Preprocessing

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Goal: Prepare texts into format used for computational text analysis
Method: Preprocessing recipe
Decisions: Feature selection, Non-english and multilingual issues.

Key Terms:

- Corpus / document
- Encoding
- Preprocessing
- Tokens, grams
- Stemming / Lemmatize,
- Bag of Words
- Document-Term Matrix

Key R Packages

- `tm`

Preparing a Corpus

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My preferred structure: Each document a row, one column for text, and other columns for metadata.

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Preprocessing Texts

One (of many) recipe for preprocessing: retain useful information

1) Remove capitalization, punctuation
2) Discard Word Order: (Bag of Words Assumption)
3) Discard stop words
4) Combine similar terms: Stem, Lemmatize
5) Output: Document-Term Matrix, each element counts occurrence of a particular term in a particular document

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Caution

```
``Turkey'' = ``turkey''
```

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[a, any, are, civil, engaged, great, in, nation, now, or,
testing, that, war, we, whether]
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Trigrams [now we are, we are engaged, are engaged in, engaged in a, in a great, a great civil, great civil war, civil war testing, war testing whether, testing whether that, whether that nation, that nation or, nation or any, or any nation]

How Could This Possibly Work?

Speech is:

- Ironic

  `Thanks, Obama`

- Subtle Negation (Source: Janyce Wiebe) :

  `They have not succeeded, and will never succeed, in breaking the will of this valiant people`

- Order Dependent (Source: Arthur Spirling):

  `Peace, no more war`

  `War, no more peace`

How Could This Possibly Work?

Three answers

1) It might not: Validation is critical (task specific)
2) Central Tendency in Text: Words often imply what a text is about `war, civil, union` or tone `consecrate, dead, died, lives`.

   Likely to be used repeatedly: create a theme for an article
3) Proof in the pudding: Bag-of-words assumption works for a number of applications.

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- Exercise caution when discarding stop words
- You may need to customize your stop word list$\rightsquigarrow$ abbreviations, titles, etc.

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- Stemming/Lemmatizing algorithms: Many-to-one mapping from words to stem/lemma

Comparing Stemming and Lemmatizing

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Lemmatizing algorithm:

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- Verify result is a word

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- Remove sparse terms (rare words)
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- Weight some terms more than others (tf-idf)

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Step 4: Applying Stemming Algorithm

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Step 5: Create Count Vector

Stem	Count
ago	1
brought	1
seven	1
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conceiv	1
men	1
father	1
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$\boldsymbol{X}$ = main input for many computational text analysis applications.

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Non-English languages pose specific challenges:

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Solutions

1. Language-specific processing and software (e.g. `tm, txtorg`).
2. Translate everything into English or other common language (e.g., Google Translate), especially if doing cross-language work

To the R code!