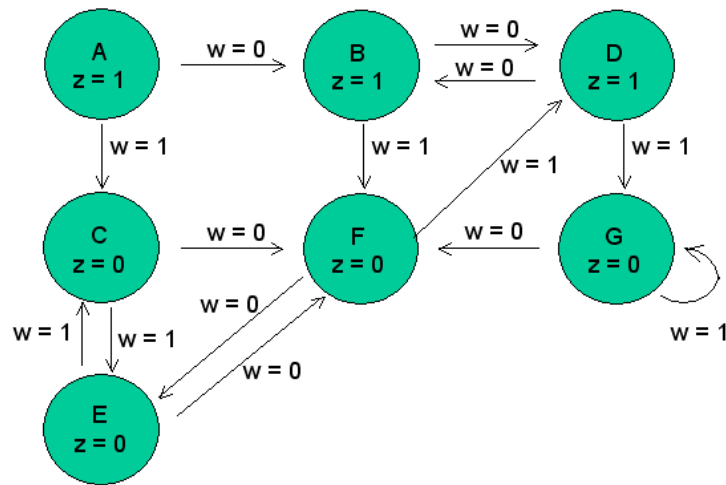


Why does so few of you solve state minimization tasks?

We're just showing that there exists state minimization, and present a simple method that can be applied to small state diagram.

