

DFA minimization

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generating a scanner:

0. user provides regular set
1. regular set \rightarrow NFA
2. NFA \rightarrow DFA

but subset construction can cause
a "blowup" in the number of states

3. minimize the DFA

i.e. find an equivalent DFA with the
minimal number of states

minimization algorithm

be aggressive - try using only two states

1. merge all final states

2. merge all non-final states

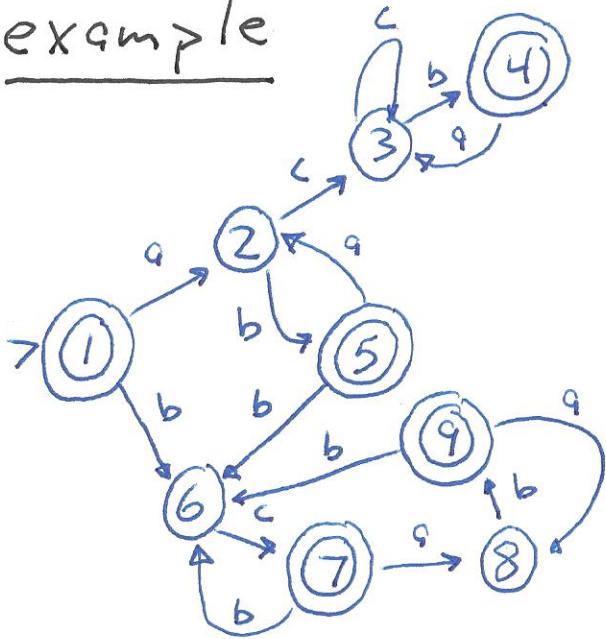
then repeatedly back off as necessary

- split state when out arcs have

different destination in merged DFA

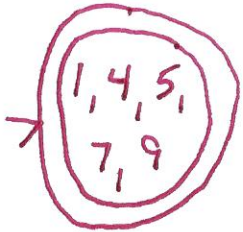
produces DFA with provably smallest number of states required to recognize the regular language

example

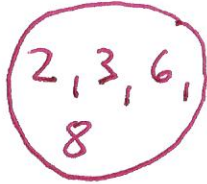


be aggressive

F



N



	1	4	5	7	9
a	N	N	N	N	N
b	N	E	N	N	N
c	E	E	E	E	E

↑
needs to
be split
off

	2	3	6	8
a	E	E	E	E
b	F	F	E	F
c	N	N	F	E

Keep together
split off
split off

backoff #1



	1	5	7	9
q	N_1	N_1	N_3	N_3
b	N_2	N_2	N_2	N_2
c	E	E	E	E

Under the first two columns (1, 5) and the last two columns (7, 9), there are brackets labeled "split off".

	2	3
q	E	E
b	F_1	F_2
c	N_1	N_1

Under the first and second columns, there are arrows pointing up from labels "split off".

back off # 2

(1,5) (4) (3) (8)

(7,9) (2) (6)

	1	5		7	9
a	2	2	a	8	8
b	6	6	b	6	6
c	E	E	c	E	E

Done!

minimized DFA

