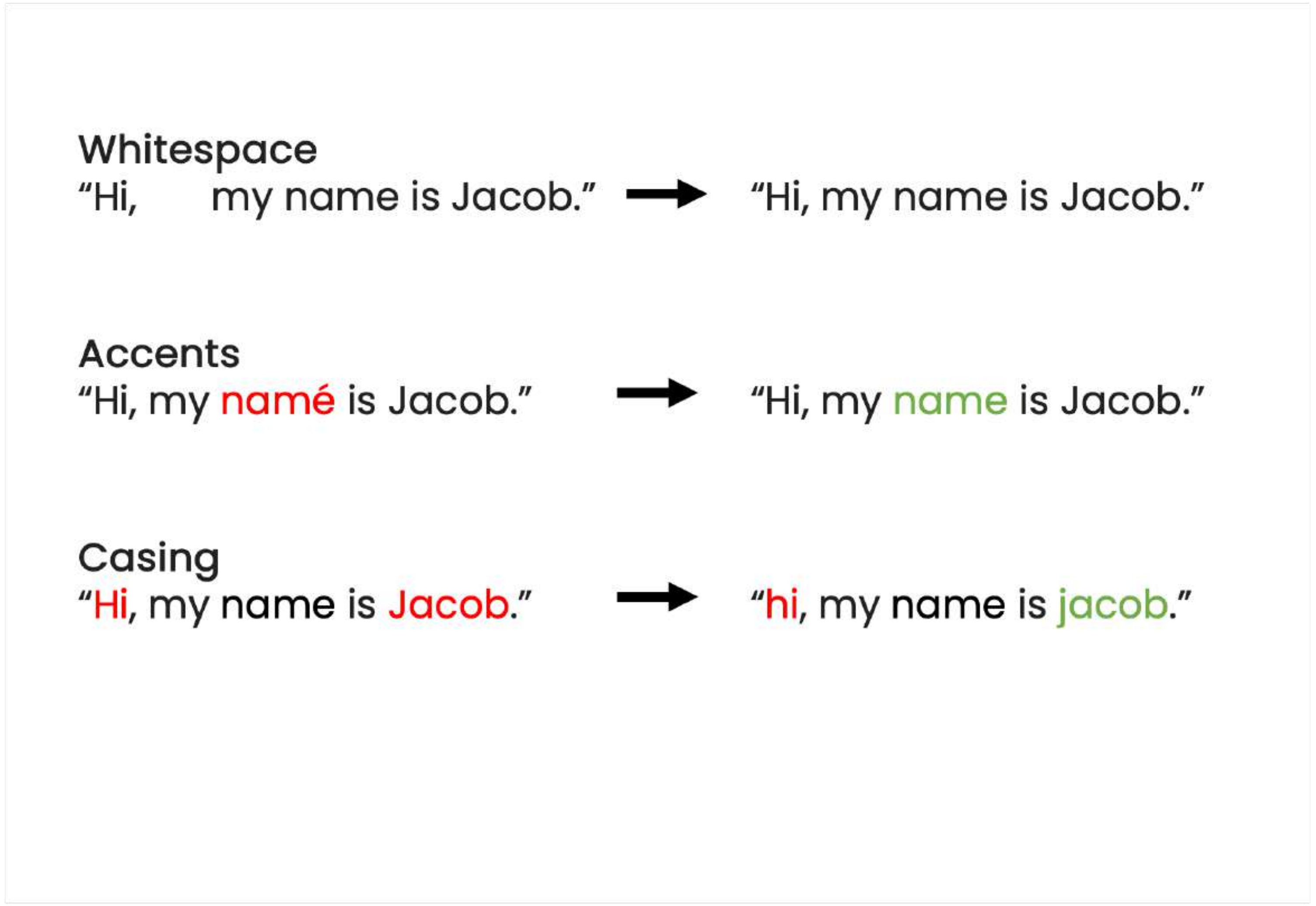
“Hi,   my name is Jacob.” → “Hi, my name is Jacob.”

Accents

“Hi, my namé is Jacob.” → “Hi, my name is Jacob.”

