SNS College of Engineering Coimbatore - 641107

Analysis Framework

AP/IT

In what ways can we compare algorithms?

- Time & Space efficiency
- Cost, Power
  - Dependence on
    - Input encoding
    - Critical operation of algorithm
    - Frequency of critical operation execution
    - Number of “things” stored in memory relative to input encoding

Input Size

Let b represent number of bits for the encoding of n in binary:

$$b = \lfloor \log_2 n \rfloor + 1 \tag{1}$$

Measuring Running Time

- Basic Operation
  - The operation contributing the most to total runtime
  - Frequency of execution depends on input

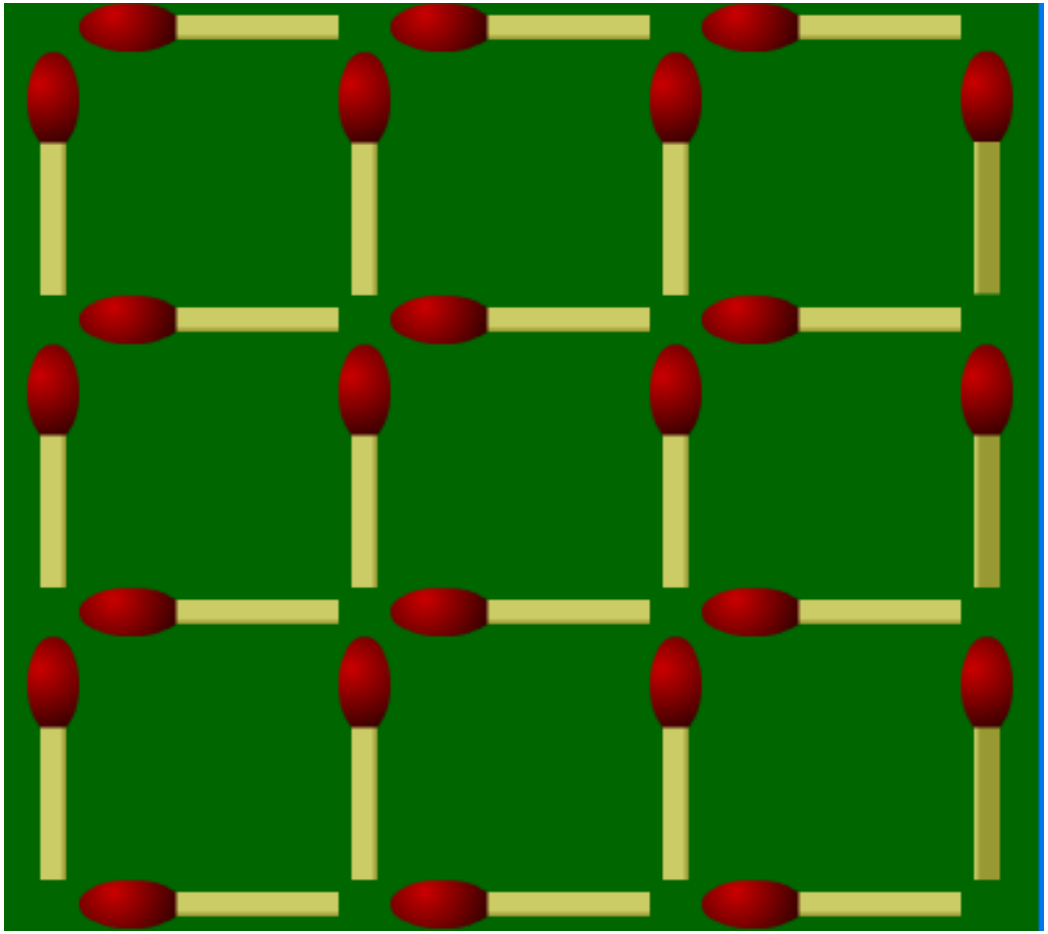
$$T(n) \text{¼} c_{op} C(n)$$

Where, Cop=execution time of algorithm

