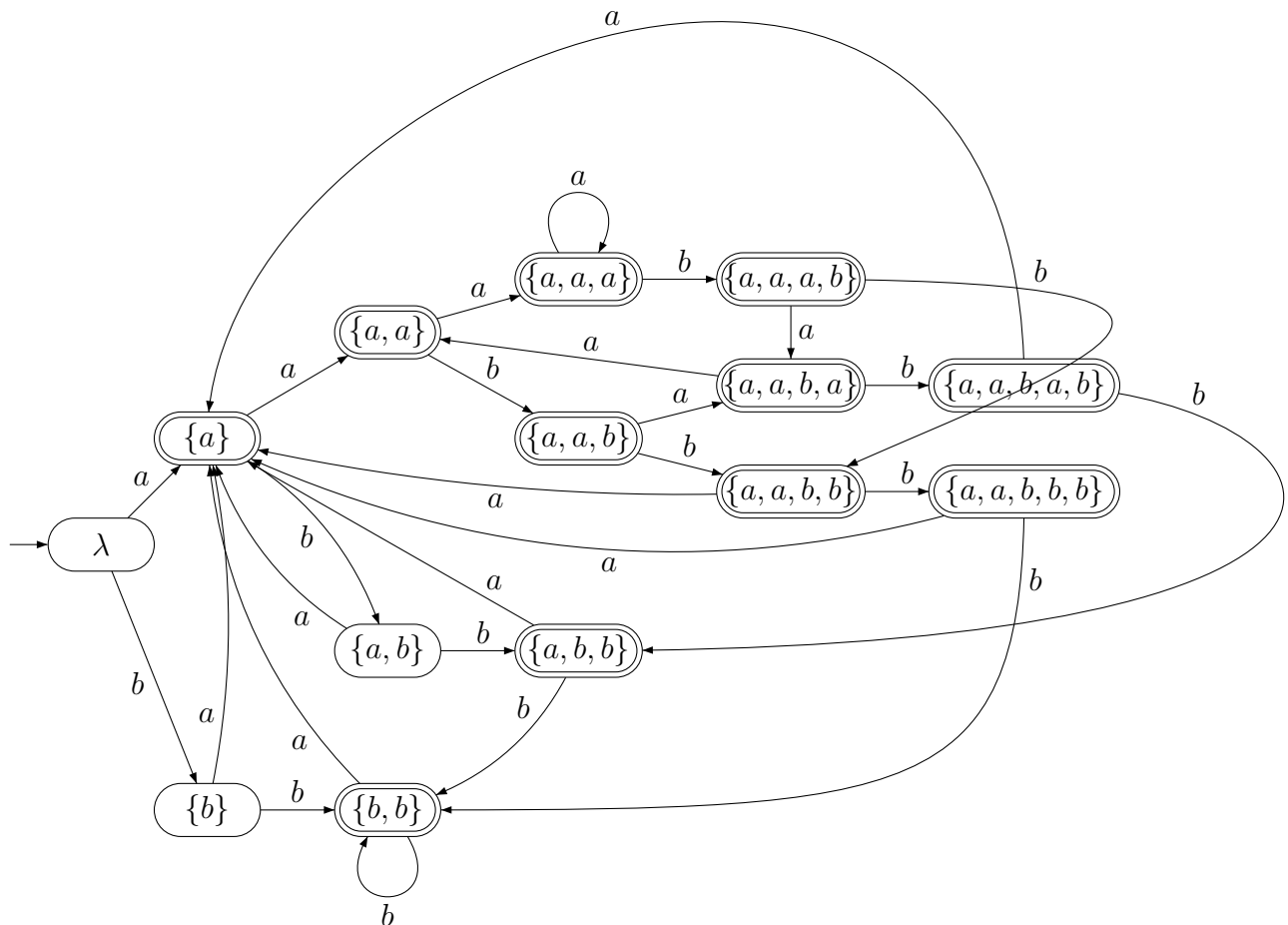


From the definition of the transition function for DA_M , $\delta(ab, a) = h(aba)$, which is the longest suffix of aba in $Pref(M)$, that is a . Therefore $\delta(ab, a) = a$. The result to apply this process is the DA_M which is shown below:



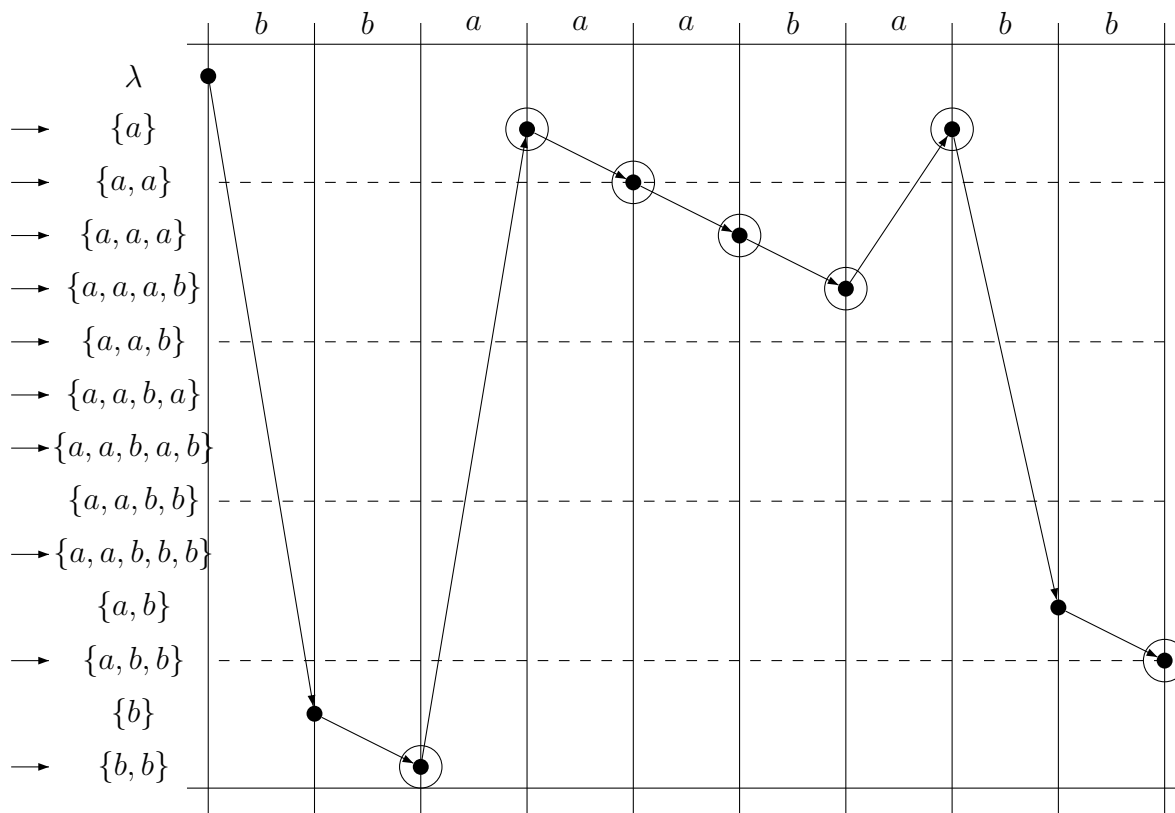
In the same way we did in the previous practice, we have obtained an automaton that recognizes the language Σ^*M . Thus, while any text is analyzed, whenever a final state is reached it can be assured that a pattern in M has been found. In fact, the patterns detected are those which are suffix of the string that denotes the final state.

To easily process the text, we modify the automaton to annotate in each final state u which patterns in M are suffix of the string u . This information is summarized in the following table:

state	$\{a\}$	$\{a, a\}$	$\{b, b\}$	$\{a, a, a\}$	$\{a, a, b\}$	$\{a, b, b\}$
patterns	p_1	p_1	p_2	p_1, p_3	p_4	p_2, p_5

state	$\{a, a, a, b\}$	$\{a, a, b, a\}$	$\{a, a, b, b\}$	$\{a, a, b, a, b\}$	$\{a, a, b, b, b\}$
patterns	p_4, p_6	p_1, p_7	p_2, p_5	p_8	p_2, p_9

Now, it is possible to carry out a string matching process by a deterministic parsing over the automaton. Whenever a final state is found, those patterns associated to the state are found. For instance, taking into account the text $x = \{b, b, a, a, a, b, a, b, b\}$, the deterministic parsing is represented as a trellis below:



The final states reached during the analysis are circle-marked. Note that, once the second symbol of the text is analyzed the state $\{b, b\}$ is reached. This implies that the pattern p_2

has been found (pattern bb). In the same way, once the prefix $bbaaa$ has been analyzed, state $\{a, a, a\}$ is reached, thus patterns a y aaa have been found.

Exercises

Exercise 1

Implement a Mathematica module that, on input of a string u and a set of strings M , returns the longest suffix of u which is in M .

Exercise 2

Implement a Mathematica module that, on input of a set of strings M , outputs the dictionary automaton for M .

Exercise 3

Implement a Mathematica module that, on input of a dictionary automaton of a set of patterns M and a text x , outputs the set of positions of x where a pattern in M can be found.

Bibliography

Maxime Crochemore, Christophe Hancart and Thierry Lecroq ALGORITHMS ON STRINGS. *Cambridge University Press*, 2007.