Normalization

- Cleaning text
- Removing whitespaces
- Accents
- Lowercasing

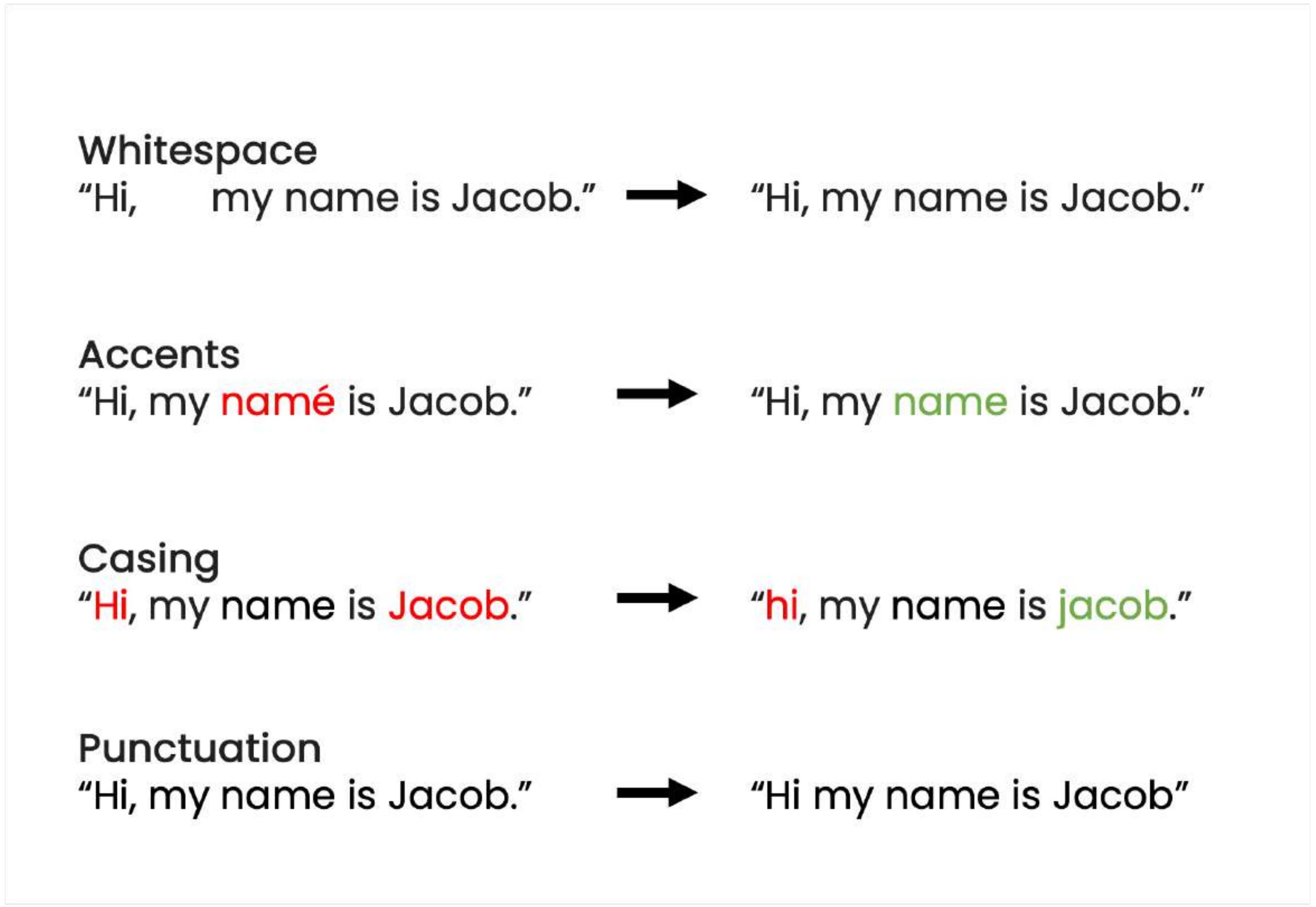

Whitespace
"Hi,   my name is Jacob." → "Hi, my name is Jacob."

