Lecture 2

EXPLORING and PREPROCESSING Text Data

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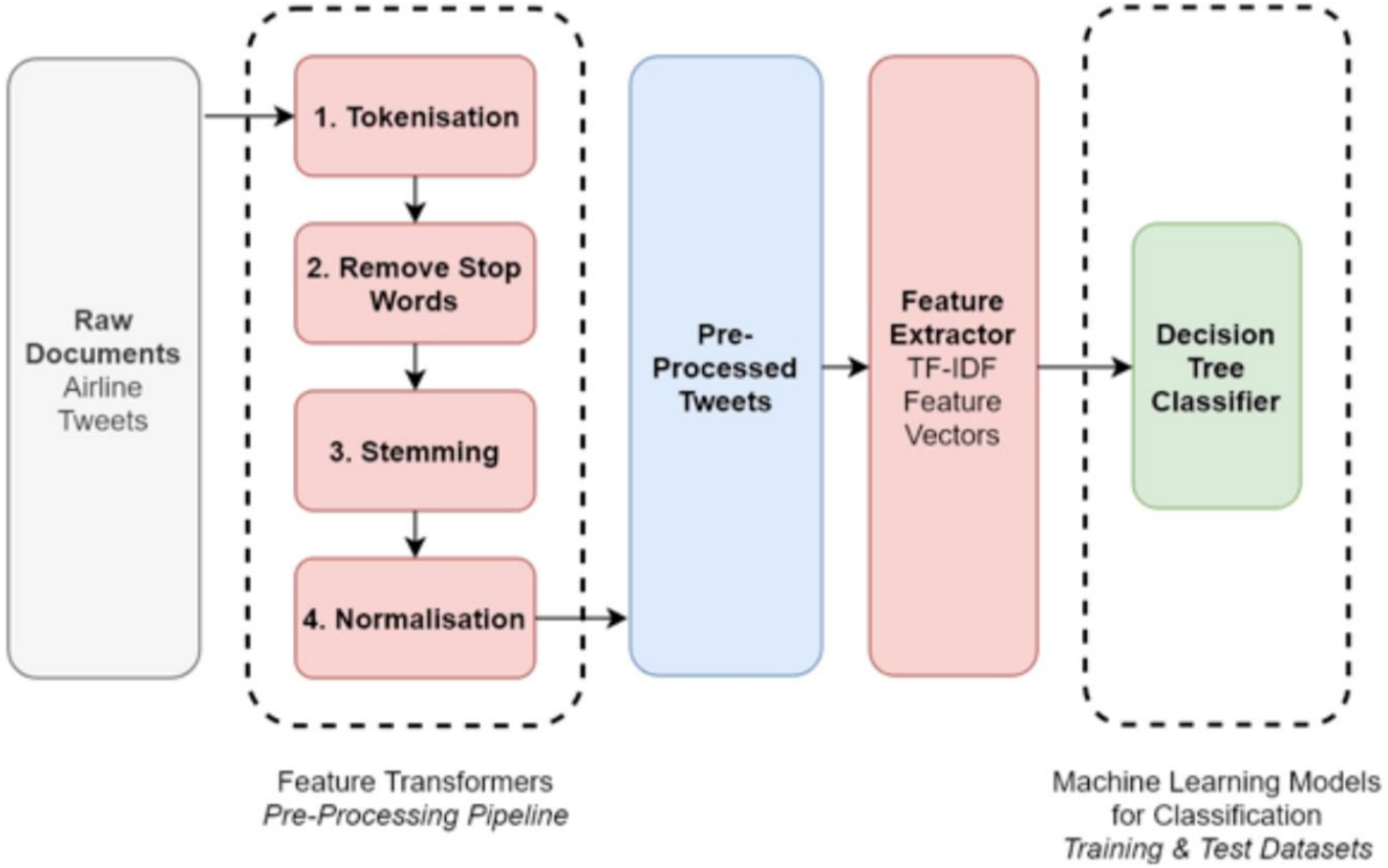
Content

- Data Preprocessing
- Text Data Preprocessing Techniques
  - Uncapitalizing
  - Removing Punctuation
  - Removing Stopwords
  - Standardizing text
  - Correcting spelling
  - Tokenizing
  - Stemming and Lemmatization
- Text Data Exploring
- Building pre-processing model for text data

