

Section 1 Questions: (submit as ‘myTigerID_cshw1.pdf’):

1. Train a bigram model on the corpus. Run it on the following commands and list the output:

a. `python myTigerID_cshw1_gram.py predict_ngram --word whale --nwords 100
--load PathToBigramModel.p`

whale ' s more was this course steered straight flame and povelson , you jump when the wreck . but i ' s the elephant in that in their outreaching comprehensiveness and that final consequence ? only fenced by a staid , and a spare spars and schoolmasters . the terrific ahab rushed to one . well , entitled cetology . " the common usage had two seamen to you — that there , and so that , when stubb had led by one side , then , shipmates would answer me a little oil . ere forgetfulness altogether with the

- b. `python myTigerID_cshw1_gram.py predict_ngram --word whale --nwords 100
--load PathToBigramModel.p --d`

- c. `python myTigerID_cshw1_gram.py predict_ngram --word tomato --nwords 100
--load PathToBigramModel.p`

Error: Word not found in training data.
tomato

2. Train a trigram model on the corpus. Run it on the following commands and list the output:

- a. python myTigerID_cshw1_gram.py predict_ngram --word "the harpooneer" --nwords 100 --load PathToTrigramModel.p

the harpooneer oar , he transports himself with boots at all . suddenly queequeg started to his wearied mates , and pine wood ; and no coffin and no coffin and went out of the harpoons and line . presently , catching sight of him . ” upon this strange affair myself . ” — _charles lamb ’ s beginning . ” — _job_ . “ pull up — pull up ! shiver her ! — aloft there ! there again ! — a savage , so long been bound . but no sooner trimmed the yards swung round ; starboard and

- b. python myTigerID_cshw1_gram.py predict_ngram --word "the harpooneer" --nwords 100 --load PathToTrigramModel.p --d

- c. Run 2.b again without $-d$, 3 times in a row.

Run1:

the harpooneer sleepy at the girdling line of advance be strictly confined to its own unavoidable , straight out beyond the duodecimo , this omnitooled , open - mouthed at times his hate seemed almost theirs ; the masoned , walled - town , and victorious fowl , that at any time to become pursed together . such a sight strange to see him now — a whaleman too — shall we keep chasing this murderous fish till he couldn ' t half like that just quoted from langsdorff , you might say a touch , and hailing the three - fourths

Run2:

the harpooneer oar , bethink him that at every motion of his wrinkles ; the better qualified and set on edge , for he might make himself at home , he led the chase was now wrapped in a horse - shoe stubbs , sir ? ” “ merchant service many captains never show themselves on deck , for ahab too is mad . yet when jonah was swallowed down and pulverize that subaltern ’ s boat , which he sailed from home ; all these things in his berth , and swear it now on negro hill or in tormented chase

Run3:

the harpooneer is it ye pull for your one lost leg ; while , drew out , and wag thy ears . you would take his hammer the heavy beating of his intentions , at times — that was sudden , as a dead comrade from the prairie . “ the things that you can ’ t you snap your oars , sir , ” says jonah now , bulkington ? glimpses do ye do when ye come ? ” he added — “ gripe your oars , and various other parts of the sperm whale , so that he soon mounted

Section 2 Questions: (append to submit as ‘myTigerID_cshw1.pdf’):

1. Train a BPE tokenizer using the default value for k. What is the output of: `python myTigerID_cshw1_bpe.py tokenize --text The bright green Norwegian avocado was eaten by the whale! --load PathToBPEModel.p`

Tokens: ['the', 'br', 'i', 'gh', 't', 'gre', 'en', 'no', 'r', 'we', 'gi', 'an', 'a', 'vo', 'ca', 'do', 'wa', 's', 'ea', 'ten', 'b', 'y', 'the', 'wh', 'al', 'e', '!']

Token IDs: [65, 469, -1, 85, -1, 230, 12, 95, -1, 191, 367, 8, -1, 410, 112, 341, 153, -1, 405, 288, -1, -1, 65, 34, 20, -1, -1]

2. Train a BPE tokenizer using k=3000. What is the output of: `python myTigerID_cshw1_bpe.py tokenize --text The bright green Norwegian avocado was eaten by the whale! --load PathToBPModel.p`

Tokens: ['the', 'bri', 'gh', 't', 'gre', 'en', 'nor', 'we', 'gi', 'an', 'a', 'voc', 'ad', 'o', 'wa', 's', 'ea', 'ten', 'b', 'y', 'the', 'wh', 'al', 'e', '!']

Token IDs: [65, 942, 85, -1, 230, 12, 1716, 191, 367, 8, -1, 2714, 194, -1, 153, -1, 405, 288, -1, -1, 65, 34, 20, -1, -1]

3. Train a BPE tokenizer using k=10. What is the output of: `python myTigerID_cshw1_bpe.py tokenize --text The bright green Norwegian avocado was eaten by the whale! --load PathToBPEModel.p`

Tokens: ['th', 'e', 'b', 'r', 'i', 'g', 'h', 't', 'g', 'r', 'e', 'e', 'n', 'n', 'o', 'r', 'w', 'e', 'g', 'i', 'an', 'a', 'V', 'o', 'c', 'a', 'd', 'o', 'w', 'a', 's', 'e', 'a', 't', 'e', 'n', 'b', 'y', 'th', 'e', 'w', 'h', 'a', 'l', 'e', '!!']

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Section 3 Questions: Tokenization in Real-World Scenarios

Google SentencePiece:

1. What are the classes required to import a trainable BPE tokenizer? What would the import statement look like?
The classes required to import a trainable BPE tokenizer is SentencePieceProcessor. SentencePiece provides a python wrapper around a C++ implementation and training is done using SentencePiece trainer. The import will be: import sentencepiece as spm
2. Assume we have a string_corpus object. How would we train a bpe_model object?
spm_train --input=corpus.txt --model_type=bpe --vocab_size=8000
3. Assume the same string_corpus object. How to perform inference using our bpe_model?
sp = spm.SentencePieceProcessor(model_file="bpe.model")
sp.encode("some text")
4. Does this library differ from our implementation in Section 2 in terms of arguments for how BPE trains? If so, how?
Yes it does differ from our implementation in section 2 because SentencePiece uses a fixed vocabulary size while we use a fixed number of merges k. Sentence piece also trains from raw text.
5. What backend(s), e.g., programming languages besides Python does this library utilize?
C++ is the backend programming language

HuggingFace Tokenizers:

1. What are the classes required to import a trainable BPE tokenizer? What would the import statement look like?
from tokenizers import Tokenizer
from tokenizers.models import BPE
from tokenizers.trainers import BpeTrainer
from tokenizers.pre_tokenizers import Whitespace
2. Assume we have a string_corpus object. How would we train a bpe_model object?
tokenizer = Tokenizer(BPE())
tokenizer.pre_tokenizer = Whitespace()
trainer = BpeTrainer(special_tokens=["[UNK]"])
tokenizer.train(files=["string_corpus.txt"], trainer=trainer)
3. Assume the same string_corpus object. How to perform inference using our bpe_model?
output = tokenizer.encode("How to perform inference using our bpe_model")
tokens = output.tokens
token_ids = output.ids
4. Does this library differ from our implementation in Section 2 in terms of arguments for how BPE trains? If so, how?
Yes, HuggingFace Tokenizers differ from our implementation in section 2 for training BPE. HuggingFace Tokenizers uses a fixed vocabulary size to control training while we use k merge.
5. What backend(s), e.g., programming languages besides Python does this library utilize?

They use Rust, [Node.js](#), and Ruby

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