Accents
"Hi, my namé is Jacob." → "Hi, my name is Jacob."

Casing
"Hi, my name is Jacob." → "hi, my name is jacob."

Normalization

- Cleaning text
- Removing whitespaces
- Accents
- Lowercasing
- Punctuation



Whitespace
"Hi,   my name is Jacob." → "Hi, my name is Jacob."

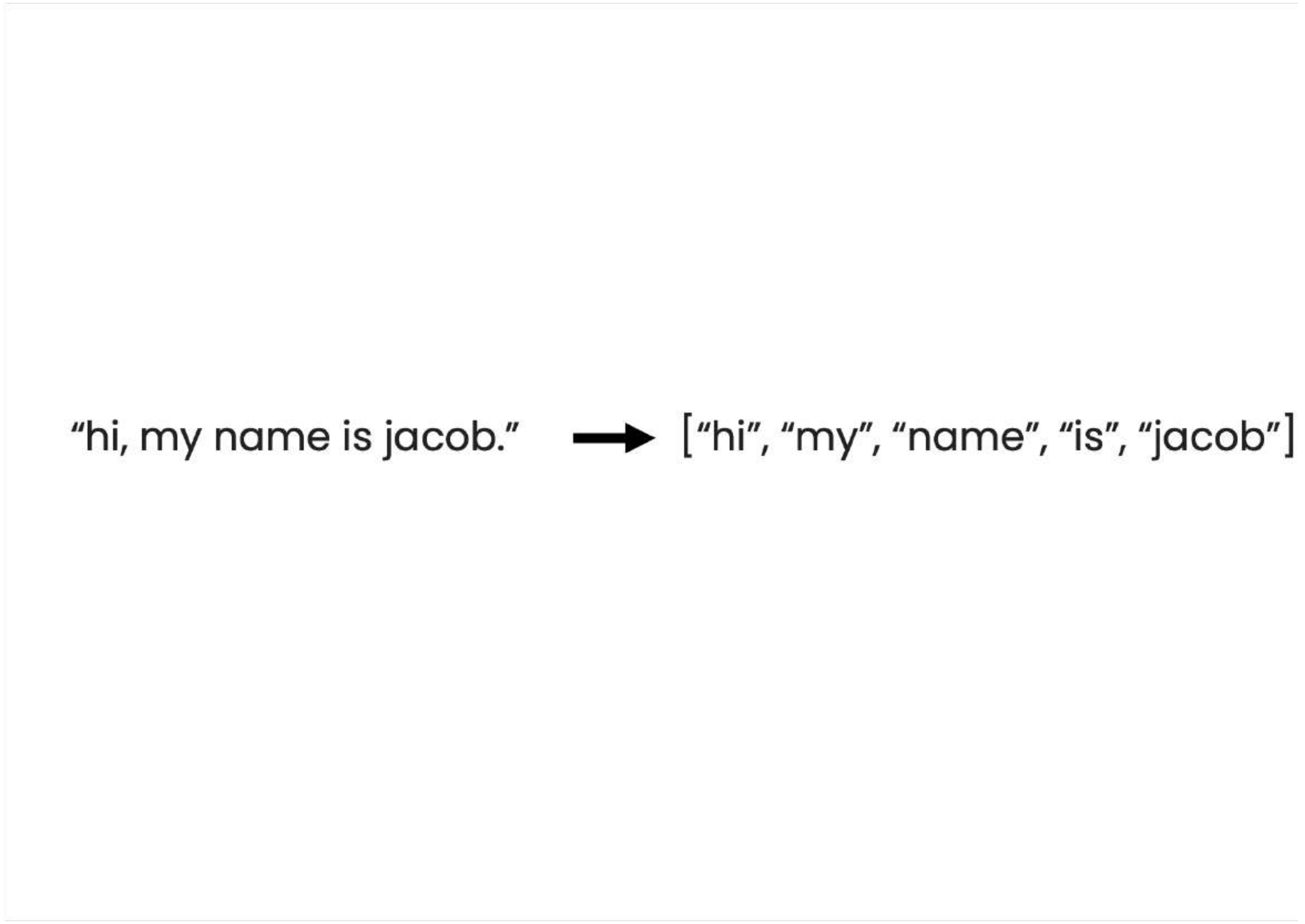
Accents
"Hi, my namé is Jacob." → "Hi, my name is Jacob."

