

LING 570: Hw4
Due date: 11:45pm on Oct 27

As usual, the example files are stored under `~/dropbox/10-11/570/hw4/examples/`.

Note: In this assignment, “FSM” (finite state machine) means an FSA or an FST. You can decide which one you want to use.

Q1 (20 points): Write **expand_fsm1.sh**, which builds an expanded FSM given a lexicon and morphotactic rules expressed by an FSA.

- The command line: **expand_fsm1.sh** lexicon morph_rules output_fsm
- Lexicon and morph_rules are input files; output_fsm is the output file.
- The lexicon file has the format “word classLabel”. A sample file is **examples/lexicon_ex**.
- The morph_rules file is an FSA (in the Carmel format) that encodes the morphotactic rules; that is, the input symbols in the FSA are class labels (e.g., regular_verb_stem). An example is **examples/morph_rules_ex**, which represents the same FSA as the one on Slide #23 of 10_13_morph.pdf except that the hyphens in class labels are replaced with underlines and there is only one final state.
- The output_fsm file is the expanded FSM (in the Carmel format), where the labels of the arcs in the morph_rule FSA are replaced by the words in the lexicon. See slide #19-21 in 10_13_morph.pdf as an example.

Q2 (20 points): Write **morph_acceptor1.sh**, which checks whether the input words are accepted by the FSM created in Q1.

- The command line: **morph_acceptor1.sh** fsm word_list output_file
- fsm and word_list are input files; output_file is the output file
- “word_list” is a list of words, one word per line (e.g., **examples/wordlist_ex**)
- “fsm” is the FSM (in the Carmel format) created in Q1
- “output_file” has the format “word => answer” for each word in the word_list, where “answer” is “yes” if the word is accepted by the morph acceptor, or “no” otherwise (e.g., **examples/q2_result_ex**)

Q3 (35 points): Write **expand_fsm2.sh** and **morph_acceptor2.sh** so that the “output” file produced by morph_acceptor2.sh has the format “word => answer”, where “answer”

is “morph1/label1 morph2/label2 ...” if the word is accepted by the morph acceptor, or “*NONE*” otherwise (e.g., **examples/q3_result_ex**).

- The command line formats of **expand_fsm2.sh** and **morph_acceptor2.sh** are the same as **expand_fsm1.sh** and **morph_acceptor1.sh**, respectively.
- In your note file, explain briefly how the fsm produced by **expand_fsm1.sh** differs from the one produced by **expand_fsm2.sh**.

Q4 (10 points) Run the following commands and store the results under **hw4_dir/q4/**

```
expand_fsm1.sh lexicon_ex morph_rules_ex hw4_dir/q4/q4_expand_fsm
```

```
morph_acceptor1.sh hw4_dir/q4/q4_expand_fsm wordlist_ex hw4_dir/q4/q4_result
```

Q5 (15 points) Run the following commands and store the results under **hw4_dir/q5/**

```
expand_fsm2.sh lexicon_ex morph_rules_ex hw4_dir/q5/q5_expand_fsm
```

```
morph_acceptor2.sh hw4_dir/q5/q5_expand_fsm wordlist_ex hw4_dir/q5/q5_result
```

Note: The example files (e.g., **q2_result_ex**) under **examples/** are meant to show the format of the files. They are not meant to serve as the gold standard.

The submission should include:

- The hw4 note file that includes answers to Q3.
- The source and shell scripts in Q1, Q2, Q3: **expand_fsm1.sh**, **morph_acceptor1.sh**, **expand_fsm2.sh**, **morph_acceptor2.sh**, and any scripts called by them.
- **Hw4_dir/q4/**, which includes **q4_expand_fsm** and **q4_result**.
- **Hw4_dir/q5/**, which include **q5_expand_fsm** and **q5_result**.

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