A Constraint on the Number of Distinct Vectors with Application to SLAM

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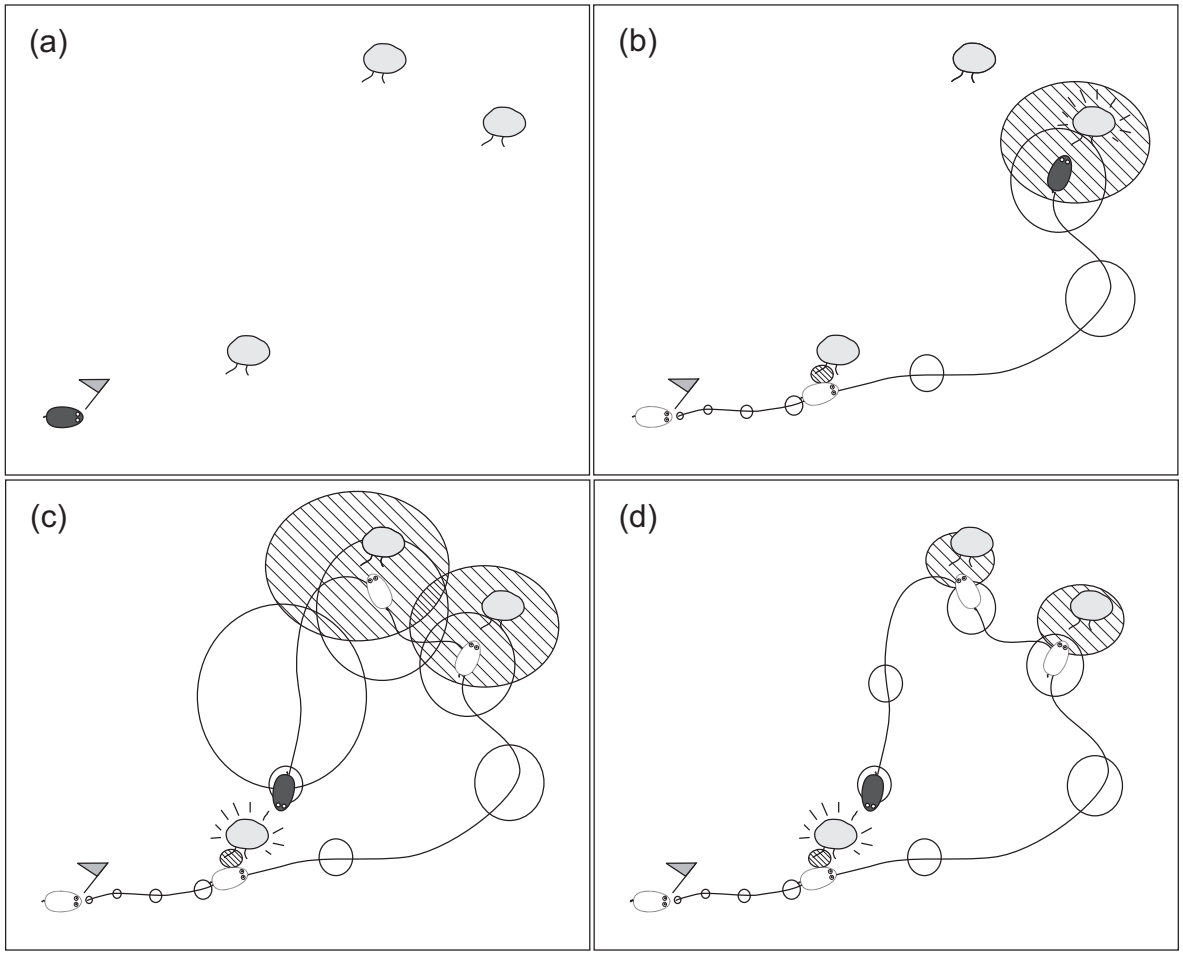
SWIM'09 June 11th 2009

Outline

The SLAM problem



Potential mistakes : omission, illusion, mismatching.

