

Homework 2 for LING 570

Haotian He

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1 Question 1

(2) (4 points) Under `sample/` directory, run the following commands:

```
carmel -k 1 fsa7 wfst1
```

```
cat ~/dropbox/13-14/570/hw2/examples/wfst1_test | carmel -k 1 -sli wfst1
```

Do they yield the same results? What do these commands do?

Yes. Except the second *cat* has a input line in the result as it's read as a string, they yield the same results, because they accept both an FSA as `fsa7` and a string input as `wfst1_test`, and then pass them through a WFST as `wfst1` to yield the first best path with the probability of this whole path. The command `-k n` gives *n* best paths through the resulting transducer are written to the standard output in lieu of the transducer itself.

2 Question 4

In this program, I use an external Graph library/class (`/Graph.java`, `/Graph.class`, and `/Graph$Node.class`) made by my friend Yaohua in CSE 331 class, which is just like the popular JGraphT library online. This library is to help drawing directed graphs, which is just what FSA needs. I use it to create a nested HashMap to store all the transitions in the Carmel formatted FSA files. In addition, I have another two Strings to store both the start state and the final state.

For the NFA problem, my algorithm uses three nested for loops to check each input (For loop 1) with every possible start state (For loop 2) and the resulting next or final states (For loop 3) for each given string line (already be trimmed as plain number/letters strings).

However, this algorithm's drawback is that, it cannot handle states or inputs that are made up of multiple letters or numbers. Moreover, I assume that there is only one start state and only one final state. For those with multiple states, I need to create a HashSet to store those states then. Before this, I actually used `ArrayList<Character>` and `ArrayList<int>` to store the FSA, but soon I found these data structures could not help me to handle NFA, even though it worked well for DFA. Thus, I did not delete them, but renamed them as DFA also attached in the directory for reference or comparison.