The Purpose of the Midterm?

• Pedagogical purposes
  – Track whether students learned parts of curriculum and what may need further clarification
  – Provide a motivating force for students to study the “important” parts of the curriculum
  – Clarify how to prepare students to do final projects

• Administrative purpose: determine 1/3 of grade

• Possible conflict
  – A difficult test makes pedagogical sense
  – An “acceptable” average grade may make administrative sense

• Current Strategy: Motivate test based on pedagogical objectives, but make it as open book as possible
  – You can bring materials, search the web, etc., but I will want you to solve the problems posed by the test
Outline

• Linguistic Resources & Descriptive Linguistics
  – Especially Corpus Annotation

• Rules used by Automated Procedures
  – Ones covered in Class

• Algorithms Discussed in Class

• How does Evaluation Work
Annotation

- You should be able to write usable specifications
- You should be able to annotate based on specifications
- You should understand some of the mechanics
  - Character offsets
  - A Markup language
  - BIO tags
- You should understand the difference between training and test corpora
Descriptive Linguistics

• The basic parts of speech and phrasal categories.
  – The difference between a determiners and an adjective
  – forms of verbs

• You know how to manually divide sentences into tokens

• You should know how to identify the head of a phrase

• You should be able to draw a phrase structure tree modeling the linguistic analysis of a sentence
Rules: Regular Expressions

• You should know how to write a basic regular expression

• You should know how to write a phrase structure rule including at least:
  – Context free rules
  – Left (or right) regular rules

• For a regular expression, you should be able to identify a set of phrase structure rules that describe the same language (set of strings)
Algorithms: Deterministic Finite State Machine

- Given:
  - Finite State Machine (FSM)
  - Input String
- Would the FSM recognize the string?
- Which sequence of states would be entered before recognition was complete?
- How would the FSM on the next slide process:
  - AababAB
  - AABB
DFSA for Regexp: $A(ab)^*ABB$?
Algorithms: Context-Free Generator

• Show the steps for randomly generating a sentence given:
  – A lexicon and a context-free grammar with start symbol S
• The algorithm expands each non-terminal into a randomly chosen right hand side.
• Going left to right, the first non-terminal symbol is always expanded first.
• The mechanism (as discussed in class) is to place each right hand side on top of the stack with the left-most symbol at the top of the stack.
The CKY parsing algorithm

• Fill in the triangular chart given a (short) sentence and a set of context free rules
• Remember
  – How the chart encodes start and end positions
  – That each rule is in Chomsky Normal Form
    • i.e., is binary branching
• See the next slide
### 6th Iteration of CKY Algorithm

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Common Evaluation Metrics

• If all instances are classified
  – Accuracy = Correct/All-Instances

• If only some instances are classified
  – Precision = Correct/Instances in System Output
  – Recall = Correct/Instances in Answer Key
  – F-measure = Mean of Precision and Recall
    • Actually Harmonic Mean of Precision and Recall
      – $\frac{2}{\frac{1}{\text{precision}} + \frac{1}{\text{recall}}}$
Sample Precision and Recall

• System for finding holiday names
• Exactly 10 correct holiday names in hand-coded corpus (the answer key)
• The system marks 12 holiday names, 8 of which match the ones in the answer key.
  – Precision = 8/12 = .67
  – Recall = 8/10 = .80
  – F-measure = 2/(.80+.67) = .73