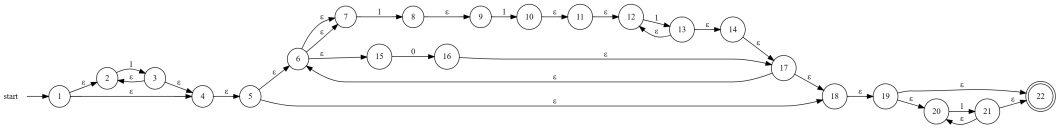
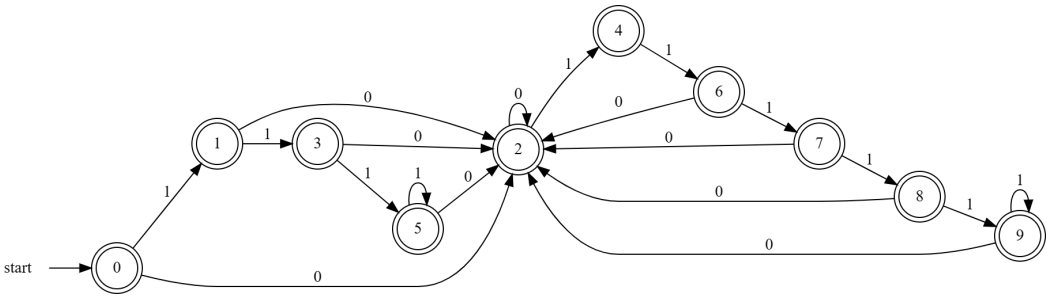
编译原理 -Assignment 1

1. **RE = 1* (0|111*) *1*** represents all strings that do not contain 010
    1. Using **Thompson Algorithm** to construct a finite automaton



    2. Converting NFA to DFA if the FA obtained in 1.1 is nondeterministic

I	I_1	I_0	**Accept**
{1,2,4,5,6,7,15,18,19,20,22}mark$T0$	{3,8,21,2,4,5,6,7,9,15,18,19,20,21,22}mark $T1$	{16,6,7,15,17,18,19,20,22}mark$T2$	Yes
$T1$	{3,8,10,21,2,4,5,6,7,9,11,12,14,15,17,18,19,20,21,22}mark$T3$	$T2$	Yes
$T2$	{8,21,9,20,22}mark$T4$	$T2$	Yes
$T3$	{3,8,10,13,21,2,4,5,6,7,9,11,12,14,15,17,18,19,20,21,22}mark$T5$	$T2$	Yes
$T4$	{10,21,6,7,11,12,14,15,17,18,19,20,22}mark$T6$		Yes
$T5$	$T5$	$T2$	Yes
$T6$	{8,13,21,6,7,9,14,15,17,18,19,20,22}mark$T7$	$T2$	Yes
$T7$	{8,10,21,6,7,9,11,12,14,15,17,18,19,20,22}mark $T8$	$T2$	Yes
$T8$	{8,10,13,21,6,7,9,11,12,14,15,17,18,19,20,22}mark$T9$	$T2$	Yes
$T9$	$T9$	$T2$	Yes



    3. Determine whether the DFA obtained in 1.2 is minimized. If not, please minimize the DFA

    intial set:{0,1,2,3,4,5,6,7,8,9}

    8 on '1' $\rightarrow$ 9,8 on '0' $\rightarrow$ 2;9 on '1' $\rightarrow$ 9;9 on '0' $\rightarrow$ 2 $\Rightarrow${0,1,2,3,4,5,6,7,89}

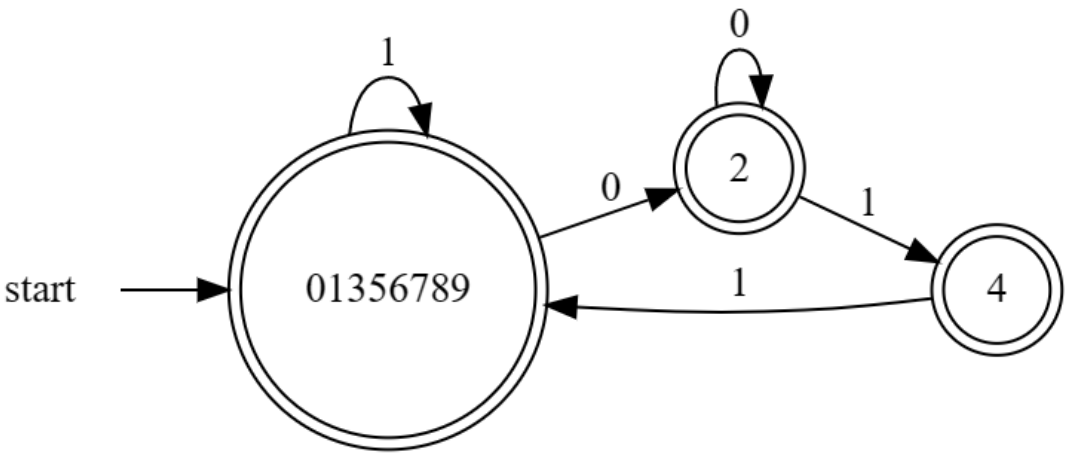
    7 on '1' $\rightarrow$ 89,7 on '0' $\rightarrow$ 2;89 on '1' $\rightarrow$ 89;89 on '0' $\rightarrow$ 2 $\Rightarrow${0,1,2,3,4,5,6,789}

