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Concept Mapping of Medical Terms

via Syntax, Semantics, and Pragmatics Levels

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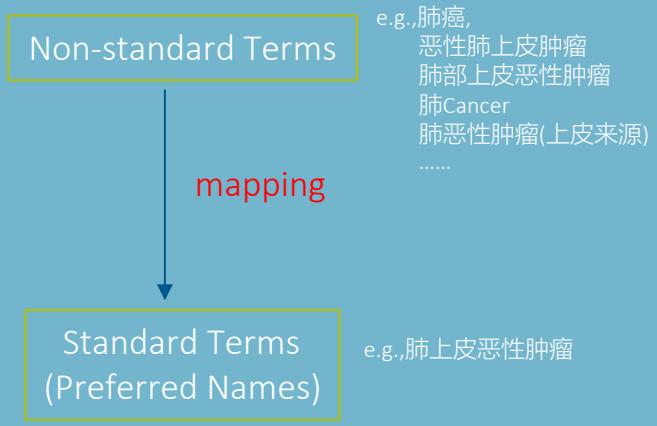
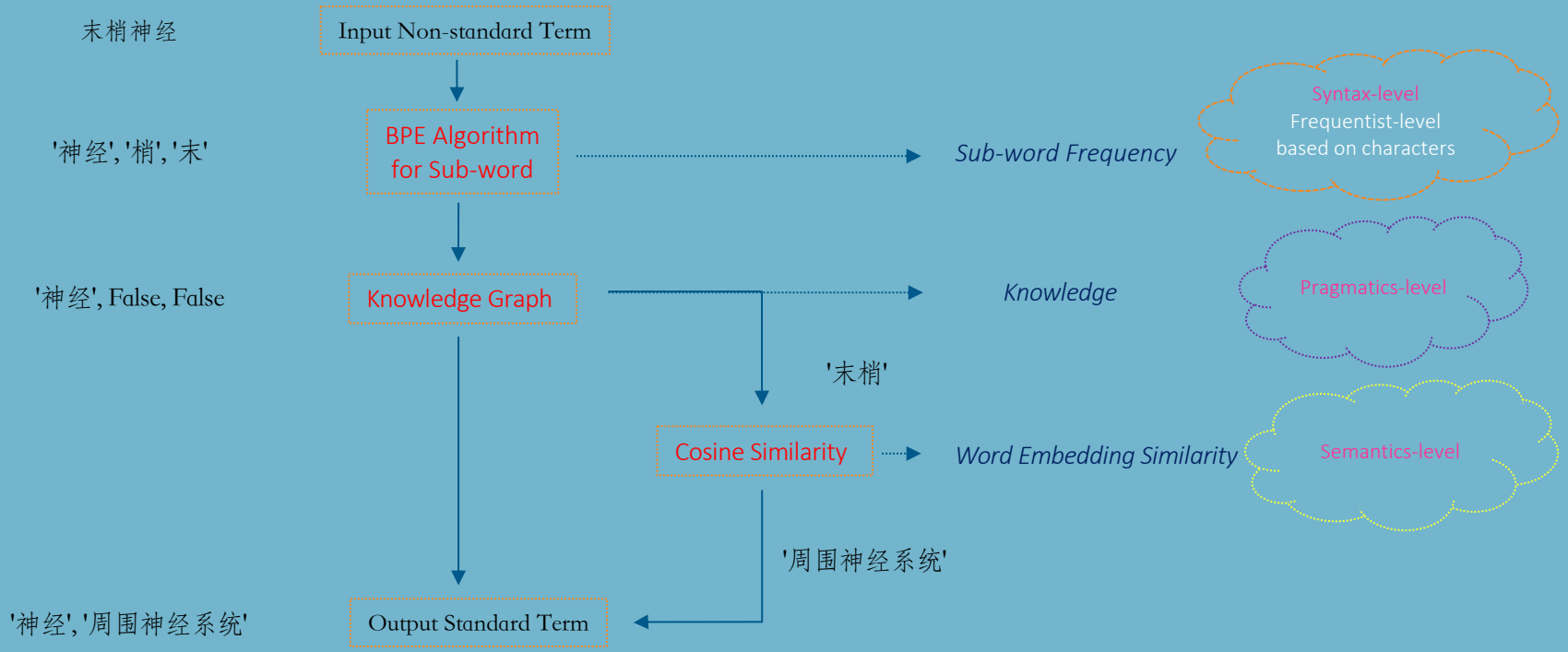
Objectives