State table

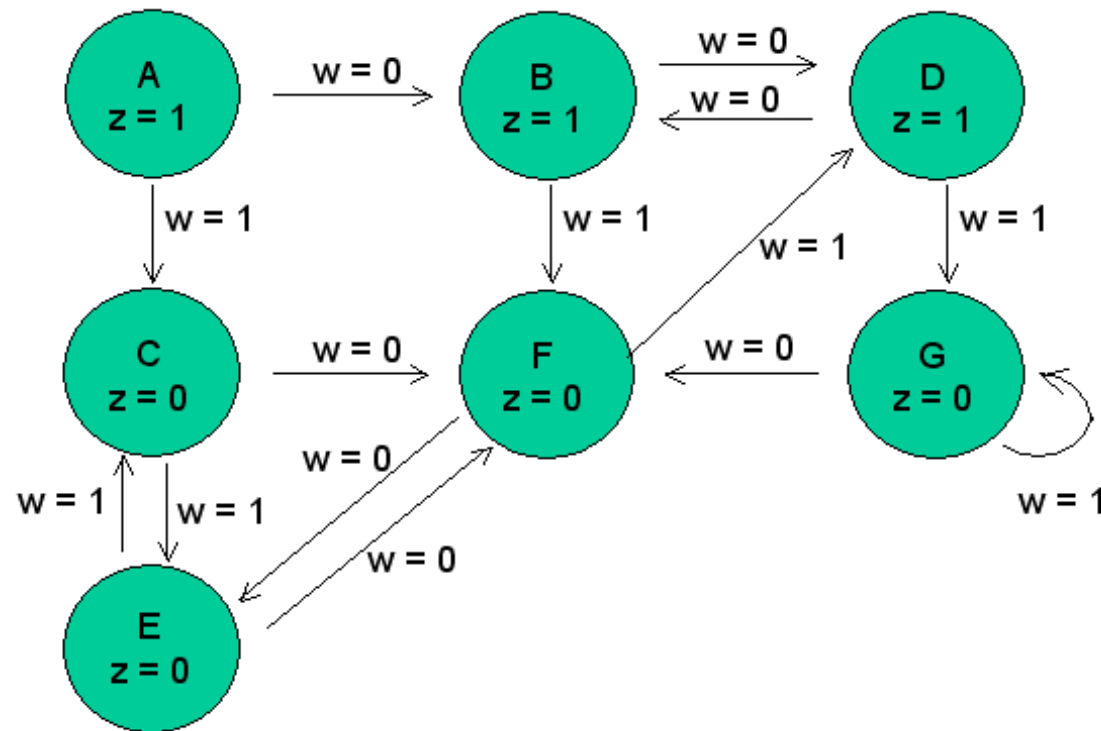


Initial state diagram

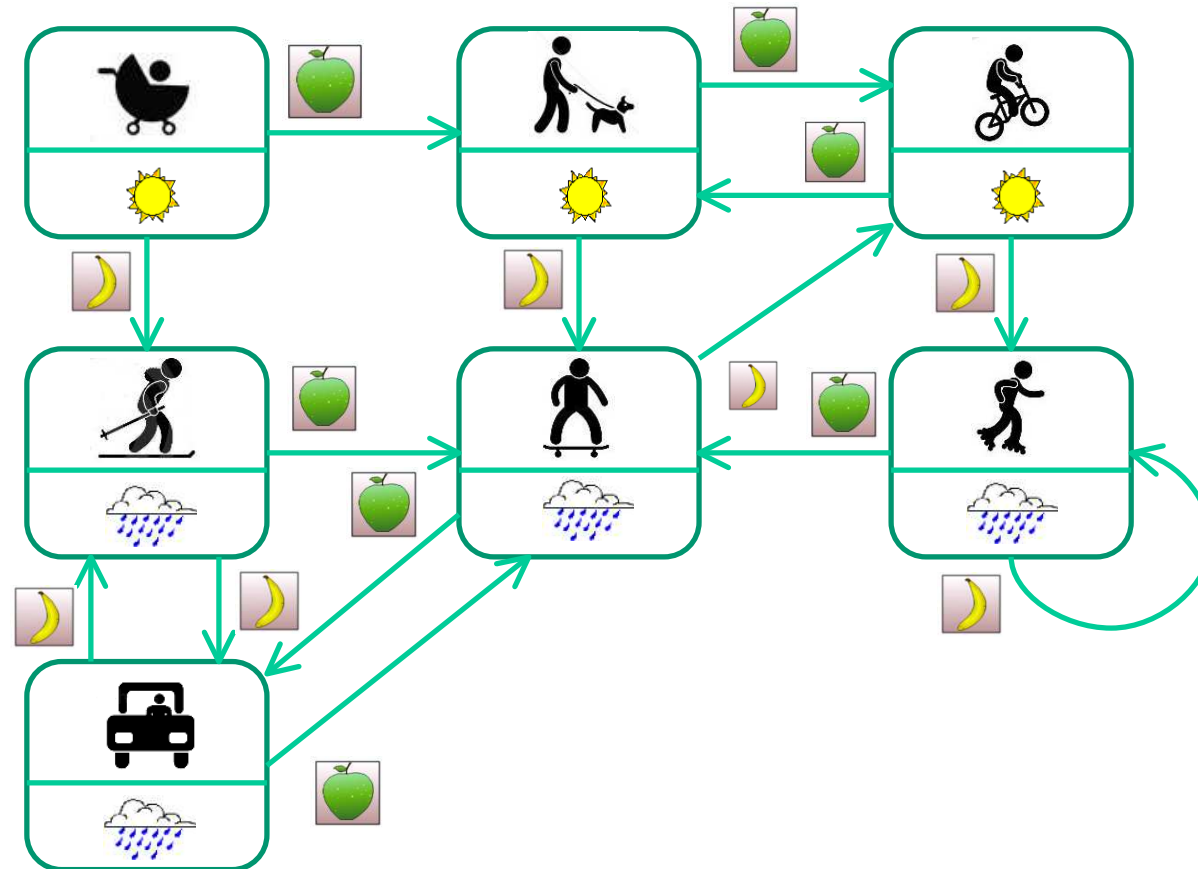
Present state	Next state		Output z
	$w = 0$	$w = 1$	
A	B	C	1
B	D	F	1
C	F	E	0
D	B	G	1
E	F	C	0
F	E	D	0
G	F	G	0































Initial state table































Is state minimization difficult?

