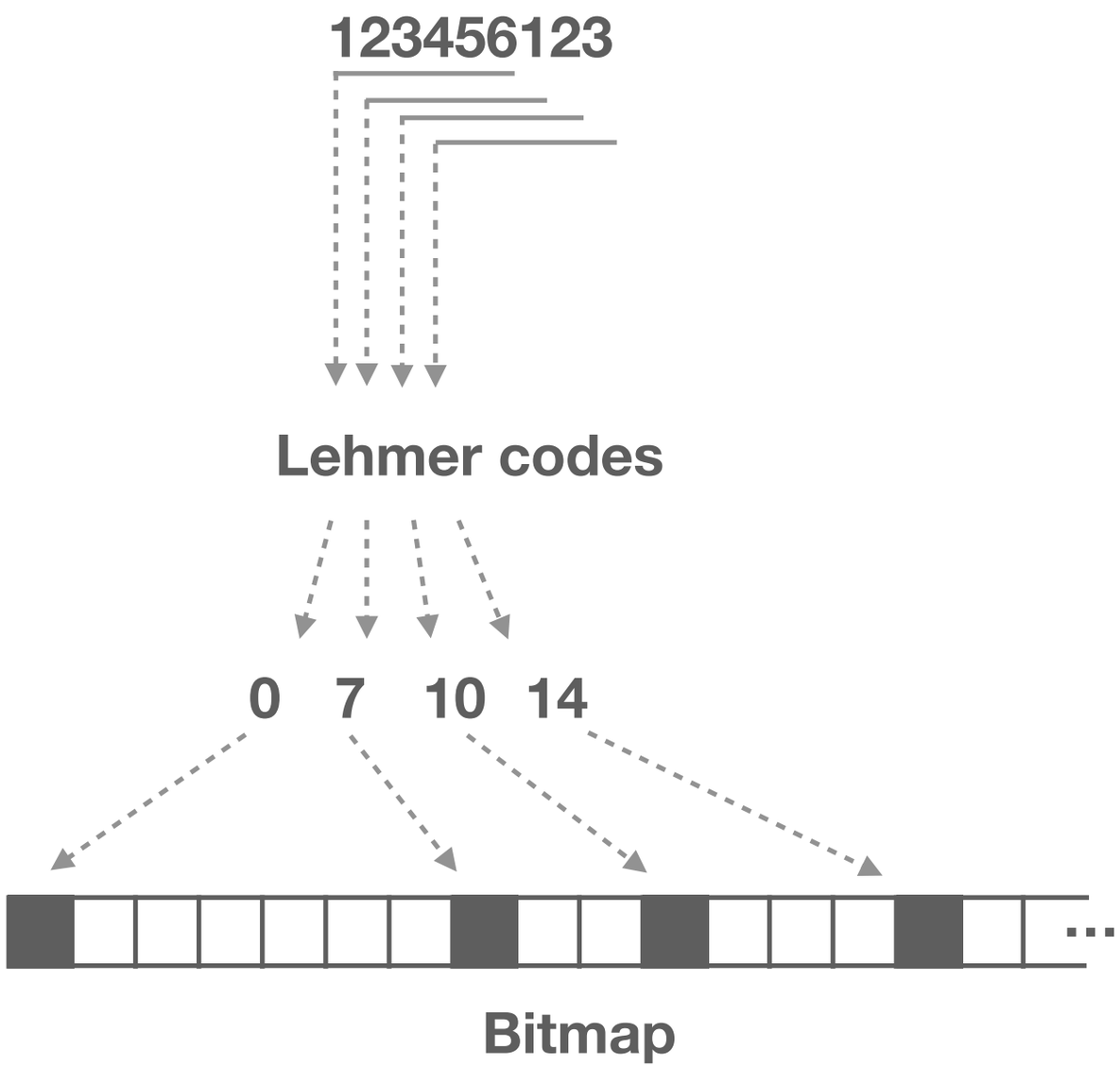
