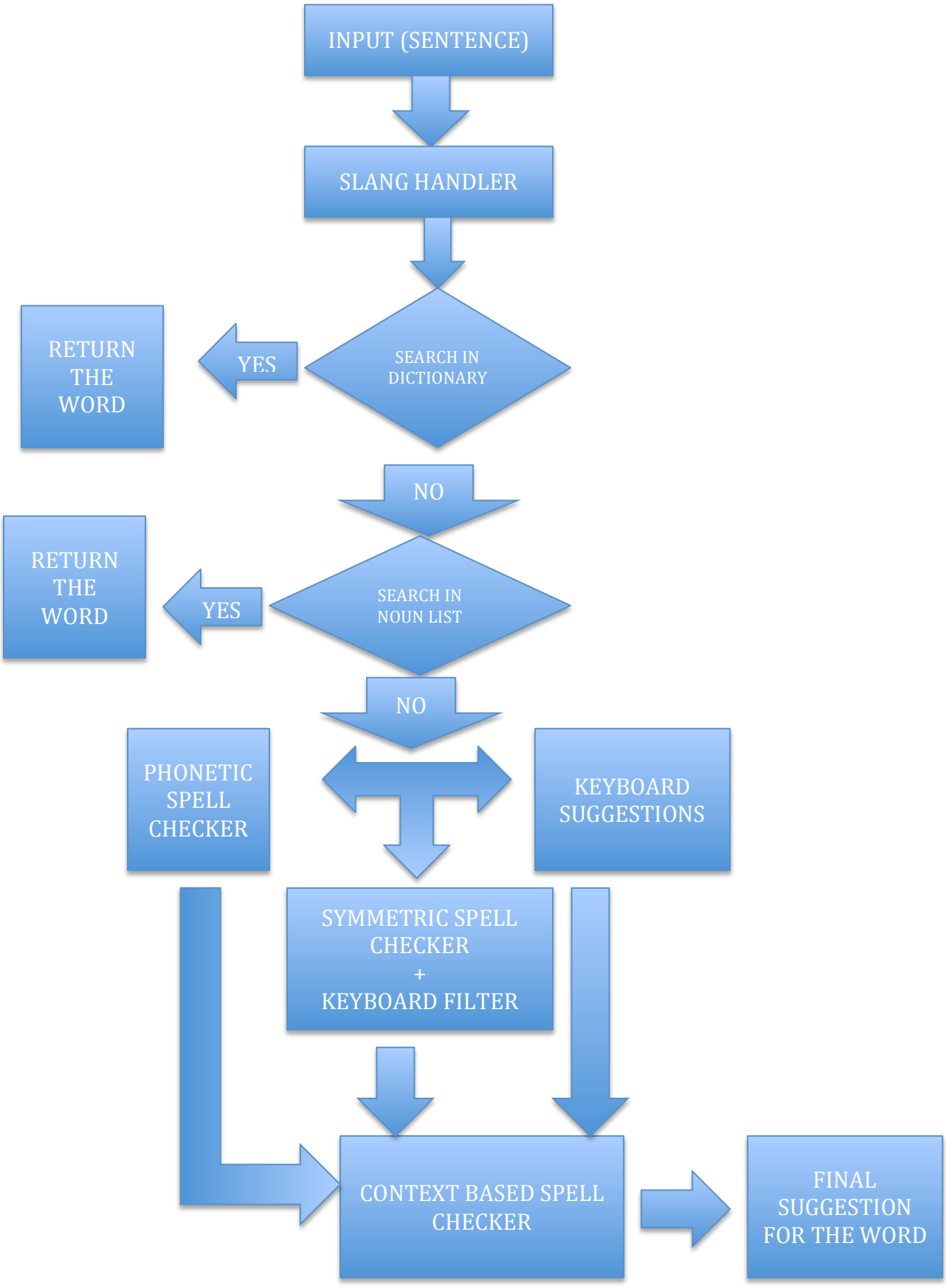
TEXT NORMALIZER



SUBCOMPONENTS

- Text Cleaner
- Slang Handler
- Check in Dictionary
- Check Noun
- Spell Correction
- Keyboard Filter
- Phonetic Spell Correction
- Keyboard Suggestions
- N-gram Model (Backward and Forward)

SUBCOMPONENTS IN DETAIL (STEP-WISE)

TEXT CLEANER

Input is taken in the form of a sentence. Extra spaces, punctuations, special characters are handled. If some letters are present 3 or more times in succession then these are reduced to 2. While handling special characters, email ids and URLs are kept as such.