1. Data Preprocessing

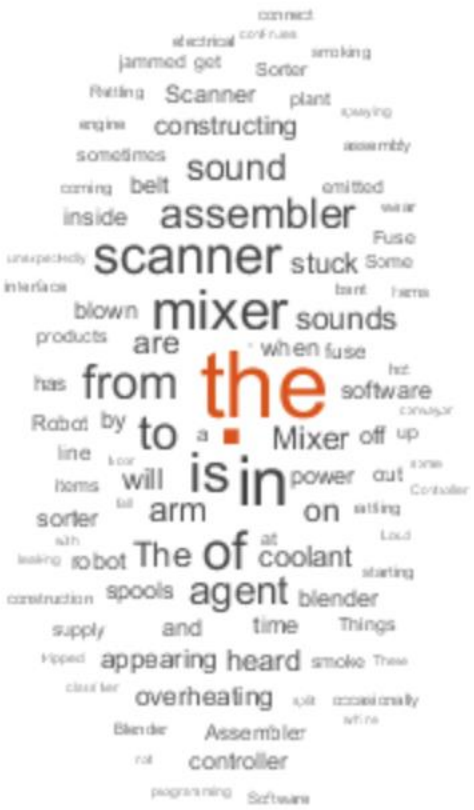


Source: https://www.mlanalytics.in/how-does-text-preprocessing-in-nlp-work/

Motivation

- Text data come from many resources (and *heterogeneous*!)
  - Web, social network, documents, etc.
  - Noise, redundancy
- ==> Need to be transformed into **<u>understandable format</u>**

Raw Data



Cleaned Data

2. Text Data Preprocessing Techniques
2.1. Uncapitalizing

- Problem: *“NLP” and “nlp” is different or not?*

- All the text needs to be represented in the same format
- Solution: using `lower()` function in `python`

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2.2. Removing Punctuation

- *Punctuation has no meaning!*
- Reducing data dimension as well as improving the computational performance
- Solution: Regular Expression + `replace()` function in `python`

	A	B	C	D
1	Text with Punctuation			Remove Punctuation
2	"Apple"			Apple
3	(Pear). 5			Pear 5
4	{[Orange]}			Orange
5	Lemon;;; :::			Lemon
6	Lychee!			Lychee
7	<Blueberry>			Blueberry
8	Dash-test			Dashtest
9	TEST~!#$%^&*()_+{}[]"":;<>?.,			TEST

2.3. Removing Stop words

- Stop words are commonly used in text document but meaningless
- Removing stop words allows to reduce the data dimension and to improve the model performance
- Solution:
  - Using the library NLTK
  - Building a list of stop-words and removing them from the input document
  - Example: https://github.com/stopwords/vietnamese-stopwords

2.4. Standardizing Text

- Transforming acronym and abbreviation in the document text
- Solution:
  - Building a dictionary for common acronym and abbreviation in the text

Raw	Normalized
2moro 2mrrw 2morrow 2mrw tomrw	tomorrow
b4	before
otw	on the way
:) :-) ;-)	smile

2.5. Correcting Spelling

studing $\longrightarrow$ studying
intresting $\longrightarrow$ interesting
aquire $\longrightarrow$ acquire

- Data comes from social network (e.g., user comments, blogs, tweets etc.) may contain spelling errors
- Correcting spelling allows to remove redundant words
- Solution:
  - Using library TextBlod

2.6. Tokenizing

- Motivation: split the input text into "terms" ➔ numerical representation
- Input: document after some pre-processing techniques
- Output: A list of terms
- Solution
  - For English documents: NLTK, TextBlod, Spacy
  - For Vietnamese documents: VnCoreNLP, underthesea, coccoc-tokenizer