$C(n)$= number of times this operation is run on input n

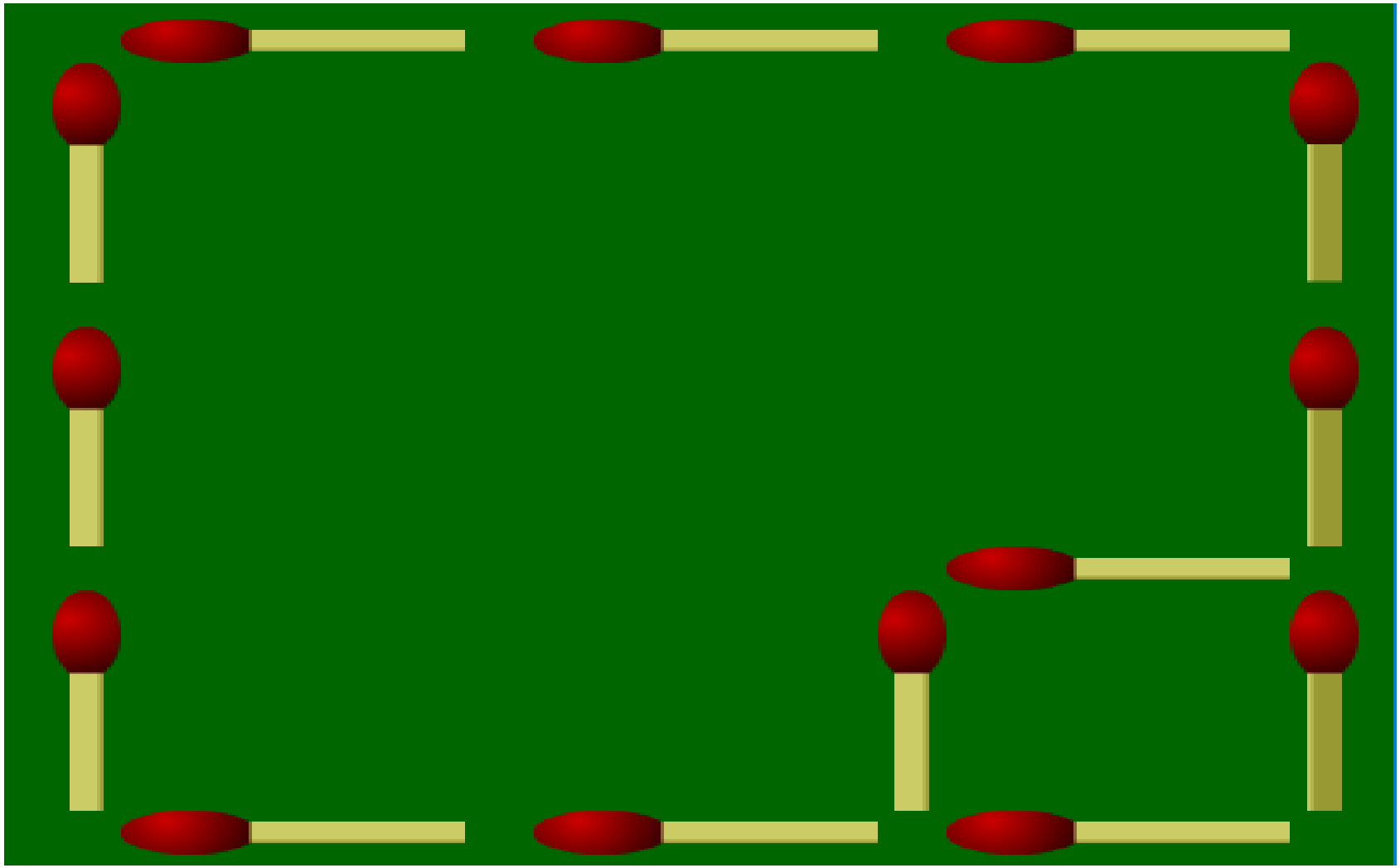
$T(n)$= running time

Break



Take away
10 matches
to form
2 squares

Break



Order of growth

TABLE 2.1 Values (some approximate) of several functions important for analysis of algorithms

n	$\log_2 n$	n	$n \log_2 n$	n^2	n^3	2^n	$n!$
10	3.3	10^1	$3.3 \cdot 10^1$	10^2	10^3	10^3	$3.6 \cdot 10^6$
10^2	6.6	10^2	$6.6 \cdot 10^2$	10^4	10^6	$1.3 \cdot 10^{30}$	$9.3 \cdot 10^{157}$
10^3	10	10^3	$1.0 \cdot 10^4$	10^6	10^9		
10^4	13	10^4	$1.3 \cdot 10^5$	10^8	10^{12}		
10^5	17	10^5	$1.7 \cdot 10^6$	10^{10}	10^{15}		
10^6	20	10^6	$2.0 \cdot 10^7$	10^{12}	10^{18}		

Activity

- **Answers**
- 1. c 2.b 3.a 4.d 5.d 6.a 7.a