编译原理
作业 1

软件 42
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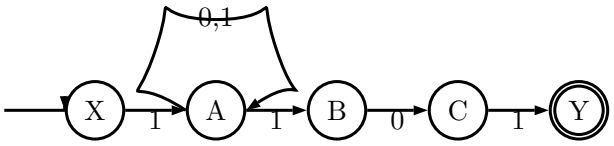
3.7 构造下列正规式相应的 DFA

$$1(0|1)^*101$$
$$1(1010^*|1(010)^*1)^*0$$
$$0^*10^*10^*10^*$$
$$(00|11)^*((01|10)(00|11)^*(01|10)(00|11)^*)^*$$

答：

- 首先画出对应的 NFA：

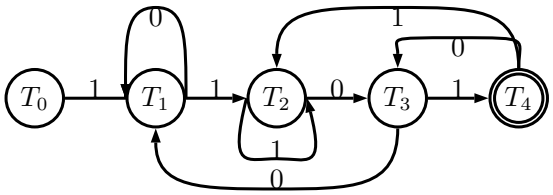


将该 NFA 确定化：

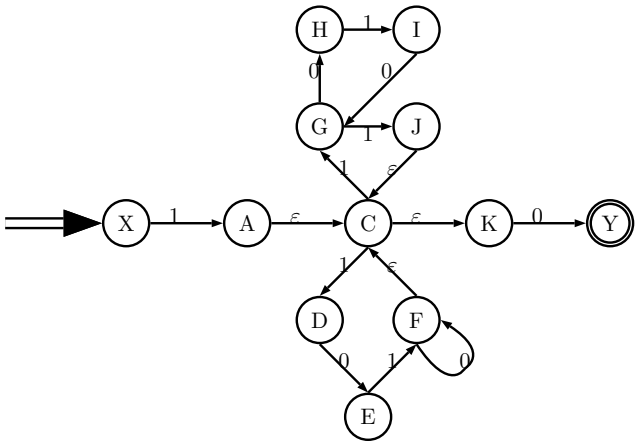
表 1: 状态转换矩阵

I	I_0	I_1
T_0 {X}	{}	T_1 {A}
T_1 {A}	T_1 {A}	T_2 {A,B}
T_2 {A,B}	T_3 {A,C}	T_2 {A,B}
T_3 {A,C}	T_1 {A}	T_4 {A,B,Y}
T_4 {A,B,Y}	T_3 {A,C}	T_2 {A,B}