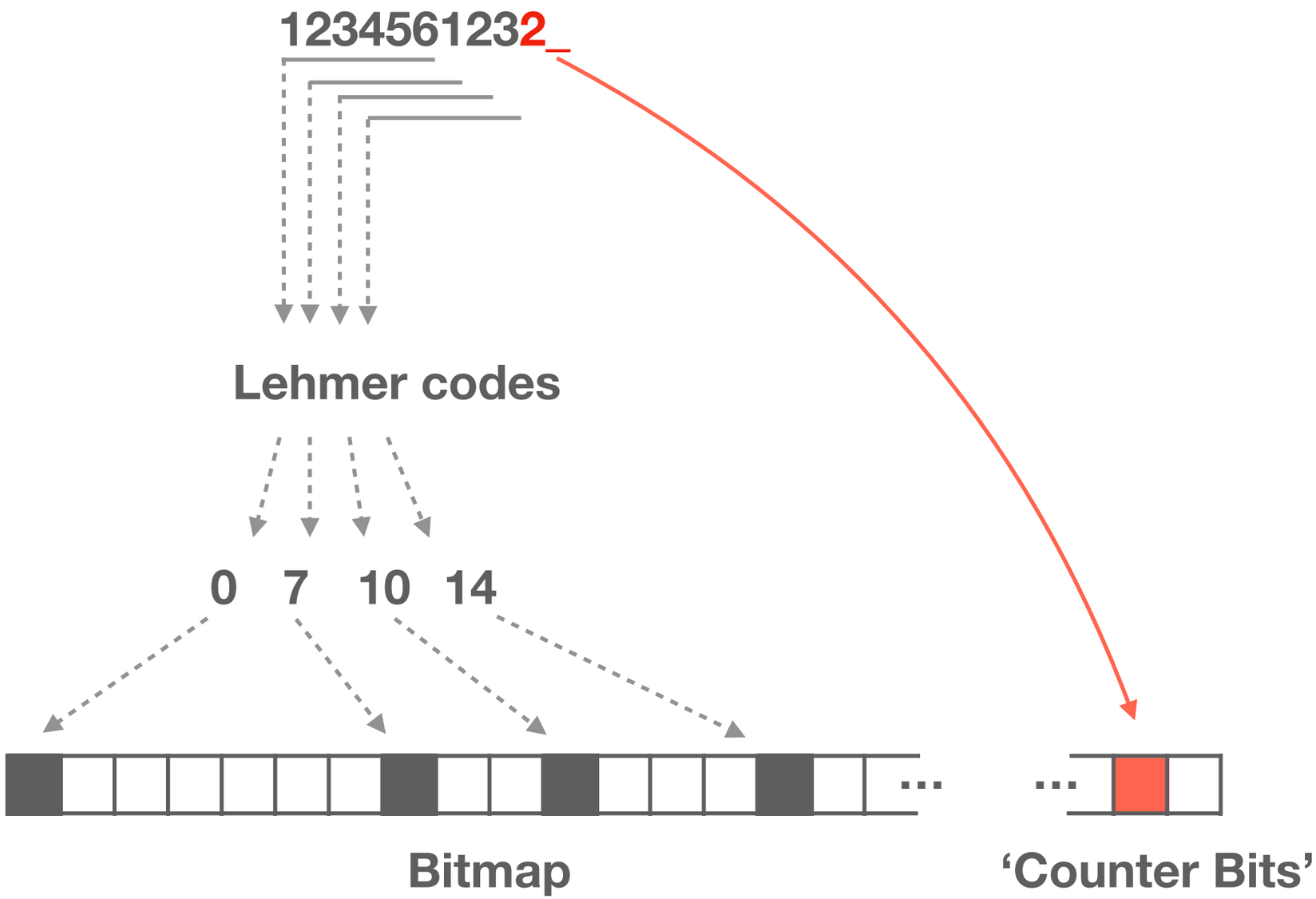
The reduction:

