Computational Psycholinguistics

Q&A Lecture

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Structure of the Course

- Course assessment:
  - ✓ Satisfactory completion of all tutorials
  - ❑ Exam at end of course = 100% of grade
    - ✚ Responsible for ***all*** material presented in the course
      - ▲ **Lecture material, tutorials**, assigned papers

- Materials
  - ❑ Lecture overheads and assigned readings will be available from the course web page, in the library, and/or distributed in class.

Topics: Part 1

- Human language processing
  - Experimental methods
    - Reading times, eye-tracking, EEG/ERP
- General and Philosophical Issues
  - Modularity
  - Competence-performance
  - Experience-based versus innate mechanisms
- Syntactic Processing
  - Psychologically plausible parsers
    - Incrementality, Memory Load and Ambiguity
  - Theories of Ambiguity Resolution
  - Reanalysis
- Experience-based Models
  - Probabilistic Models
  - Interactive Models

Topics: Part 2

- Connectionist models
  - Properties: learning, generalisation, gradience, frequency
  - Representation: localist vs distributed
  - Network architecture: nodes, layers, weights
  - Computation
    - Biological basis: simple processing units, parallel computation, memory
    - Forward propagation: node activation, activation function
    - Backward propagation: error, weight update
  - Learning: perceptrons, multi-layer networks, generalised Delta Rule
  - Assessing performance: RMS and cosine based on probability distribution
  - Advantages and disadvantages (wrt symbolic models)
- Pattern Associators, Competitive Networks and Self-Organizing Maps
  - Storing and recalling patterns
  - Similarity and thresholds
  - Properties: generalisation, fault tolerance, prototype formation
  - Hebbian learning
  - Role of competition
  - Unsupervised training
  - Biological plausibility

Topics: Part 2 (continued)

- Applications
  - Single vs Dual-Route models
    - Rules vs exceptions
    - Double dissociations
  - Reading Aloud: from orthography to phonology
    - Word frequency effects
    - Input/output representation
  - Learning the Past Tense
    - U-shaped learning curve: overregularisation
- Simple Recurrent Networks
  - Architecture: context layer
  - Sequence processing
  - Next-item prediction: “semi-supervised” training
  - Detecting syllable and word boundaries
  - Discovering lexical classes
    - Performance evaluation: using probability instead of RMS
    - Cluster Analysis
  - Learning linguistic structure
    - Starting small: constraints on early training
  - Principal Component Analysis

Exam Structure

- Time/Place: Feb 22, 2008 at 14:00, TBA.
- Duration: 90mins
- Format: Closed book, but calculators are required

- Part 1: *(48 points)* General
  - Eight questions, worth 6 points each, **answer all** (~5 mins per question)
- Part 2: *(26 points)* Connectionist Models (~25 minutes)
  - **Choose one** question of those given, answer all parts.
- Part 3: *(26 points)* Symbolic Models (~25 minutes)
  - **Choose one** question of those given, answer all parts.