Casing
"Hi, my name is Jacob." → "hi, my name is jacob."

Punctuation
"Hi, my name is Jacob." → "Hi my name is Jacob"

Pre-tokenization

- Input text split into smaller tokens
- Several types of pre-tokenization methods
- Split by whitespace
- Difficulty with languages that don't use spaces separate words



Tokenizer models

- Byte-Pair Encoding, WordPiece, SentencePiece, Unigram
- Each has specific tokenization process
- Goal is to create vocabulary of characters
- Understand most common patterns

Using tokenizers

```python
from transformers import AutoTokenizer

tokenizer = AutoTokenizer.from_pretrained("distilbert-base-uncased")
```

```python
print(tokenizer.backend_tokenizer.normalizer.normalize_str("HOWDY, how aré yoü?"))
```

```
howdy how are you
```

```python
from transformers import pipeline

my_pipeline = pipeline(model="distilbert-base-uncased")
```

Using tokenizers

```
from transformers import GPT2Tokenizer
input = "HOWDY, how aré yoü?"

gpt_tokenizer = GPT2Tokenizer.from_pretrained("gpt2")
```

```
gpt_tokens = gpt_tokenizer.tokenize(text=input)

print(gpt_tokens)
```

```
'Howdy', 'Ghow', 'Gare', 'Gyou', '?']
```

Let's practice!

WORKING WITH HUGGING FACE

Text classification

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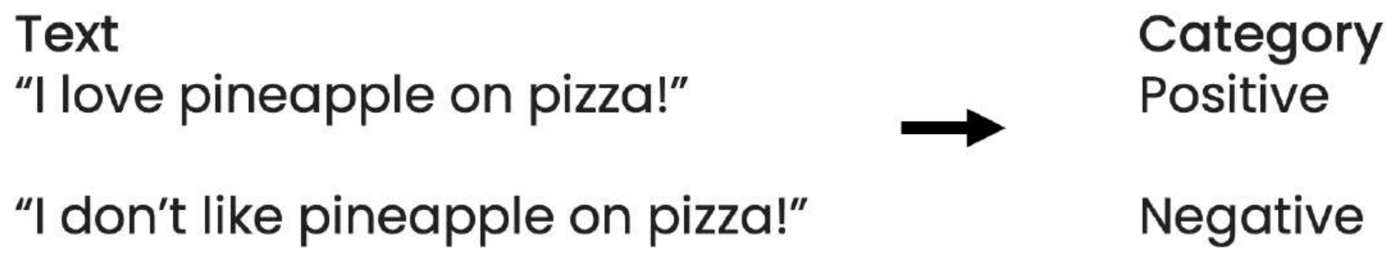
Jacob H. Marquez
Lead Data Engineer

What is text classification?

- Assign a set of predefined categories to text
- Sentiment analysis



Text		Category
"I love pineapple on pizza!"	→	Positive
"I don't like pineapple on pizza!"		Negative

[1] https://huggingface.co/tasks/text-classification

What is text classification?

- Assign a set of predefined categories to text
- Sentiment analysis
- Question Natural Language Inference (QNLI)
  - Entailment means true
  - Not entailment means false
  - Neutral means no relationship

Question
"What famous palace is located in London?"

Premise
"London contains four World Heritage Sites: the Tower of London; Kew Gardens; the site comprising the Palace of Westminster."

$\rightarrow$

Category
Not entailment (false)

[1] https://huggingface.co/tasks/text-classification

What is text classification?

