Derek Schlabach and Kyle Kent
Dr. VanDrunen
Computational Linguistics
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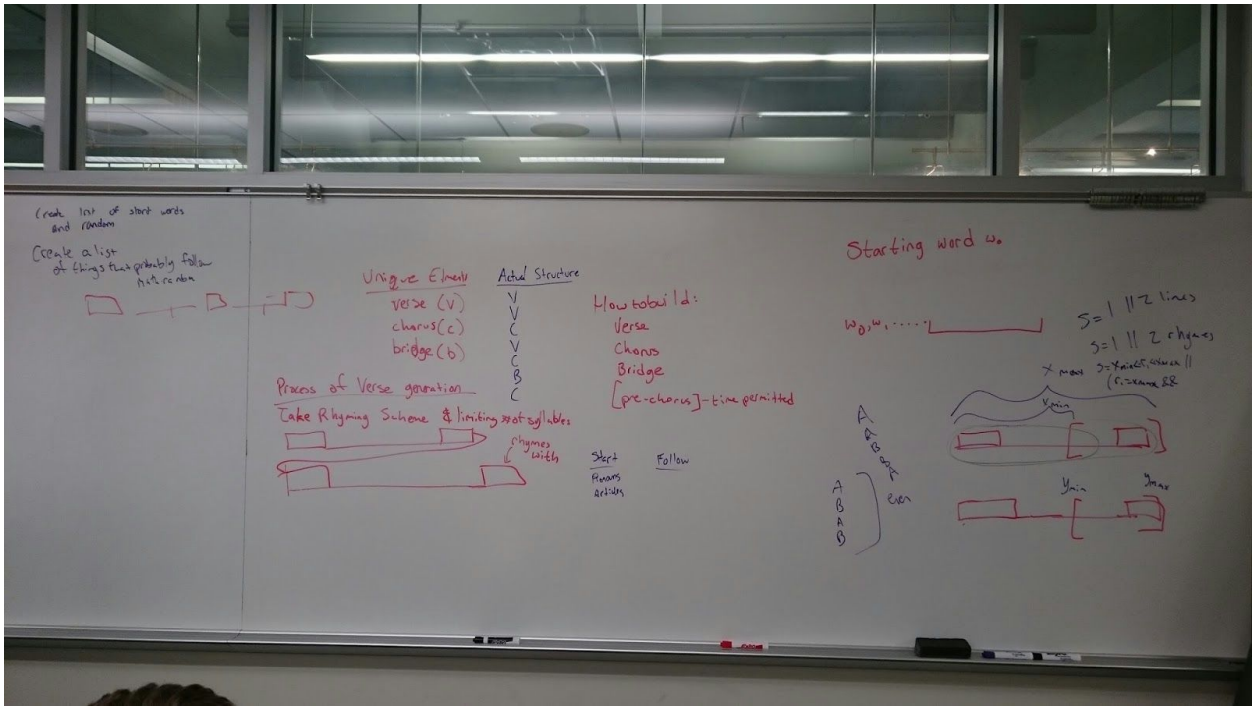
Generating Taylor Swift's Next Hit Single (or Failing Gloriously)

