ABSTRACT

Certain previous researches attempted to characterize how association memory works. A naive postulation would assume that the mechanisms for that relationship are mainly due to the processes of semantic similarity. The present work not only validates that the LSA calculation outcome is related to the norm of association memory for both English and Chinese, but also proposes that association memory could be constructed by considering the similar co-occurrences across situations for words from the perspective of LSA. The work further analyzes the constructed association bipartite nets and the results showed that the counts of different associations are proportional to the strength of association memory. It can be concluded that the words associated with many other words would have higher probability to have higher LSA values. Finally, we suggest a possible mechanism of how association memory is formed and depicts how words with general concept would be more probable to be associated with other words.

Key words: association memory, latent semantic analysis

Scenarios assumptions of association memory

The present work proposed a mechanism how association memory were built. The association of words were build while two words emerge in a scenery. While one of connected word is stimulated, another word will be associated. The build association will be strengthen by coherence of two words, and the coherent of words can be characterized by LSA.

Bird → Bird+ Nest → Nest

Further, the word with general concept would be easily coherent to other words and tends to be associated. For example, a bird is a general concept to a nest, a feather, a pelican, awing, a gull, and a eagle. The word bird is tend to be associated while the cue word is stimulated.

Method

To evaluate the relation between LSA (latent semantic analysis) and association memory, the value of LSA and strength of AM (association memory) were collected. AM is the probability the target word is associated by hint the clue word. Furthermore, both value of AM and LSA were compared. Scenarios assumption of association memory provide the possible way how both AM and LSA are connected. To approve the scenarios assumption of association memory, the link between clue word and associated word constructs the bipartite net. The DD (divergence degree) of clue words and the average of association is these were further analyzed. The divergence degree of a concept is the number of clues associating with certain concept.

Result and Discussion

The result shows the score of LSA is proportional to the mean value of forward association memory in each region of each decile. Because LSA characterize the coherence of two words and the coherence of two words may strengthen the association memory based on scenarios assumptions, LSA is proportional to the forward strength of association memory. Moreover, the general concept would easily be associated from large number of clues. In contrast, the sub-contrast would hardly to be associated, and would be associated from less number of clues. Thus, the divergence degree, which is the number clues associating with the target concept, is proportional to the forward association. On the other hand, the general clues are hardly backwardly associated with its clue concept. The result shows that the divergence degree is inversely proportion to backward association, because the general concept is not specific to any sub concept. The more general the target concept is, the less probability of clue is backwardly associated.

Conclusion

In the present work, the relation between LSA and AM is revealed. Because LSA characterize the coherence of two words and the coherence of two word strengthen the association. Further, clues tend to associate with the general concept, and are with less probability to be associated from general concept.