Formal Languages

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1 Sentence making

Possible generated sentences are:

```
a quick cow happily jumps the sad fox
the sad fox slowly eats a brown owl
a quick owl slowly jumps a brown fox
```

2 Grammar generating

The rules are :

(1)

$$VP \to V \tag{1}$$
$$VP \to V\ VP \tag{2}$$

Example[1] :

    `a quick cow happily eats slowly jumps the quick fox`

[1] The core of the language is to recursion

(2)

$$NP \to Det\ NONS\ QST \tag{3}$$
$$S \to Aux\ NP\ VPO \tag{4}$$
$$VPO \to VerbO\ N \tag{5}$$
$$NONS \to N\ CONJ\ NONS \tag{6}$$
$$Aux \to do \tag{7}$$
$$VerbO \to jump \mid eat \mid catch \tag{8}$$
$$CONJ \to and \tag{9}$$
$$QST \to ? \tag{10}$$

Example[2] :

    `do the cow and the fox eat the owl?`

[2] Now we can ask questions can't we?

3 FSA Problem

(1) The answer is filled in the following sheet:

1	2	3	4	5	6	7	8	9	10
Y	N	N	Y	N	N	N	Y	Y	N

(2) The formal grammar can be written as the following:

With the finite state automaton $M = \{\{S_0, S_1, S_2, S_3, S_4\}, \{\texttt{run}, \texttt{faster}, \texttt{forrest}\}, t, S_0, \{S_3, S_4\}\}$, where t is the all possible form of $(A, b) \to C$ where node A is connected by edge b to node C.

$$S_0 \to \texttt{run} \ S_1 | \texttt{forrest} \ S_3 \tag{11}$$

$$S_1 \to \texttt{run} \ S_0 | \texttt{faster} S_2 | \texttt{forrest} \ S_3 \tag{12}$$

$$S_2 \to \texttt{forrest} \ S_3 | \texttt{run} \ S_1 \tag{13}$$

$$S_3 \to \texttt{run} \ S_4 | \emptyset \tag{14}$$

$$S_4 \to \emptyset \tag{15}$$

4   Build an automation

We have the following automation with s_2 and s_4 are accepting states[3] .
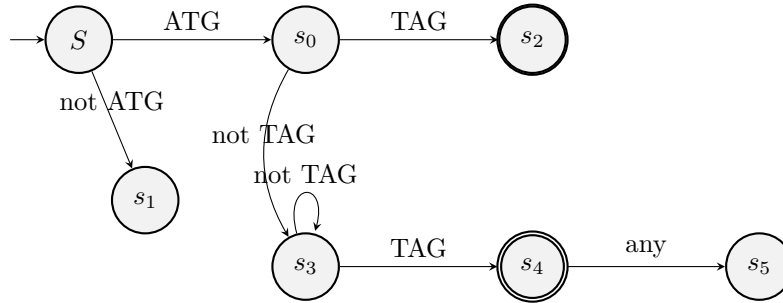
[3] Regarding 3 letters as a whole for simplicity without affecting its correctness. If the length of the string is not divisible by 3, then add minimum spaces to make it divisible by 3.

End of lab assignment.