- Assign a set of predefined categories to text
- Sentiment analysis
- Question Natural Language Inference (QNLI)
- Topic modeling

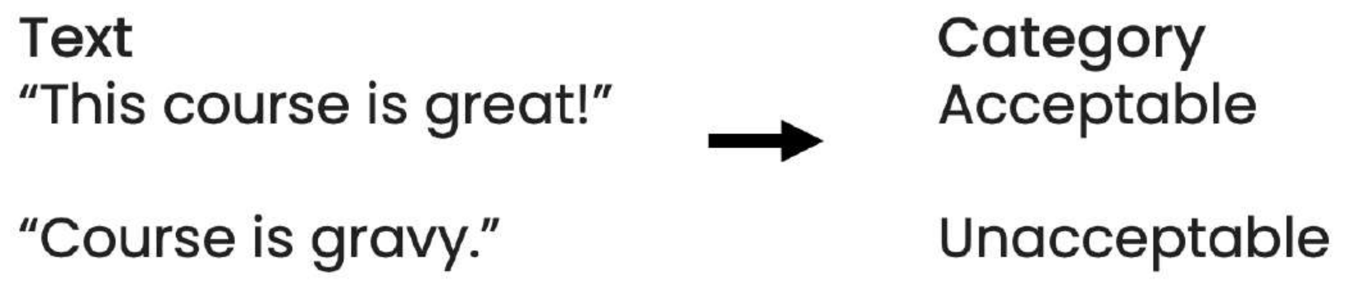
Text
"The phone died very quick..."

→

Category
"battery"

What is text classification?

- Assign a set of predefined categories to text
- Sentiment analysis
- Question Natural Language Inference (QNLI)
- Topic modeling
- Grammatical correctness



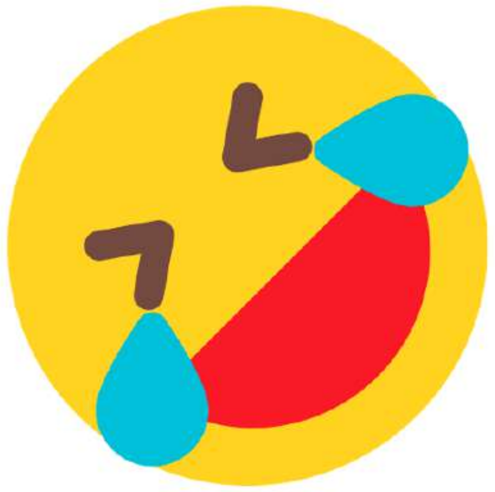
Text		Category
"This course is great!"	→	Acceptable
"Course is gravy."		Unacceptable

Challenges of text classification

Ambiguity

Challenges of text classification

Ambiguity



Sarcasm, Irony

Challenges of text classification

Ambiguity

Sarcasm, Irony

Multilingual

Getting started with text classification

```python
from transformers import pipeline


classifier = pipeline(task="text-classification")
```

```python
classifier('I love it!')
```

```
[{'label': 'POSITIVE', 'score': 0.9998656511306763}]
```

Grammatical correctness

```python
classifier = pipeline(
    task="text-classification",
    model="abdulmatinomotoso/English_Grammar_Checker"
)

classifier("I write cheese strings.")
```

```
[{'label': 'LABEL_0', 'score': 0.95}]
```

QNLI

```python
classifier = pipeline(
    task="text-classification",
    model="cross-encoder/qnli-electra-base"
)

classifier("Where is Seattle located?, Seattle is located in Washington state.")
```

```
[{'label': 'LABEL_0', 'score': 0.997811019420623 8}]
```

Zero-shot classification

- Transfer learning
- Unseen labels can be determined
- Without specific training
- Helpful when lack of resources to train new model

```
task = "zero-shot-classification"
```

```
modelId = "facebook/bart-large-mnli"
```

```
classifier = pipeline(
  task=task,
  model=modelId
)
```

[1] https://huggingface.co/tasks/zero-shot-classification

Zero-shot classification

```
text = "Wikipedia earlier this month released its list of the 25 most viewed...."

candidate_labels = ['politics', 'science', 'technology']
```

```
output = classifier(text, candidate_labels)
```

```
print(output["labels"][0])
print(output["scores"][0])
```

```
technology
0.93600781
```

Let's practice!