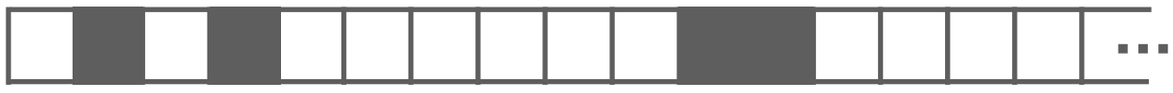


The reduction:



‘Symmetry breaking’

123456123

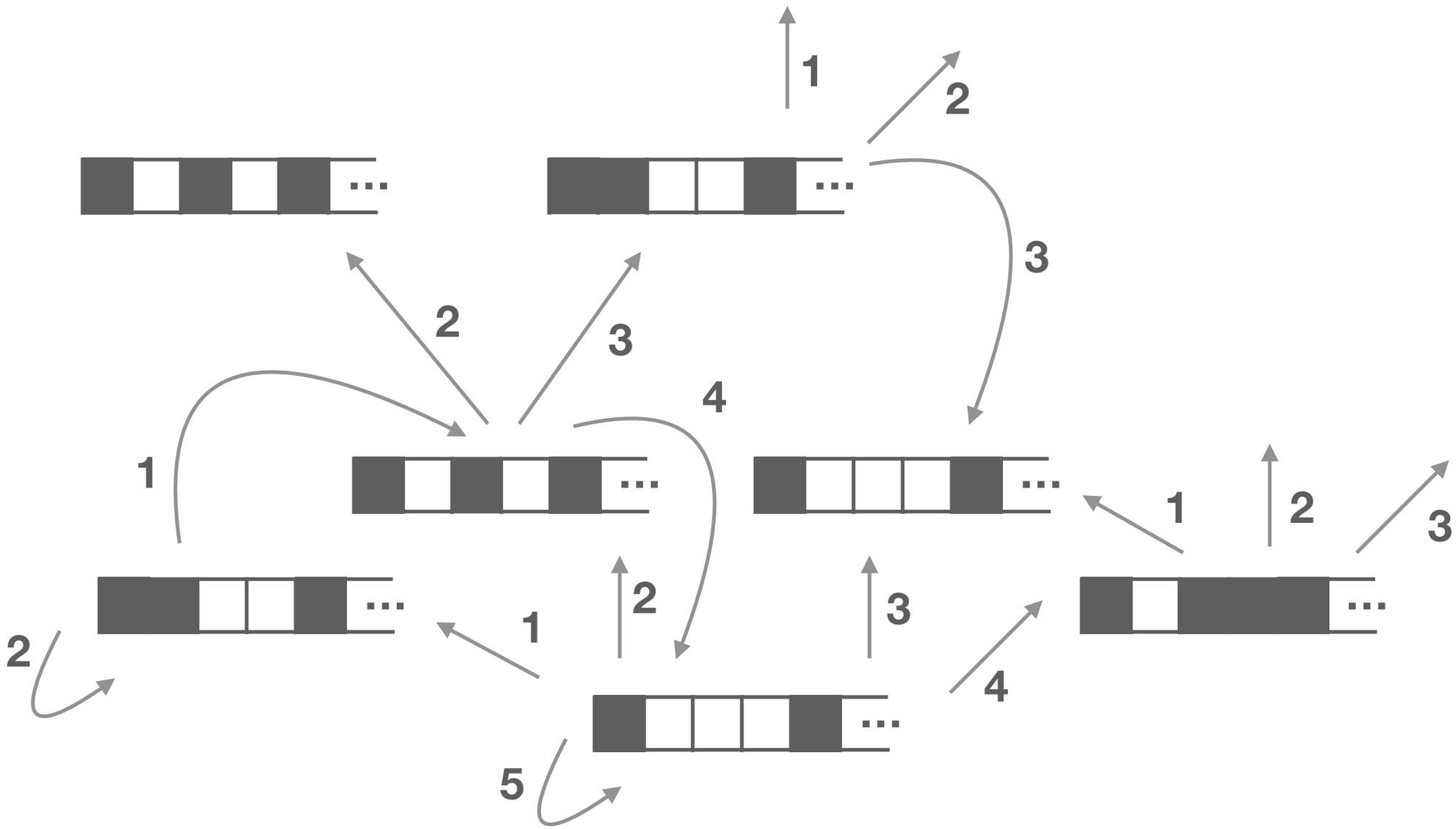
213465213 

321456321

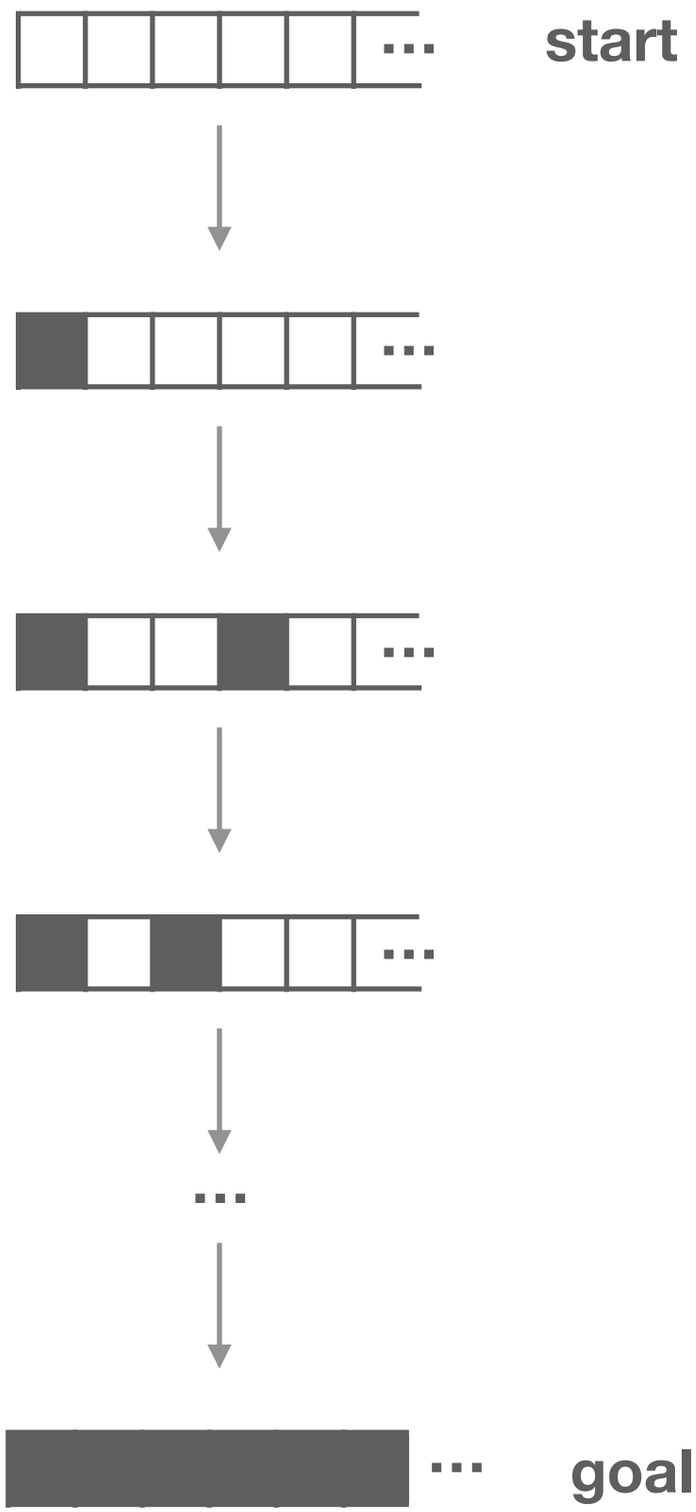
412345412

… …. (N! possible relabelings)

Directed cyclic graph:



Shortest path:



Shortest path algorithms:

A*

Breadth-First

Frontier Search

Dijkstras

Depth-First

Adaptive A*

Branch and Bound

Best-First

D* Lite

Jump Point

IDA*

Shortest path algorithms:

A*

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Best-First

D* Lite

Jump Point

IDA*

Adaptive A*:

‘Incremental Heuristic Search’ algorithm

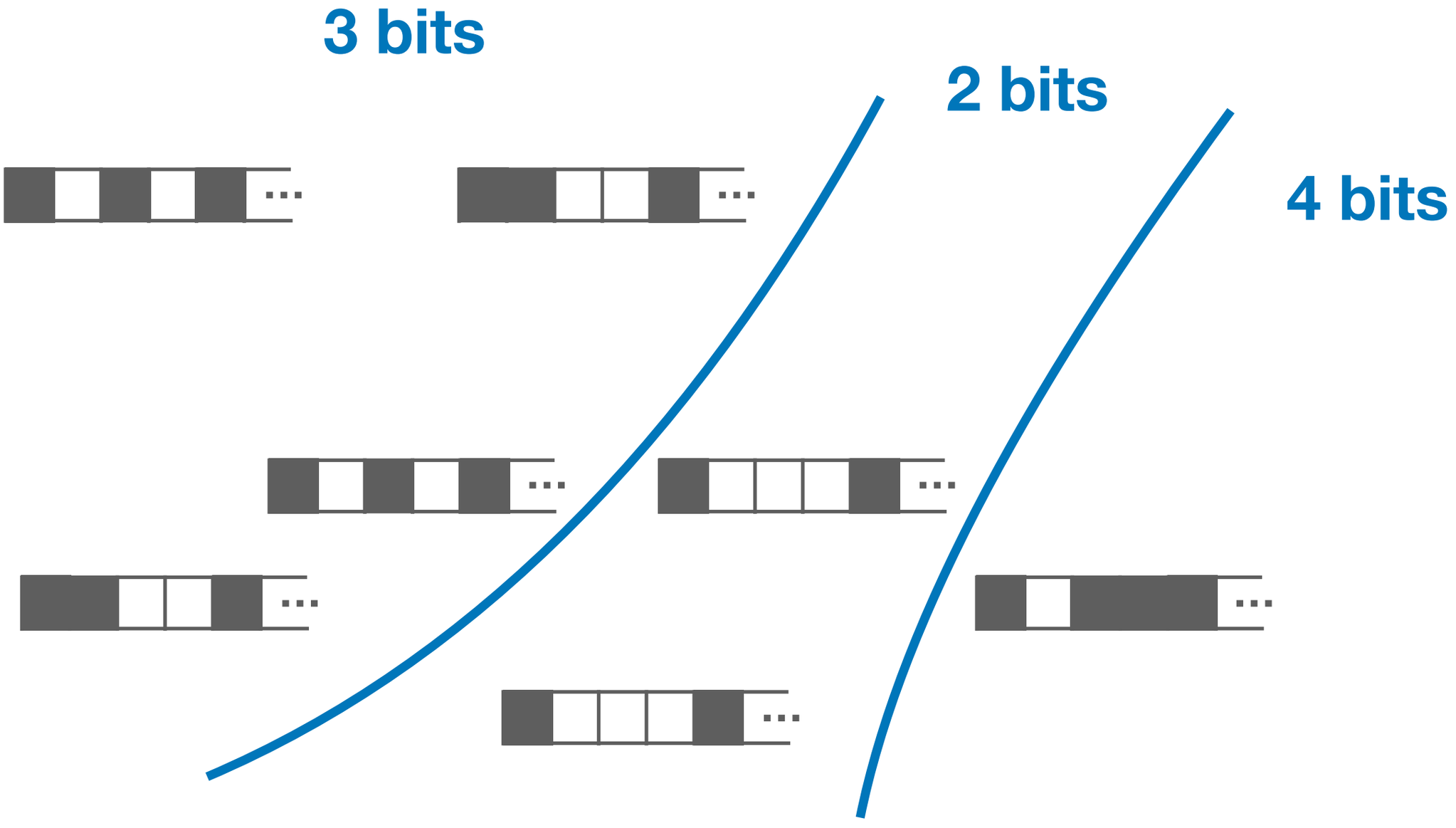
“Repeatedly solves ‘subproblems’ to learn how to solve the overall problem more quickly!”