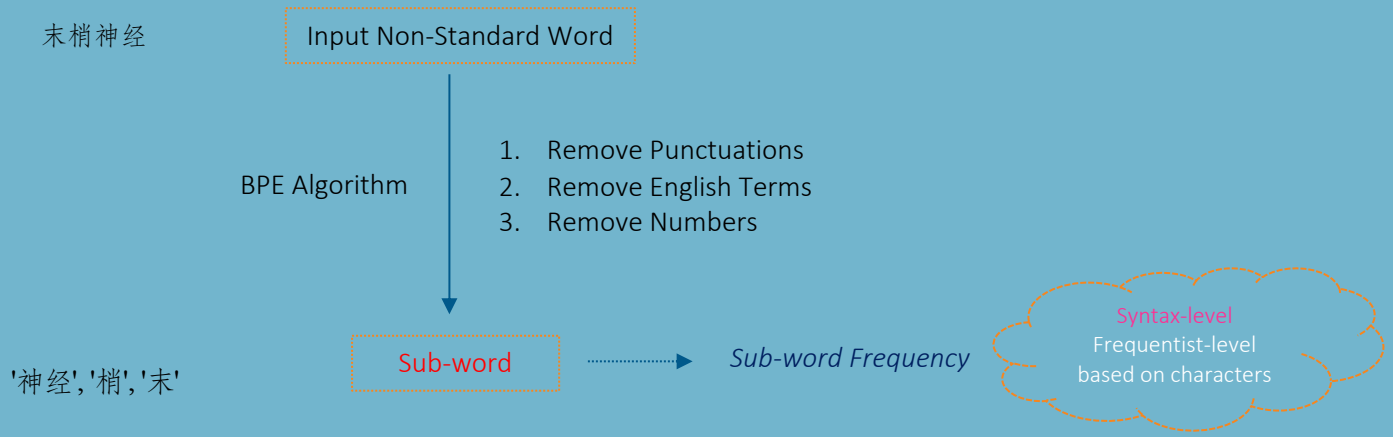


Method



Method – Syntax level Analysis

Why using Sub-words?



1. Learn compounding and transliteration from sub-word representations

2. Generalize to translate and produce new words (unseen at training time)

Getting Sub-words:

Byte Pair (2-gram) Encoding (BPE) Algorithm Recap:

1) Initialize symbol vocabulary with character vocabulary

vocab = {'l o w .': 5, 'l o w e r .': 2, 'n e w e s t .': 6, 'w i d e s t .': 3}

2) Find the most frequent 2-gram pairs (‘A’, ‘B’) from every word

{('d', 'e'): 3,('e', 'r'): 2, ('l', 'o'): 7, ('w', '.'): 5, ('w', 'e'): 8, ('e', 'w'): 6,('r', '.'): 2, ('w', 'i'): 3, ('e', 's'): 9, ('n', 'e'): 6, ('s', 't'): 9,('i', 'd'): 3, ('t', '.'): 9, ('o', 'w'): 7}

We find ('e', 's'): 9

3) Merge (‘A’, ‘B’) → (‘AB’) and repeat 2).