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Summarization

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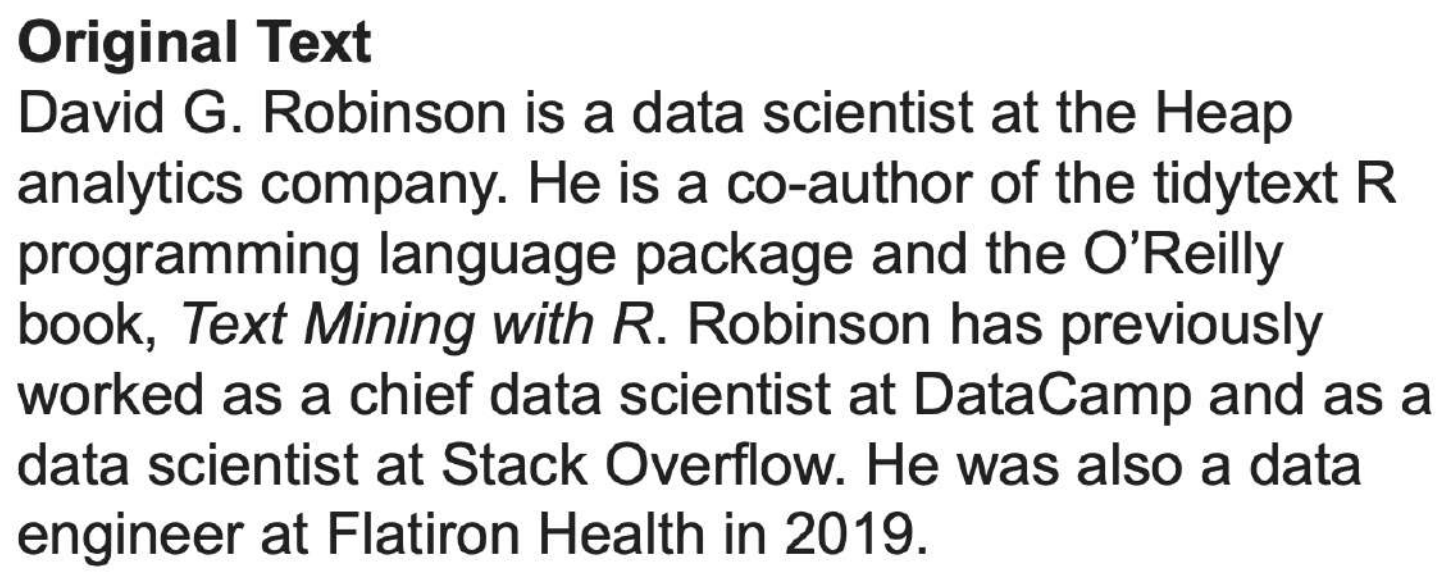
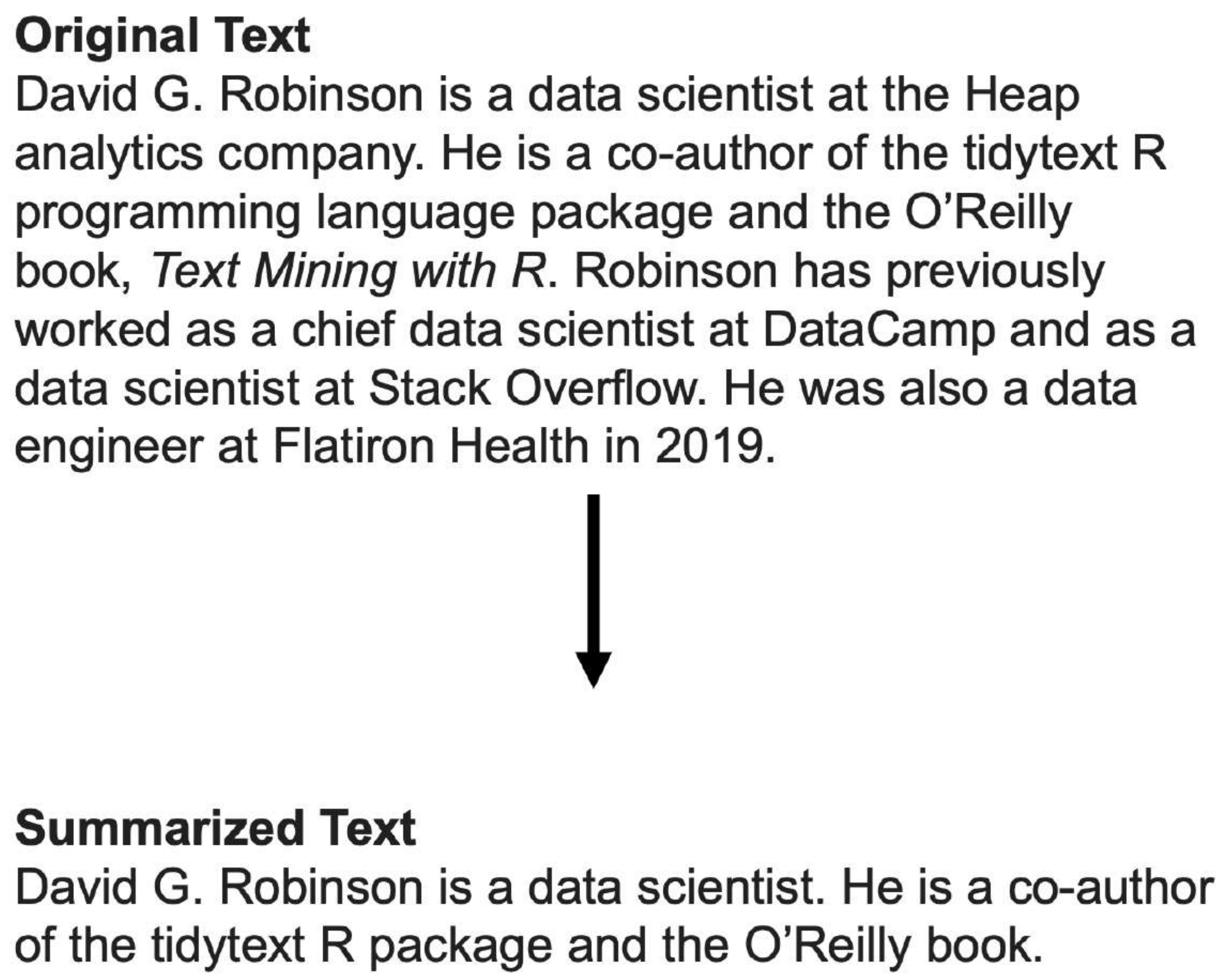
Lead Data Engineer

