

Quizlet 2: Forward and backward values | FSAs and REs

Kevin Liang

Ling 185A

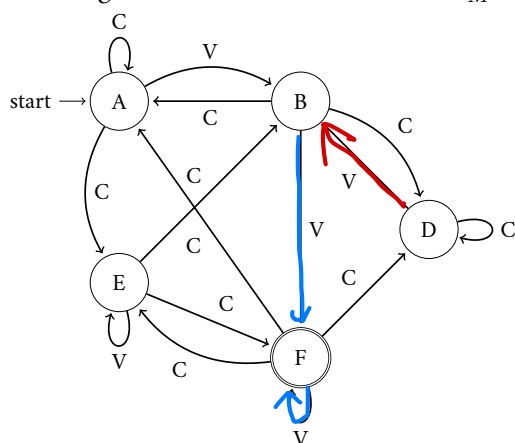
Due: 08/16/2024, 11:59 PM PDT

Your name: **Ricardo Vasela Tellez**

Total: 20
points

1 Forward and backward values

The definition of backward can be found in the lecture handout. Just like how we represented fwd_M values, we can also represent bwd_M values in a table. Each column shows bwd_M values for the entire suffix consisting of the header symbols to its right. The last column shows values for the empty string. The following table tries to work out the bwd_M values for the FSA on the left.



State	C	V	C	V	V
A				0	0
B				1	0
D			1	0	0
E				0	0
F				1	1

can we get Final state
From here to end using

1. What value does the colored cell in the last column represent? Use plain English to describe. ✓ 2 points

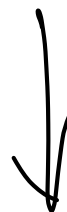
State F is a final state.

2. What value does the colored cell in the second to last column represent? Use plain English to describe; and show the derivation for why it is 1. 4 points

next page

3. Based on the current values in the last two columns, calculate the value of the coloured cell. To get full points, show the derivation and say what value this coloured cell indicates. 4 points

next page



2. What value does the colored cell in the second to last column represent? Use plain English to describe; and show the derivation for why it is 1.

We can get from state B to the final state F using V.

$$[del(B, V, A) \wedge bwd_m(E, A)] \vee$$

$$[del(B, V, B) \wedge bwd_m(E, B)] \vee$$

$$[del(B, V, D) \wedge bwd_m(E, D)] \vee$$

$$[del(B, V, E) \wedge bwd_m(E, E)] \vee$$

$$[del(B, V, F) \wedge bwd_m(E, F)]$$

$$[0 \wedge 0] \vee [0 \wedge 0] \vee [0 \wedge 0] \vee [0 \wedge 0] \vee [1 \wedge 1]$$

$$0 \vee 0 \vee 0 \vee 0 \vee 1$$

$$1 \quad \checkmark$$

3. Based on the current values in the last two columns, calculate the value of the coloured cell. To get full points, show the derivation and say what value this coloured cell indicates.

We can get from state D to the final state using VV.

$$[del(D, V, A) \wedge bwd_m(V, A)] \vee$$

$$[del(D, V, B) \wedge bwd_m(V, B)] \vee$$

$$[del(D, V, D) \wedge bwd_m(V, D)] \vee$$

$$[del(D, V, E) \wedge bwd_m(V, E)] \vee$$

$$[del(D, V, F) \wedge bwd_m(V, F)]$$

$$[0 \wedge 0] \vee [1 \wedge 1] \vee [0 \wedge 0] \vee [0 \wedge 0] \vee [0 \wedge 1]$$

$$0 \vee 1 \vee 0 \vee 0 \vee 0$$

$$1 \quad \checkmark$$

2 REs and FSAs

1. Assume $\Sigma = \{C, V\}$, use plain English or a set representation to describe the stringset characterized by the following regular expression. 2 points

$\Sigma C, CC^*$

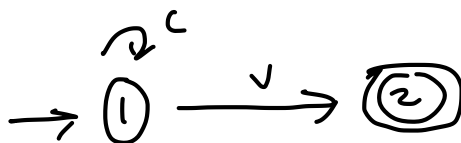
$C, CC, CCC, CCCC, \dots$

union
 $(C \mid (C \cdot C))^* \cdot V$
 concatenation

All and only strings that end with V preceded by 0 or more C's.

ex: $V, CV, CCV, CCCV, \dots$

2. Provide a graphical representation for an FSA that generates the stringset described by the regular expression above. 3 points



3. Mongolian pharyngeal harmony (Svantesson et al., 2005)

5 points

In Mongolian (Mongolic), the presence of a feature [pharyngeal] divides vowels into two classes.

Within a word, only vowels from the same class can appear alongside each other.

pharyngeal vowels $\{u, a, o\}$

non-pharyngeal vowels $\{i, e, \text{er}\}$.

Possible Mongolian words		Impossible Mongolian words
tɪɣgur ✓	'shop'	*tɪɣgur (hypothetical) ✗
cɜrga ✓	'six'	*cɜrgo (hypothetical) ✗

Assume the alphabet is $\{C, P, NP\}$ where 'C' represents all consonants, 'P' represents all pharyngeal vowels, 'NP' represents all non-pharyngeal vowels. Provide a graphical representation of an FSA that encodes this specific restriction. You do not need to worry about other restrictions such as syllable structure.

