Computational Intelligence
696i
Language
Lecture 7
Sandiway Fong
Administriva

• Reminder:
  – Homework 2 due next Tuesday (*midnight*)
Last Time

- **WordNet** (Miller @ Princeton University)
  - *word-based semantic network*
  - **Logical Metonymy**
    - gap-filling that involves computing some telic role
    - *John enjoyed* X
      - X some non-eventive NP, e.g. *the wine*
    - *John enjoyed* [Ving] X
      - *John enjoyed* [drinking] *the wine*
- **Generative Lexicon** (GL) Model (*wine*: telic role: *drink*)
- **WordNet structure**
Last Time

• **WordNet** (Miller @ Princeton University)
  – some applications including:
    • concept identification/disambiguation
    • query expansion
    • (cross-linguistic) information retrieval
    • document classification
    • machine translation
    • Homework 2: GRE vocabulary
      – word matching exercise (*from a GRE prep book*)

• GRE as Turing Test
  – if a computer program can be written to do as well as humans on the GRE test, is the program **intelligent**?
  – **e-rater** from ETS (98% **accurate essay scorer**
Today’s Lecture

• Guest mini-lecture by
  – Massimo Piattelli-Palmarini on
  – *A powerful critique of semantic networks: Jerry Fodor's atomism*
Today’s Lecture

but first...

• Take a look at an alternative to WordNet
  – WordNet: *handbuilt system*
  – COALS:
    • the correlated occurrence analogue to lexical semantics
    • (Rohde et al. 2004)
    • a instance of a vector-based statistical model for similarity
      – e.g., see also Latent Semantic Analysis (LSA)
      – Singular Valued Decomposition (SVD)
        » sort by singular values, take top $k$ and reduce the dimensionality of
          the co-occurrence matrix to rank $k$
    • based on weighted co-occurrence data from large corpora
COALS

• Basic Idea:
  – compute co-occurrence counts for (open class) words from a large corpora
  – corpora:
    • Usenet postings over 1 month
    • 9 million (distinct) articles
    • 1.2 billion word tokens
    – 100,000th word occurred 98 times
  – co-occurrence counts
    • based on a ramped weighting system with window size 4
      – excluding closed-class items
COALS

- Example:

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Table 7
Step 3 of the COALS method: Negative values discarded and the positive values square rooted.
COALS

- available online
COALS

• on homework 2
Task: Match each word in the first column with its definition in the second column

accolade  deviation
aberrant  keen insight
abate    abolish
abscond  lessen in intensity
acumen    sour or bitter
acerbic  depart secretly
abscission building up
accretion  renounce
abjure    removal
abrogate  praise
Task: Match each word in the first column with its definition in the second column

- accolade ➔ deviation
- aberrant
- abate ➔ lessen in intensity
- abscond ➔ depart secretly
- acumen
- acerbic ➔ sour or bitter
- abscission
- accretion ➔ building up
- abjure ➔ renounce
- abrogate ➔ removal
- praise
COALS and the GRE
COALS and the GRE
COALS and the GRE

ABATE

Correlation

DEVIATION  INSIGHT  ABOLISH  LESSEN  SOUR  DEPART  BUILD  RENOUNCE  REMOVAL  PRAISE
COALS and the GRE
COALS and the GRE

ACUMEN

Correlation

DEVIATION
INSIGHT
ABOLISH
LESSEN
SOUR
DEPART
BUILD
RENOUNCE
REMOVAL
PRAISE
COALS and the GRE

ACERBIC

Correlation

-0.1
-0.05
0
0.05
0.1
0.15
DEVIATION
INSIGHT
ABOLISH
LESSEN
SOUR
DEPART
BUILD
RENOUCE
REMOVAL
PRAISE
COALS and the GRE
COALS and the GRE
COALS and the GRE

ABROGATE

- Devotion
- Insight
- Abolish
- Lessen
- Sour
- Depart
- Build
- Renounce
- Removal
- Praise
**Task**: Match each word in the first column with its definition in the second column.

- accolade
- aberrant
- abate
- abscond
- acumen
- acerbic
- abscission
- accretion
- abjure
- abrogate

- deviation
- keen **insight**
- abolish
- **lessen** in intensity
- sour or bitter
- depart secretly
- building up
- renounce
- removal
- praise
Heuristic: competing words, pick the strongest

accolade ➔ deviation
aberrant ➔ keen insight
abate ➔ abolish
abscond ➔ lessen in intensity
acumen ➔ sour or bitter
acerbic ➔ depart secretly
abscission ➔ building up
accretion ➔ renounce
abjure ➔ removal
abrogate ➔ praise

7 out of 10