得到 DFA：



- 首先画出 NFA 为：

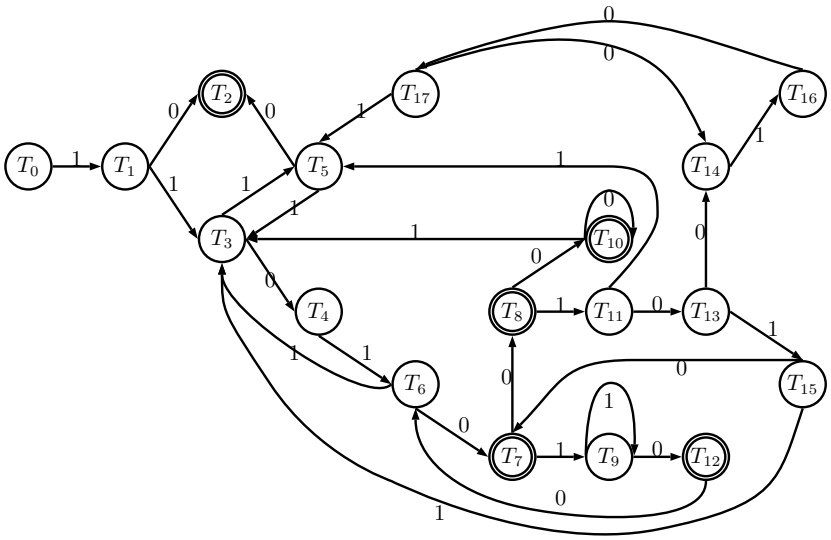


将该 NFA 确定化：

表 2: 状态转换矩阵

I	I_0	I_1
T_0 {X}	{}	T_1 {A,C,K}
T_1 {A,C,K}	T_2 {Y}	T_3 {D,G}
T_2 {Y}	{}	{}
T_3 {D,G}	T_4 {E,H}	T_5 {J,C,K}
T_4 {E,H}	{}	T_6 {I,F,C,K}
T_5 {J,C,K}	T_2 {Y}	T_3 {D,G}
T_6 {I,F,C,K}	T_7 {G,F,C,K,Y}	T_3 {D,G}
T_7 {G,F,C,K,Y}	T_8 {H,F,C,K,Y}	T_9 {J,C,K,D,G}
T_8 {H,F,C,K,Y}	T_{10} {F,C,K,Y}	T_{11} {I,D,G}
T_9 {J,C,K,D,G}	T_{12} {Y,E,H}	T_9 {D,G,J,C,K}
T_{10} {F,C,K,Y}	T_{10} {F,C,K,Y}	T_3 {D,G}
T_{11} {I,D,G}	T_{13} {G,E,H}	T_5 {J,C,K}
T_{12} {Y,E,H}	{}	T_6 {F,C,K,I}
T_{13} {G,E,H}	T_{14} {H}	T_{15} {J,C,K,F,I}
T_{14} {H}	{}	T_{16} {I}
T_{15} {J,C,K,F,I}	T_7 {Y,F,C,K,G}	T_3 {D,G}
T_{16} {I}	T_{17} {G}	{}
T_{17} {G}	T_{14} {H}	T_5 {J,C,K}

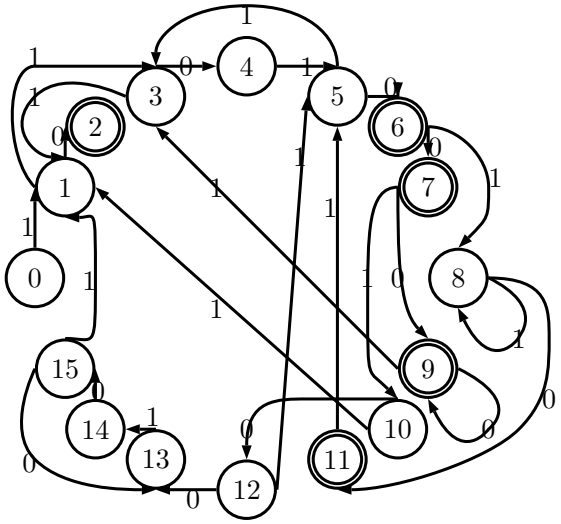
得到 DFA 为：



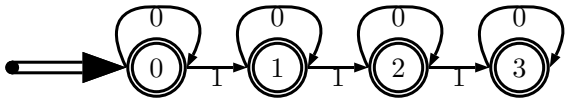
对于此 DFA 可以进一步化简：

{{0}, {1,5}, {2}, {3}, {11}, {13}, {17}, {4}, {6,15}, {7}, {8}, {10}, {9}, {12}, {14}, {16}}