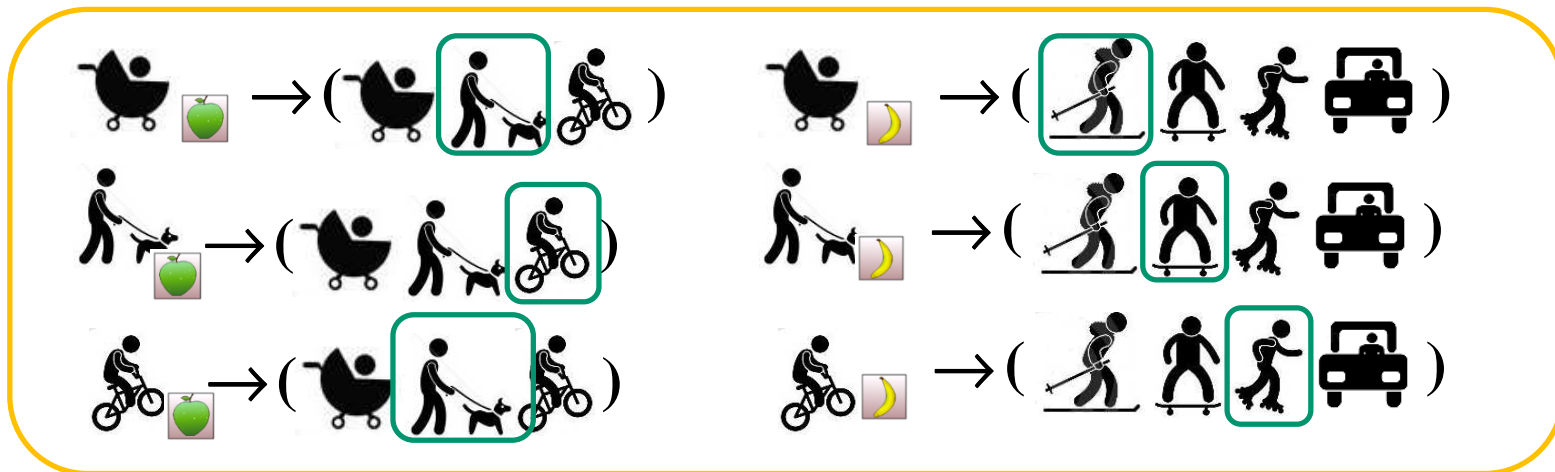
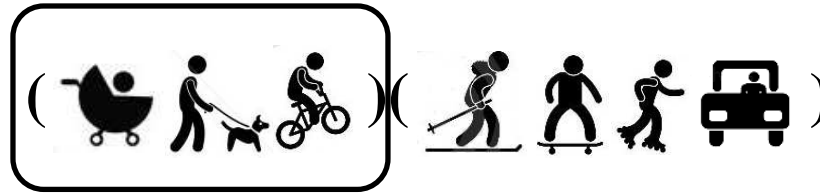


Kindergarten version ...

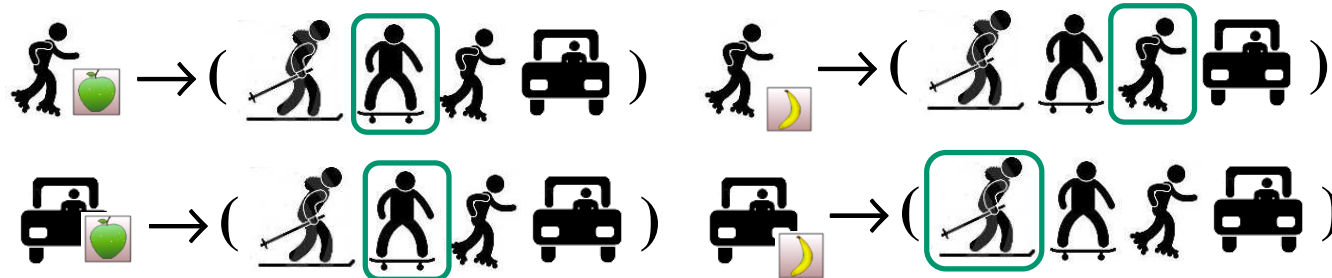
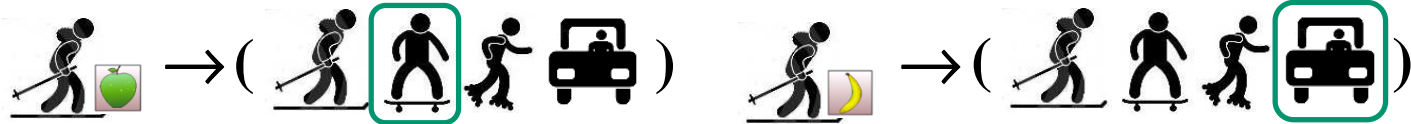
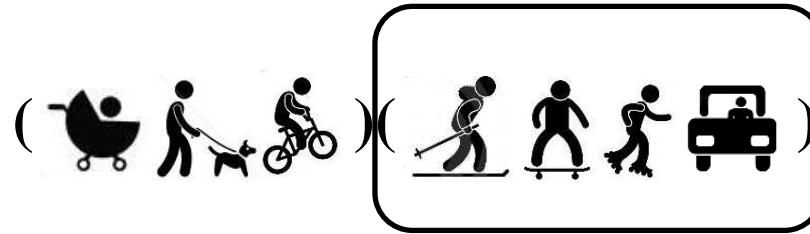
































State	Input/next		Output
			
			
			
			
			
			
			
			