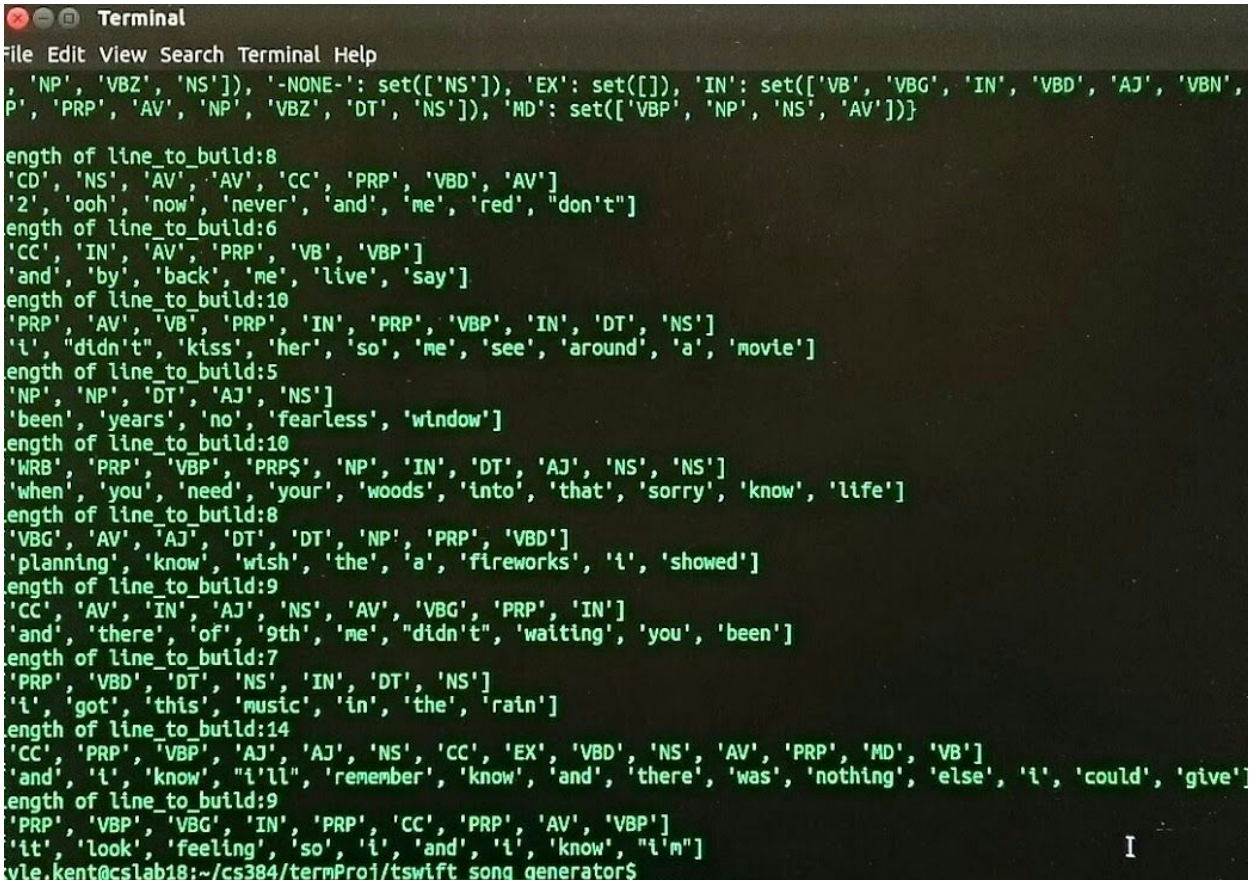
For our term project, we decided to try and model the songwriting of talented pop-star Taylor Swift using all of her existing music, which turned out to be a moderately-sized corpus. At the start, our we decided upon a few goals, some basic, others rather ambitious:

1. Create a language model based on Taylor's musical lyrics and those alone.
2. Find, or develop, some way of separating words by syllables in order to create valid song constructs.
3. Find, or develop, some way to determine rhymes and create them using a rhyme scheme.
4. Create lines of the song using valid line structures that Taylor has already used by tagging her entire corpus and recording her line structures.
5. Format the lines using syllable-count constraints and song component structures (such as verses and choruses).
    a. Sub-Task: Make a reduced set of tags small enough to handle but diverse enough to preserve her style and line-structure patterns.



(These are our original notes from that meeting)

As we started this project, we decided that a planning session would be a good idea in order to establish some direction for the project. We we found valuable examples online for rhyming and syllabilization (cited in code), which provided us with the resources that we needed to get started. We each began development on some preliminary code and the project began to take shape: we chose the trigram model from Project 2 to model Taylor's language as we are not considering any words that she has not used in her songs already.



(Some preliminary text generation before we implemented rhyming, syllables, or song structure)

We tag her entire corpus and create a map from our reduced tag set to every word that was tagged with each respective tag. Then, we use those tags to determine every unique line structure that she used in her writing and save those in an array. As we do this, we also create a map from every part of speech that ends a line structure to every line structure that has followed that part of speech, in order to make more coherent lines. We start generation by creating a song structure of song components which specifies the number of lines in each component, syllable ranges for that component, and the rhyme scheme that we would like to use there. To generate a line, we choose a random line structure to start, then for succeeding structures we continually generate until we get one that is allowed to follow the preceding one, as specified by our aforementioned map. After getting a valid sentence structure, we then move on to selecting the actual words in the line. In order to select standard words for the lines we select them based only on the part of speech that is asked for by the struct and the probability of that word based on the trigram model (which would revert to a unigram or bigram if necessary). We choose a word from a pool of words with weighted

probabilities in order to preserve some degree of randomness but also factor in the probability of Taylor using any of these words. However, for the line endings, which have to rhyme and match the rhyme scheme, we record the first instances of each of the rhymes in the rhyme scheme and then base the other line endings off of those rhymes. Additionally, each line has to meet the specified syllable range, and if it does not we scrap it and start the line over until it qualifies.

In all honesty, the text that we get is not all too coherent, but the syllables and rhyming are decent and the structure is valid, so it could easily be sung, and possibly even be a hit in a foreign country where English is not well understood! If we could have had a larger corpus of her language and possibly incorporated some words that she has not used yet we may have been able to create a better song, so that is what we would try to do differently if we had another opportunity. Anyway, here is the first song that we ever generated, just as an example: (it takes about 3 minutes to generate a song and some songs are better than others):