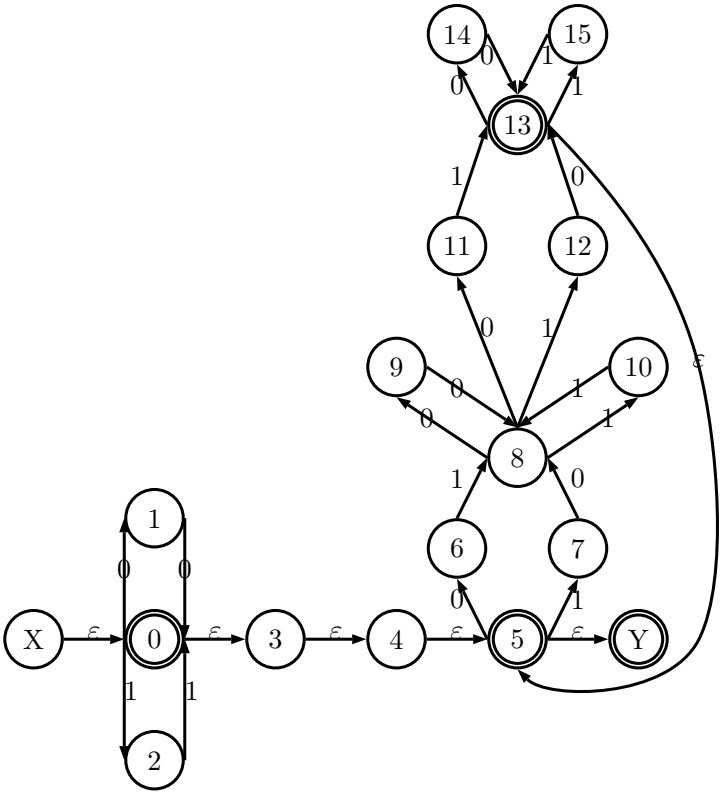
化简后的 DFA 如下：



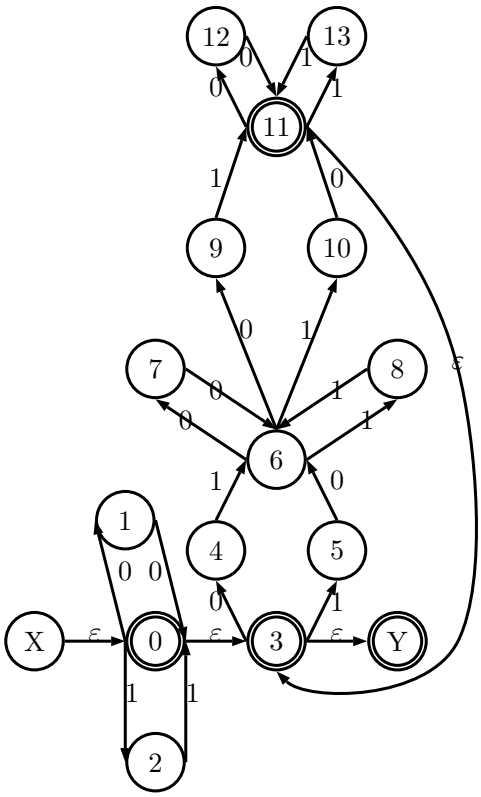
- DFA 为：



- 首先画出对应的 NFA：



对此 NFA 进行简化：

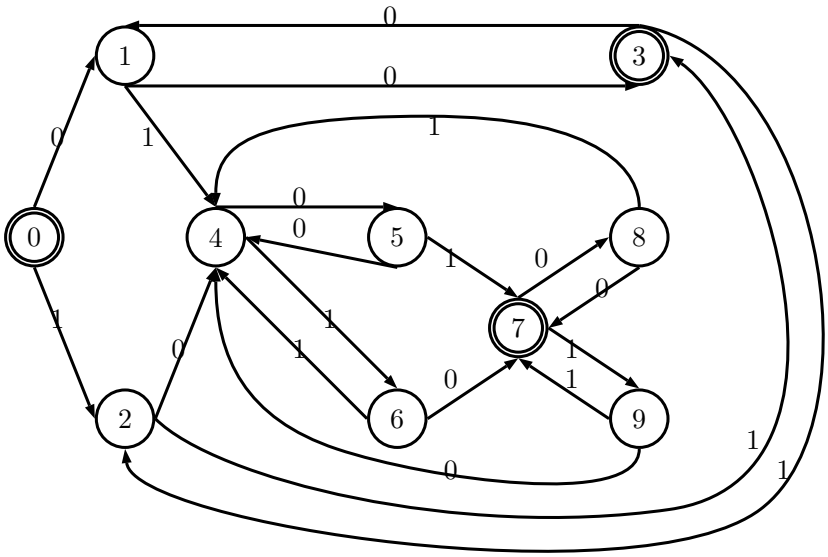


将该 NFA 确定化：

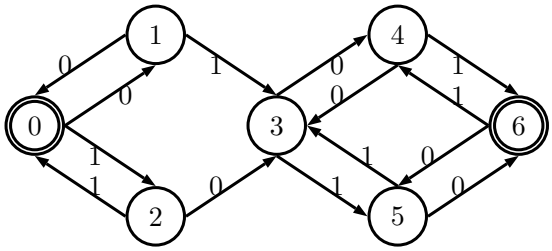
表 3: 状态转换矩阵

I	I_0	I_1
0 {X,0,3,Y}	1 {1,4}	2 {2,5}
1 {1,4}	3 {0,3,Y}	4 {6}
2 {2,5}	4 {6}	3 {0,3,Y}
3 {0,3,Y}	1 {1,4}	2 {2,5}
4 {6}	5 {7,9}	6 {8,10}
5 {7,9}	4 {6}	7 {11,3,Y}
6 {8,10}	7 {11,3,Y}	4 {6}
7 {11,3,Y}	8 {12,4}	9 {13,5}
8 {12,4}	7 {11,3,Y}	4 {6}
9 {13,5}	4 {6}	7 {11,3,Y}

得到 DFA 如下：



对该 DFA 进一步化简.{{0,3}, {1}, {2}, {4}, {5,9}, {6,8}, {7}}
得：

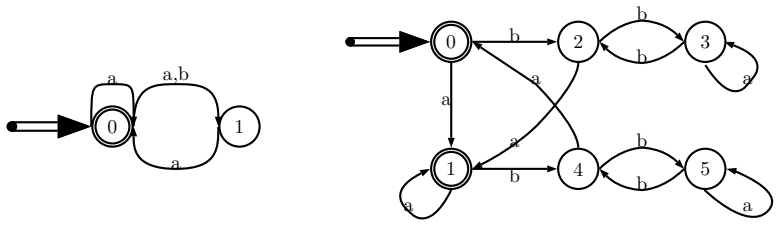


3.9 对下面情况给出 DFA 及正规表达式：

(1) {0,1} 上的含有子串 010 的所有串；

(2) {0,1} 上不含字串 010 的所有串。

3.12 将图 3.18 的 (a) 和 (b) 分别确定化和最少化。



(a) (b)

3.14 构造一个 DFA，它接收 $\Sigma = \{0, 1\}$ 上所有满足如下条件的字符串：每个 1 都有 0 直接跟在右边。