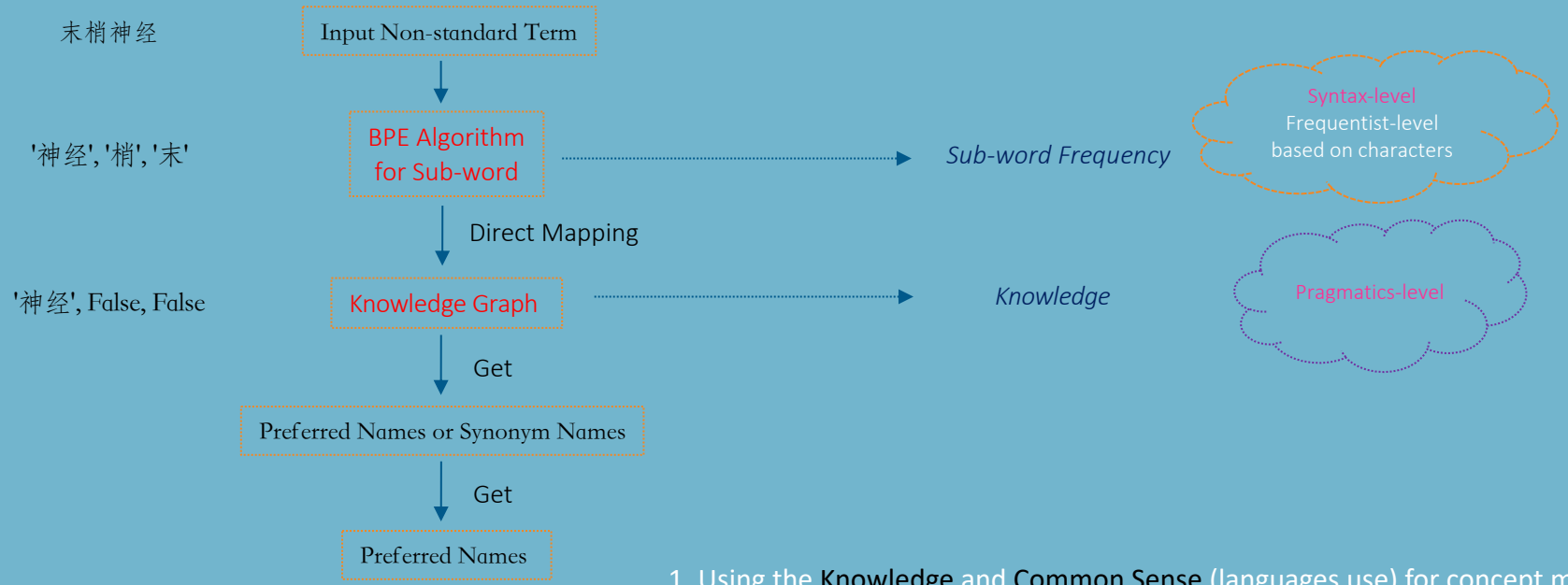
Character 2-gram

{' l o w': 5, 'l o w e r': 2, ' n e w es t': 6, ' w i d es t': 3}

4) Stop merging until reach the *num(merge operation)* or *minimum frequency*

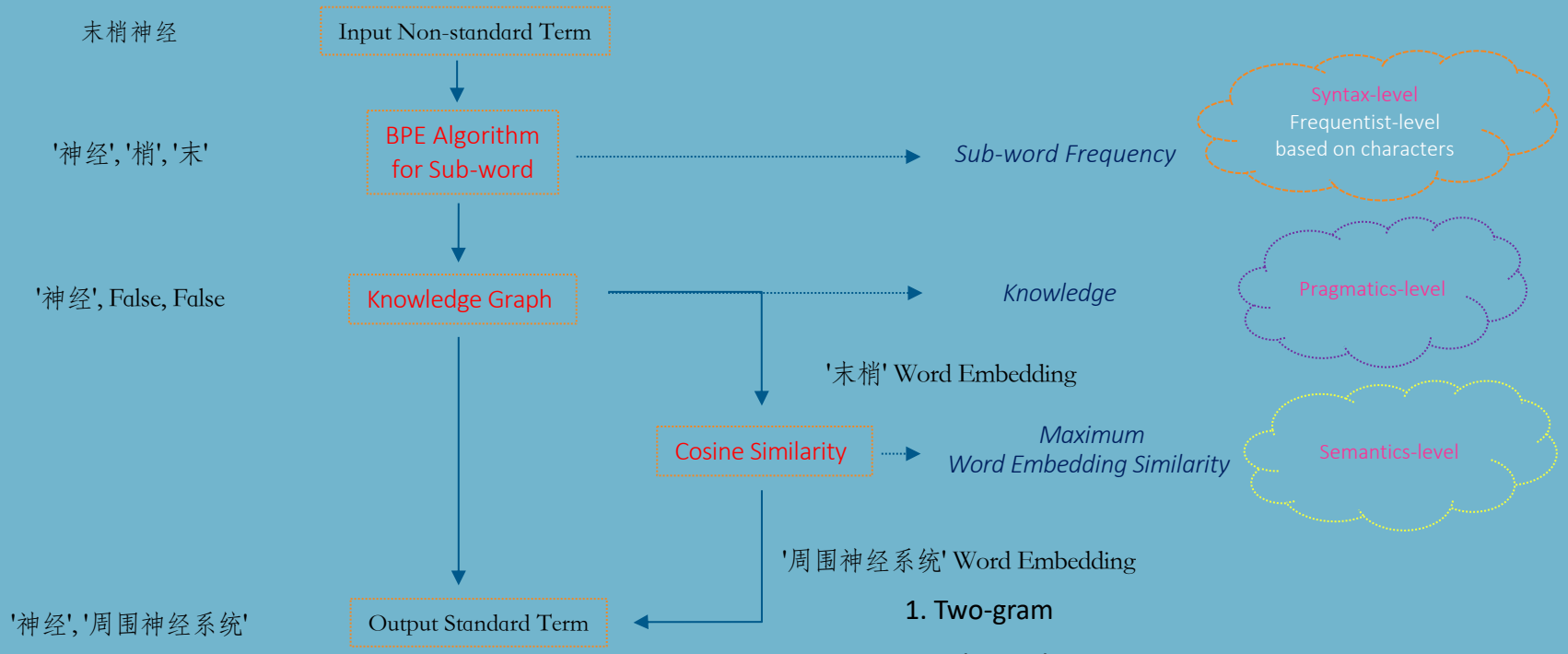
Method – Pragmatics level Analysis

Using Knowledge Graph



1. Using the **Knowledge** and **Common Sense** (languages use) for concept mapping
2. Pre-defined **Look-up Dictionary** in the field of Medical AI

Method – Semantic level Analysis



Find the most similar concept via word Embedding's Cosine Similarity

1. Two-gram
2. Sub-words
3. Forward-string grams
4. Backward-string grams
5. (If there is) Negative & other character gram

Current Challenges

1. Negative words → Add negative word's embedding to sub-word Embedding　　'非感染性' VS '感染性'
2. English words & Numbers → Sub-word Max Frequency　　'Willis环'
3. ~~Punctuations~~
4. Abbreviations
5. Isomorphism ← Similar Word Embedding!

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Thanks and have a nice day!

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