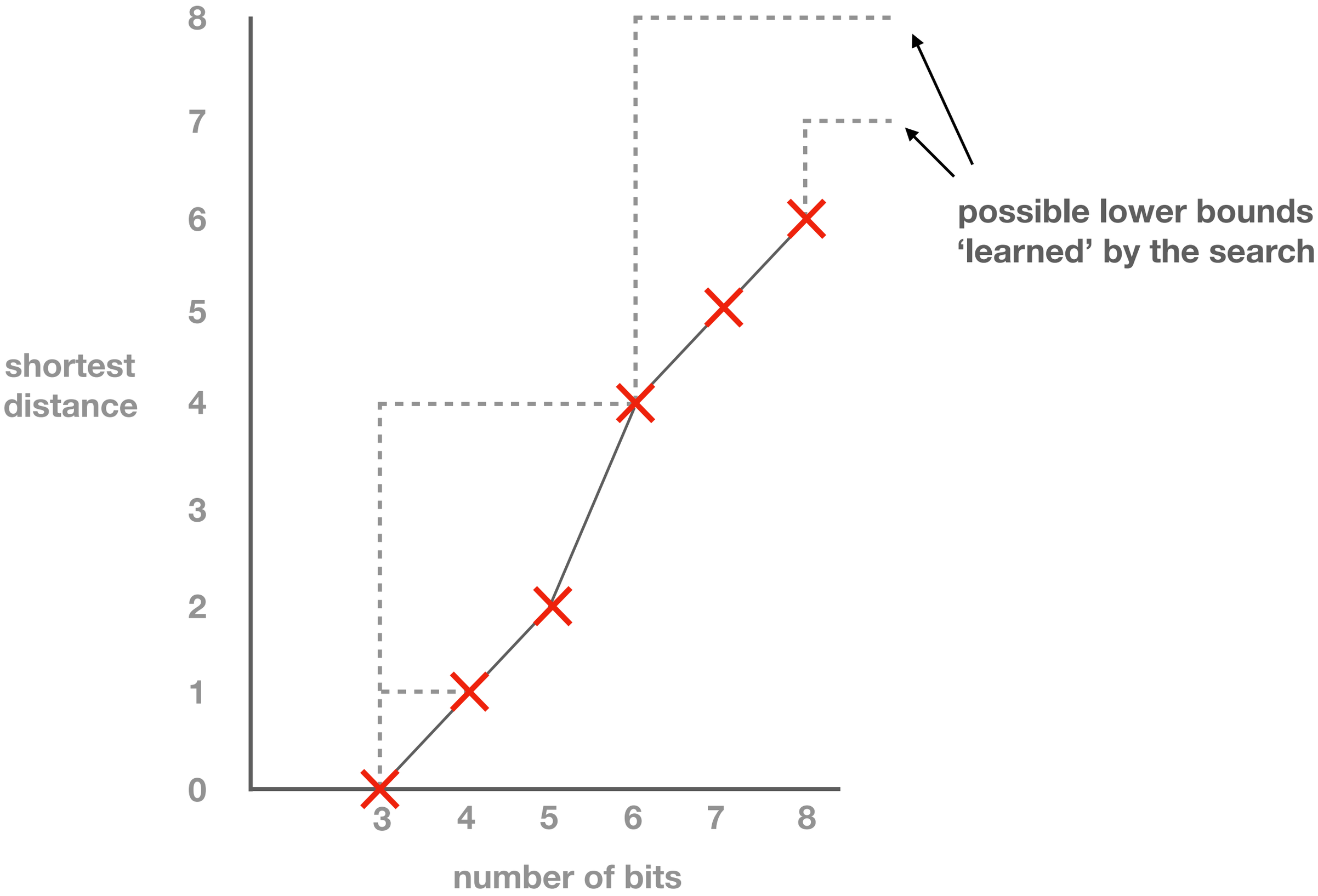
What subproblems?

“What’s the maximum number of permutations that can fit into a string that ‘wastes’ w symbols?”

“What’s the shortest path that adds n bits to the bitmap?”

‘Abstract State Space’




shortest distance
8
7
6
5
4
3
2
1
0
3
4
5
6
7
8
number of bits
possible lower bounds
‘learned’ by the search