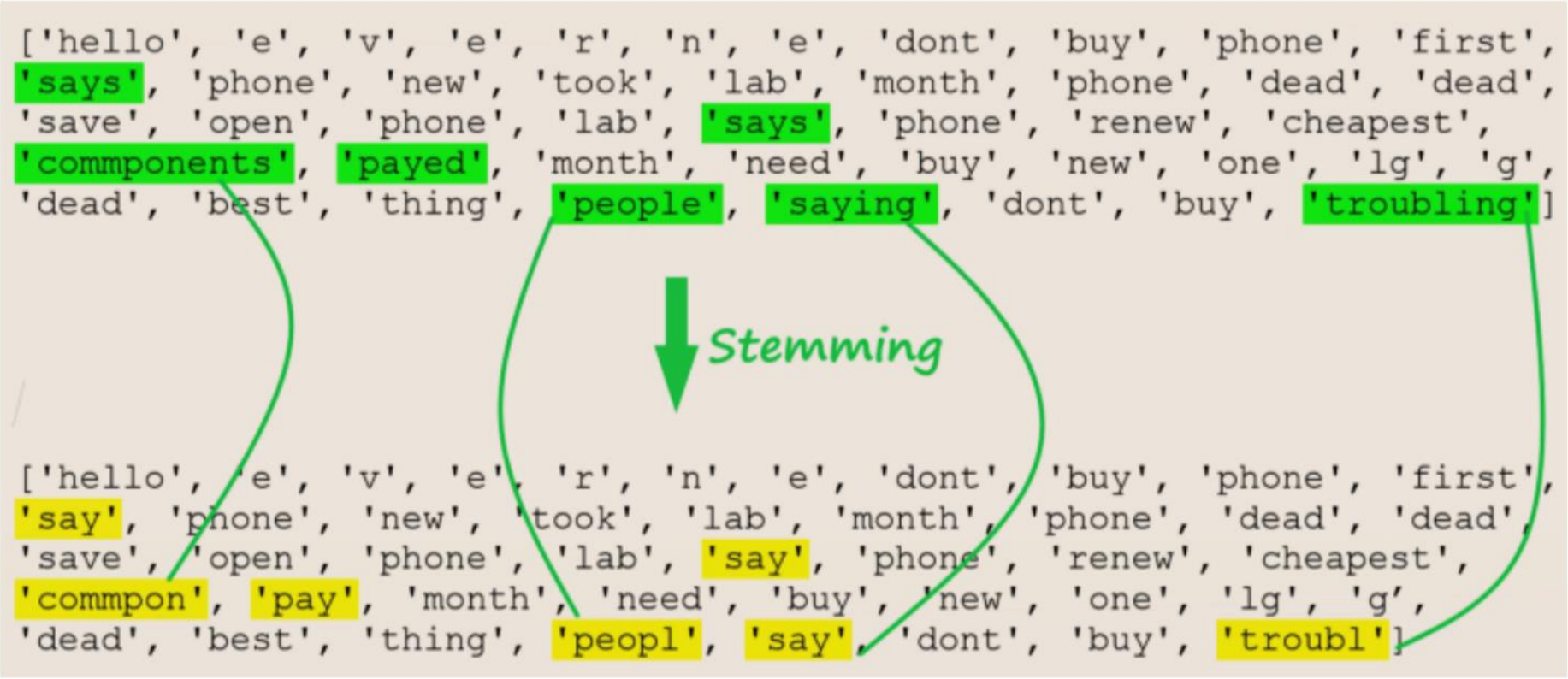
VnCoreNLP: https://github.com/vncorenlp/VnCoreNLP