    同理可得到{0,1,2,3,4,6789}

    3 on '1' $\rightarrow$ 5,3 on '0' $\rightarrow$ 2;5 on '1' $\rightarrow$ 5;5 on '0' $\rightarrow$ 2 $\Rightarrow${0,1,2,35,4,6789}

    同理可得到{0135,2,4,6789}

    0135 on '1' $\rightarrow$ 0135,0135 on '0' $\rightarrow$ 2;6789 on '1' $\rightarrow$ 6789;6789 on '0' $\rightarrow$ 2 $\Rightarrow$ {01356789,2,4}



2. The number of character '0' in each string is a multiple of three(including zero)

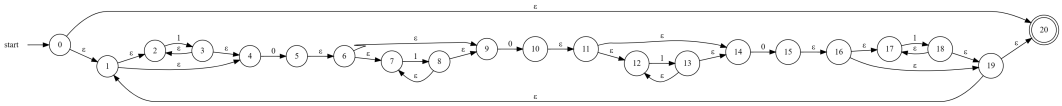
    1. Provide the RE with reason

        RE = (1*01*01*01*)*

        对于1*01*01*01*，是包含3个0的任意字符串，再其使用kleen closure，则能得到任意具有3的倍数的字符串

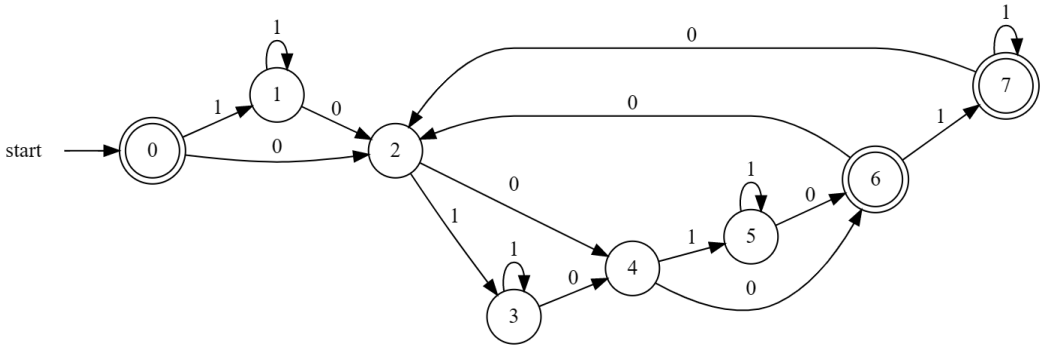
    2. Construct the corresponding DFA

        先转为NFA



        转为DFA

I	I_1	I_0	**Accept**
{0,1,2,4,20}mark$T0$	{3,2,4}mark $T1$	{5,6,7,9}mark$T2$	Yes
$T1$	$T1$	$T2$	No
$T2$	{8,7,9}mark$T3$	{10,11,12,14}mark$T4$	No
$T3$	$T3$	$T4$	No
$T4$	{12,13,14}mark$T5$	{15,16,17,19,20,1,2,4}mark$T6$	No
$T5$	$T5$	$T6$	No
$T6$	{3,18,17,19,20,1,2,4}mark$T7$	$T2$	Yes
$T7$	$T7$	$T2$	Yes



        最小化DFA

        intial set:{0,6,7} {1,2,3,4,5}

for {0,6,7}

6 on '1' → 7,6 on '0' → 2;7 on '1' → 7;7 on '0' → 2 ⇒{0,67}

for {1,2,3,4,5}

4 on '1' → 5,4 on '0' → 6;5 on '1' → 5;5 on '0' → 6 ⇒{1,2,3,45}

2 on '1' → 3,2 on '0' → 4;3 on '1' → 3;3 on '0' → 4 ⇒{1,23,45}

final:{0,67},{1,23,45}