SLANG HANDLER

After cleaning the text of unwanted characters, spaces and punctuations, we split the sentence into words. Slang List has been stored in a HashMap and hence each word is searched in the HashMap in O(1) time and we replace the slang by its meaning stored in the HashMap.
In this step it is possible that slang is associated with more than one meaning. To handle such slangs, before replacement, we do a context-based search using a 3-gram model. Hence the most probable meaning based on the context is selected and is used as substitution for the slang.
Also consider the case when the user types Pay tm. Actually the user meant the brand name Paytm. But our slang handler would return trademark for tm treating it as slang. To handle such anomalies, before look up in the slang list, we search for such possible combinations of formation of noun by first looking up the previous word, if we don't get a combination for noun we look for the combination with the next word. If again we don't get a noun we look for the combination of the three words (previous, current and next words). If we get a noun in any of the combinations we leave it as it is, else we go for slang look up and subsequent replacement.

SEARCH DICTIONARY

In the next step we search for the word in the English dictionary stored in a HashMap. If the word is present in the dictionary we just return the word as it is and proceed to the next word. If word is not present in the dictionary we do the following steps.

CHECK FOR NOUN

If the word is present in the noun list stored as a HashMap, then we return the noun as it is and we proceed to the next word. Just like we handled the case of Pay tm in slang handler, similarly before proceeding further we do the same checking at this step also because it is possible that we may not have a slang with us and hence it might not get detected in the slang handler.
If no noun or such combination of words, to form a noun, is found, we move to subsequent steps.

SPELL CORRECTION

In this step we return a list of plausible corrected word suggestions for the misspelt word given by the user as input. For Spell Correction we use Symmetric Spell Check Algorithm. This algorithm handles all the cases like deletes, inserts, substitutions and transposes by only considering deletes.
This step requires pre-processing of the corpus data. Once this pre-processing is done, this algorithm runs very fast and returns a list of suggestions up to a certain edit-distance (say 2).
For more details for the algorithm go to the following link: -
http://blog.faroo.com/2012/06/07/improved-edit-distance-based-spelling-correction/

KEYBOARD FILTER

The list of words generated from the previous step is a very exhaustive list and contains many redundant suggestions. Eg: For tre as input we will get care/bare as also some suggestions, which are redundant. Hence in this part we keep a keyboard proximity maintained in the form of a HashMap and based on this proximity we check for various words by performing inserts, swaps, deletes on them and redundant words are filtered.

PHONETIC SPELL CORRECTOR

Say user gives in the input as “bcoz”. It is quite possible that such words are not present in the slang list. Clearly the user means “because”. But we won't be getting it in suggestions from Spell Correction because the edit distance is quite high. Now for such cases we generate a list of words that sound similar to the input word. For this part we use Soundex Algorithm and Metaphone algorithm. Again these algorithms return some redundant suggestions. For getting the best possible suggestions, we run both these algorithms separately and then the common suggestions are used.
http://en.wikipedia.org/wiki/Soundex
http://en.wikipedia.org/wiki/Metaphone

KEYBOARD SUGGESTOR

Consider a worst possible scenario when user makes typing mistake in almost all the letters of a word.
Eg: User types “YGSR” but actually he/she meant something else. Now again in this scenario we won't get correct suggestions from the spell checker because the edit distance is too high. Hence for handling such anomalies we keep proximity of each letter in a HashMap and find all the possible combinations based on this proximity. Then the combination, which forms some meaningful word, is returned. Eg: In case of “YGSR” we get “THAT” as output.

CONTEXT BASED SPELL CHECK

All the suggestions obtained from spell correction (subsequent keyboard filter), phonetic algorithm and keyboard suggestions are then sent for Context Based Spell Correction. In this we check for context both backwards and forward. We use a 3-gram model. The conditional probabilities for each suggestion are calculated and the suggestion with the maximum probability is returned as the final replacement for the misspelt word.