Computational Cognitive Science, Tutorial 07

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April 29, 2014

1   Iterated Learning

- What is iterated learning? Describe how transmission occurs in iterated learning model in terms of the events in the world x (which are generated from the independent distributed $Q(x)$, the utterances y, and the set of hypotheses h about the possible concepts.

- How can you study iterated learning with people? Describe the procedure in an iterated learning experiment, or give an example of one of the experiments we looked at in class.

- How does this model of transmission behave like a Markov chain? One of the properties of a Markov chain is the stationary distribution. What does this mean?

- What does the stationary distribution of an iterated learning chain converge to? Provide an explanation on why the chain converges to this.

2   Sequential Learning with n-grams

- What are n-grams? How do you calculate uni-grams and bi-grams?

- How are n-grams Markov chains? How does this work in the case for tri-grams when there appear to be more than a single transition probability?

- Calculate both the raw and condition probabilities for both the uni-gram and bi-gram case in the sentence: "The quick brown fox jumps over the lazy dog".

- What is Zipf's law?

3   Smoothing n-grams

- What is the major issue with calculating the maximum likelihood estimates for n-grams?

- What are Laplace's and Lidstone's laws? How do they help solve the problem encountered by MLE of n-grams?

- What are some potential issues with the n-gram probabilities that are produced by these smoothing algorithms?

- How can we use these transitional probabilities to explain how humans perform word segmentation?