What is summarization?



Original Text
David G. Robinson is a data scientist at the Heap analytics company. He is a co-author of the tidytext R programming language package and the O'Reilly book, *Text Mining with R*. Robinson has previously worked as a chief data scientist at DataCamp and as a data scientist at Stack Overflow. He was also a data engineer at Flatiron Health in 2019.

What is summarization?



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Summarized Text
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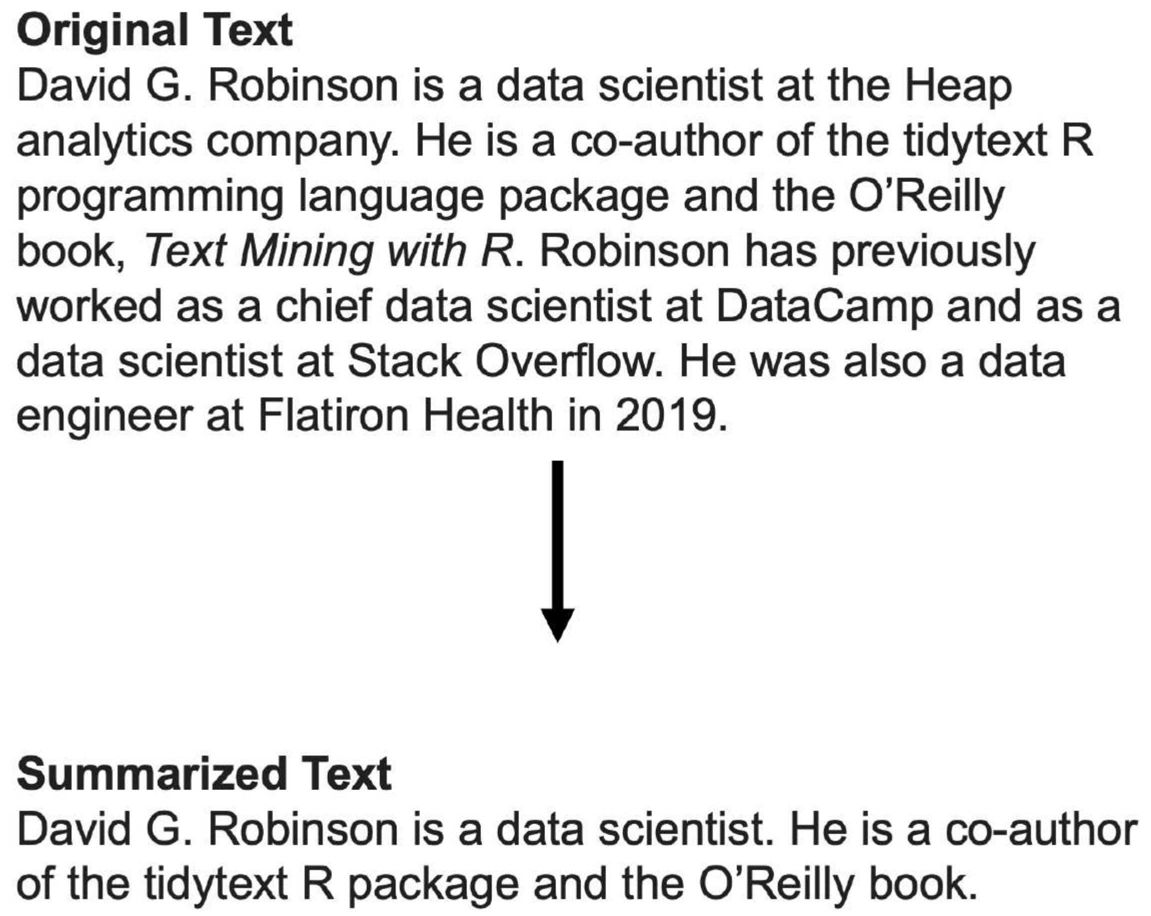
Extractive versus Abstractive



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Summarized Text
David G. Robinson is a data scientist. He is a co-author of the tidytext R package and the O'Reilly book.

Extractive

- Pieces are extracted to curate representative information
- Use sentence scoring

Abstractive

- New text generated
- Deep understanding of text
- Transformer models useful here

Use cases

News
Summaries

Use cases

News Summaries

Content Recommendations

Use cases

News Summaries

Content Recommendations

Language Translation

Summarization with pipeline

```python
from transformers import pipeline

model = "sshleifer/distilbart-cnn-12-6"
summarizer = pipeline(task="summarization", model=model)
```

```python
text = "This is my really large text about Data Science..."
summary_text = summarizer(text)
```

```python
print(summary_text[0]['summary_text'])
```

```
"Data science is a field involving multiple interdisciplinary fields."
```

Parameters for summarization

```
summarizer = pipeline(task="summarization", min_length=10, max_length=50)
```

- Put constraints around minimum and maximum number of words
- Ensure results are meaningful but not verbose
- Small storage capacity, enhance readability, improve quality

Example Error

```
Your max_length is set to 142, but your input_length is only 81.
Since this is a summarization task, where outputs shorter than the input are
typically wanted, you might consider decreasing max_length manually,
e.g. summarizer('...', max_length=40)
```

Working with multiple inputs

```
list_of_text = [row["text"] for row in data]
```

- Inputs may not be the same length
- May cause inconsistencies and incorrect results

```
summaries = summarizer(list_of_text, truncation=True)
```

- Use the maximum length size for a token specified by the model

Let's practice!

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