

Assignment 1

L445/L515
Text and Speech Encoding

Due Wednesday, September 17, 2008

1. Go to <http://www.omniglot.com> - find one example of an abjad, an alphabet (other than Latin/Roman), a syllabary, a syllabic alphabet, and a logography. (NB: None of these may be your native language.)
 - (a) For each example, give a critique of the writing system's positive and negative aspects. In other words, why would you or would you not want to use it? Discuss the phonetic difficulties in transcribing your name into each system.
 - (b) Specifically, take your abjad and one language normally written in the alphabet you have chosen and discuss how the abjad would have to be adapted for that language.
2. Assume you've been given power to alter the Latin alphabet for the purposes of better writing down English words. What would you change, add, or remove? Why?
3.
 - (a) Give the base ten numbers for the following base two numbers:
 - i. 1011 1111
 - ii. 0101 0101
 - iii. 1010 0010
 - (b) Give the base two (binary) numbers for the following base ten numbers:
 - i. 43
 - ii. 143
 - iii. 243
4.
 - (a) In your own words, describe how UTF-8 encoding works. In addition to the notes, feel free to refer to the unicode webpage: http://www.unicode.org/faq/utf_bom.html.
 - (b) Discuss the optimal way to design UTF-8, in terms of the average number of bytes per character and the number of users of a given writing system.

5. (a) Describe the differences between the two sounds [l] and [r]. If you've never had phonetics before, consider: where your tongue is, if your tongue is making contact with any part of your mouth, if your vocal cords are vibrating, where/how the air is moving out of your mouth, if there are actually two sounds involved, how the tongue is moving, etc. There may be more than one difference, and you are not required to use any linguistic terms here, only give a description.
 - (b) Think of a sentence where it would be difficult for an ASR system to tell the difference between the two sounds. (You might want to think of when it's difficult for you to tell the difference.) What do you think is going on that makes it difficult?
 - (c) (Bonus) Download Praat (<http://www.praat.org>), or some other speech analysis software, and quantitatively describe how you know it's difficult to tell the sounds apart in your sentence.
6. Attempt to “break” one of the TTS systems mentioned in the notes. Come up with example sentences to try; describe what you expect to go wrong; and analyze what the TTS system does well and what its limitations are.
 7. Table 1¹ provides bigram probabilities. For example, $P(\text{want}|i) = 0.22$. Ignoring start and end probabilities, calculate the probabilities for the following sentences using a bigram model. Show your work.
 - (a) i want to eat chinese food
 - (b) i want to eat lunch

	I	want	to	eat	Chinese	food	lunch
I	.0018	.22	.0020	.0028	.00020	.00020	.00020
want	.0014	.00035	.28	.00035	.0025	.0032	.0025
to	/00082	.00021	.0023	.18	.00082	.00021	.0027
eat	.00039	.00039	.0012	.00039	.0078	.0012	.021
Chinese	.0016	.00055	.00055	.00055	.00055	.066	.0011
food	.0064	.00032	.0058	.00032	.00032	.00032	.00032
lunch	.0024	.00048	.00048	.00048	.00048	.00096	.00048

Table 1: Bigram probabilities

¹Figure 6.7 in Jurafsky and Martin (2000), 1st edition.