SENSE DISAMBIGUATION in the PANGLYZER

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Two Problems of Sense Disambiguation

1. Determining the Standard

2. Determining the Method

Approaches to Problem One

a. Disambiguation to a task

b. Disambiguation to a dictionary

c. Disambiguation to an ontology

d. Disambiguation to internal standard

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Approaches to Problem Two

1. (explicit) Knowledge-Based

2. Statistical (implicit Knowledge-Based)

    a. Definition overlap (e.g., Cowie, Guthrie and Guthrie)

    b. Probabilistic (e.g., Brown et al.)

    c. Word Space (e.g., Schütze)

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WORD SPACE ALGORITHM

1. Collect 4-grams from large quantities of text
2. Reduce the number of 4-grams to a reasonable amount
3. Construct a collocation matrix
4. Perform SVD (Singular Value Decomposition) on the matrix
5. Take the top 97 dimensions
6. For every word, create a context vector for every occurrence of that word
7. Normalize and sum the context vectors to create a word (or confusion) vector
8. Cluster the context vectors to produce senses

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SINGULAR VALUE DECOMPOSITION (SVD)

Given any matrix, A, decompose it into a product of three matrices, U, Σ,V^T, producing a decomposition $A=U\ \Sigma V^T$ such that Σ is a diagonal matrix with decreasing positive values down the diagonal.

By cutting off the lower end of the matrix, Σ, a lower-dimensional matrix than the original is obtainable, that is the best approximation (at that rank) for the original matrix.

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CRL's APPROACH

Mark Casper and Jim Hargrave

1. Use syllables instead of 4-grams

2. Use sentences as context window

3. Disambiguate sense clusters to LDOCE-WordNet senses

4. Use LDOCE definition and WordNet synset as context vector

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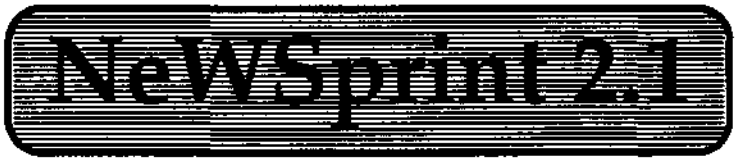
shelmrei@ithaka **stdin**

tido

Fri Mar 4 14:24:23 1994

NeWSprint 2.1 Rev B
Openwin library 3
NeWSprint interpreter 3.010



Lessons Learned

- There will be a "VIASA" article in each evaluation
- 70% to 60% in 6 months: we'll be done in 3 years!

Seriously, though:

- Study of inter-subject time variations: who is helped more?
- Incremental test-and-development cycle very important
- Multiple-Engine MT via chart manager looks very promising
- Methodological issue: fully investigating one MT technique versus finding the best-performance combination in the short run

Research Plans

Continued development of current MT engines and chart manager, including:

- Semantic mapper, sentence planner; later, higher-level semantic processing
- Example analysis problem: Ranking techniques for Spanish analysis
- Example generation problem: Article insertion in English generation
- Example of expansion of Pangloss: Japanese/English translation