Underthesea: https://github.com/undertheseanlp/underthesea

Coccoc-tokenizer: https://github.com/coccoc/coccoc-tokenizer

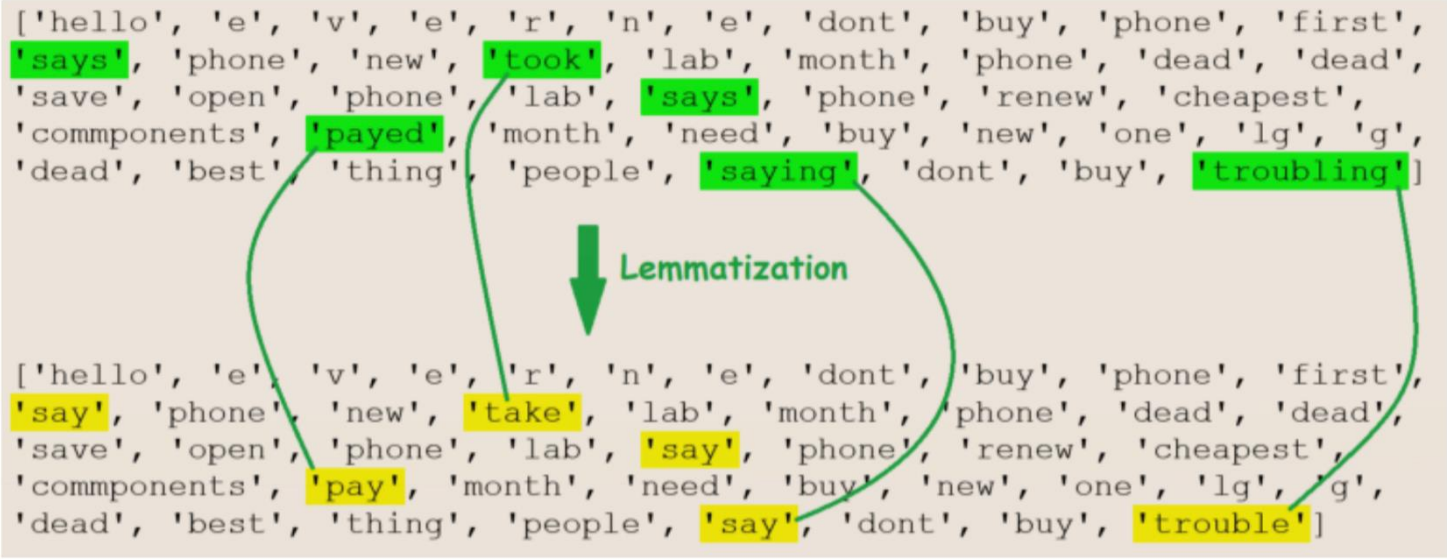
2.7. Stemming

- Extract the base form of a word by removing affixes from them
- Solution:
  - NLTK
  - TextBlod



2.8. Lemmatization

- Identify the derived forms of a word then convert them to the base form
- Input: a word
- Output: base form of this word
- Solution
  - NLTK
  - TextBlod

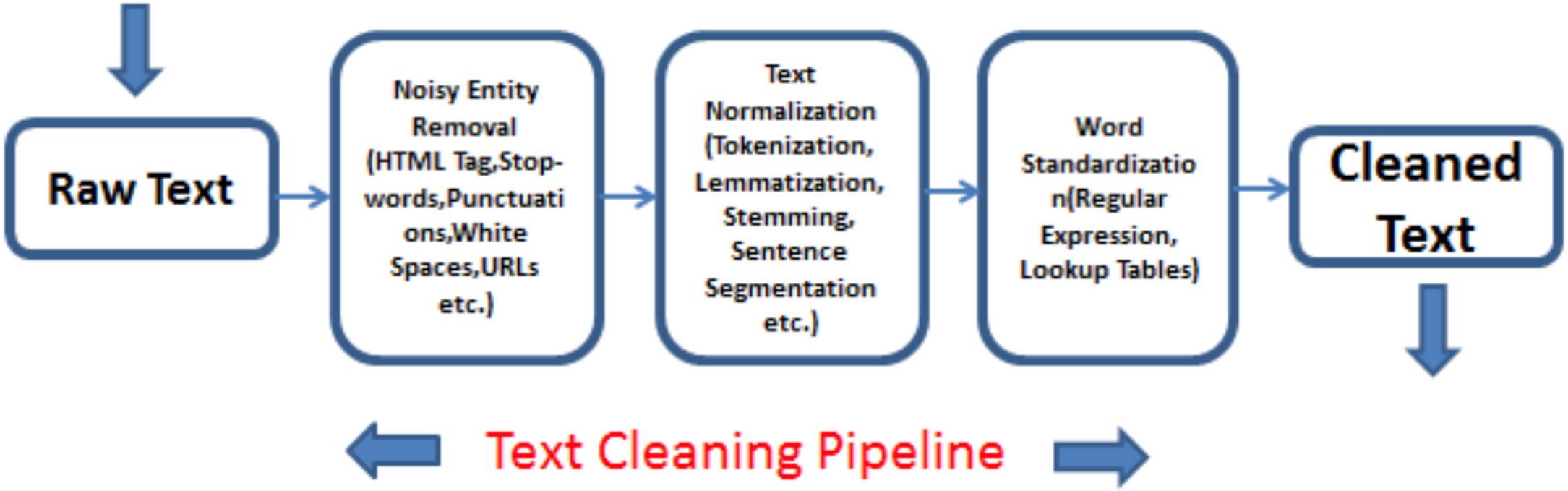


2.9. Statistical Analysis of Text Document

- Input: a text document
- Output:
  - Counting the number of words of this document
  - Counting the frequency of each word
  - Counting words with specified constraint on length
  - Building word cloud

- Solution:
  - NLTK
  - TextBlod

3. Pre-processing Text Data Model



Solution: Build a step-by-step preprocessing model with all the steps