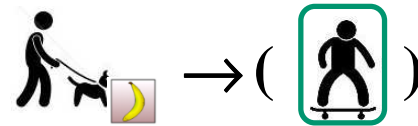
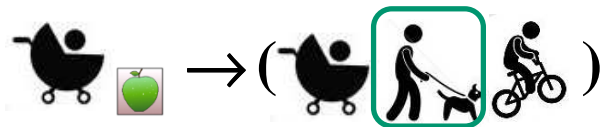
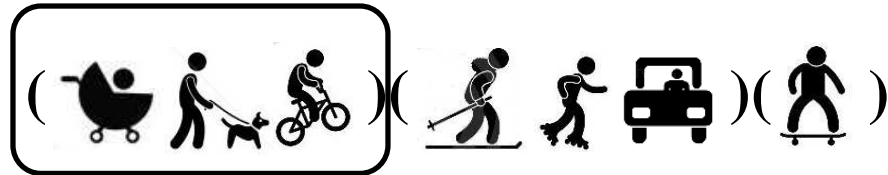
State	Input/next		Output
			
			
			
			
			
			
			
			



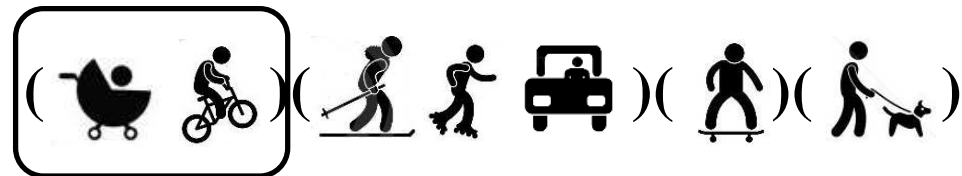
	Input/next		
State			Output



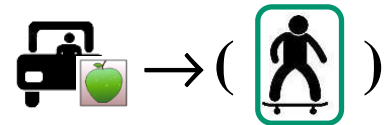
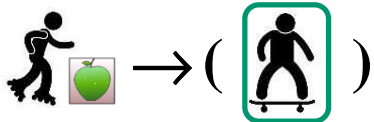
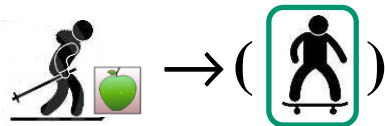
	Input/next		
State			Output
			
			
			
			
			
			
			



State	Input/next		Output



State	Input/next		Output

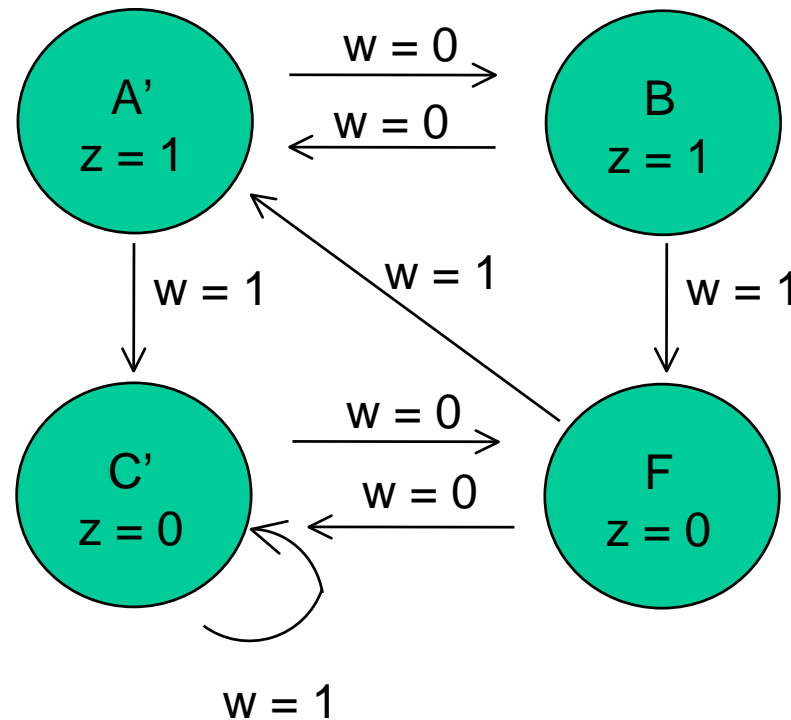






Minimized state diagram

Present state	Nextstate		Output z
	w = 0	w = 1	
A'	B	C'	1
B	A'	F	1
C'	F	C'	0
F	C'	A'	0



4 states needs 2 flip-flops ($2^2 = 4$).

More on state minimization in "Data Structures and Computer Algorithms"

- This method, (Moore 1956). State minimization of n states – **runtime** on computer is $\propto n^2$
- Hopcroft's algorithm (1971) – **runtime** on computer $\propto n \cdot \log_2(n)$

numerical Example: 100 states.

$$100^2 = \mathbf{10000}$$

$$100 \cdot \log_2(100) = \mathbf{650}$$

*Computer programs on the Internet must be **scalable**, they can "overnight" become very popular - and run the risk of overloading the servers!*

William Sandqvist william@kth.se