Outline

The NVector constraint

Let $\mathbf{x}^{(i)}$ be the position of the object corresponding to the i^{th} detection.

$$\texttt{atmost\_nvector}(n, \{\mathbf{x}^{(1)}, \ldots, \mathbf{x}^{(k)}\})$$
$$\Longleftrightarrow$$
$$|\{\mathbf{x}^{(1)}, \ldots, \mathbf{x}^{(k)}\}| \leq n.$$

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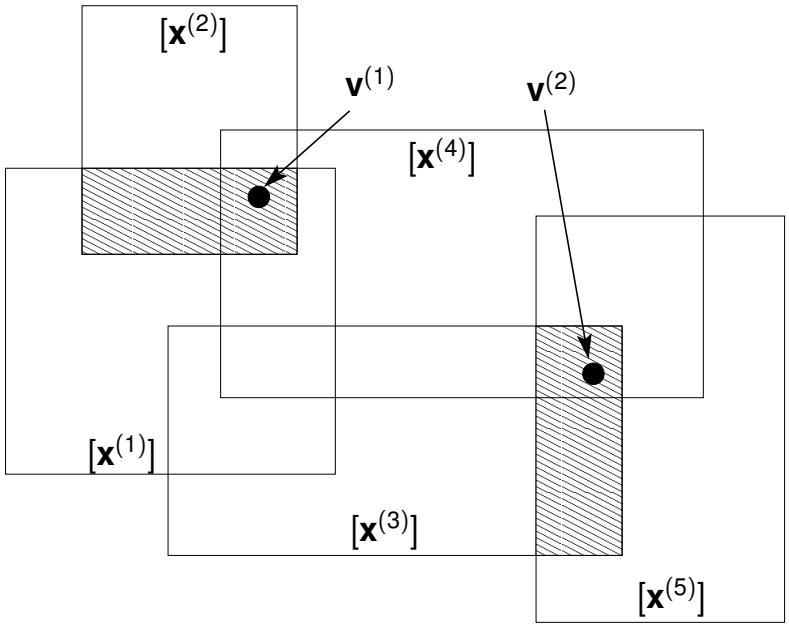
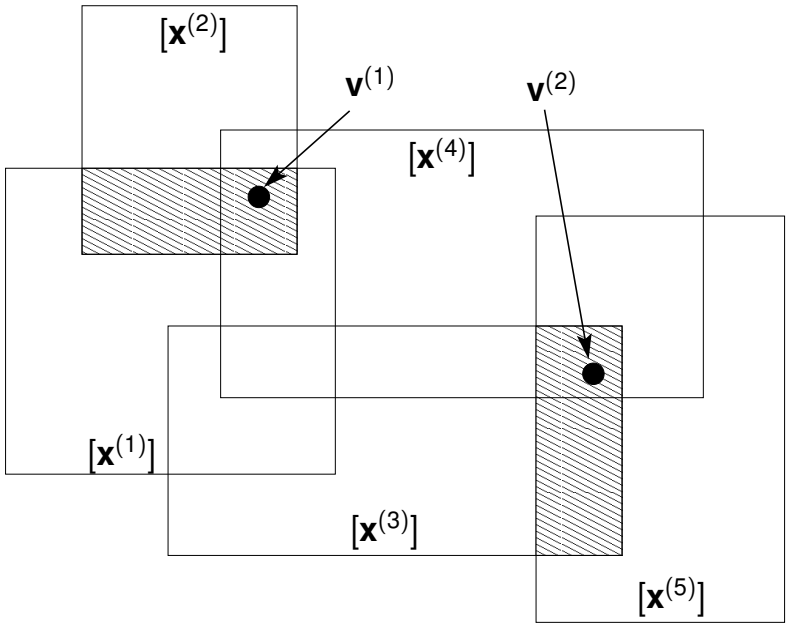


Initial state

The NVector constraint



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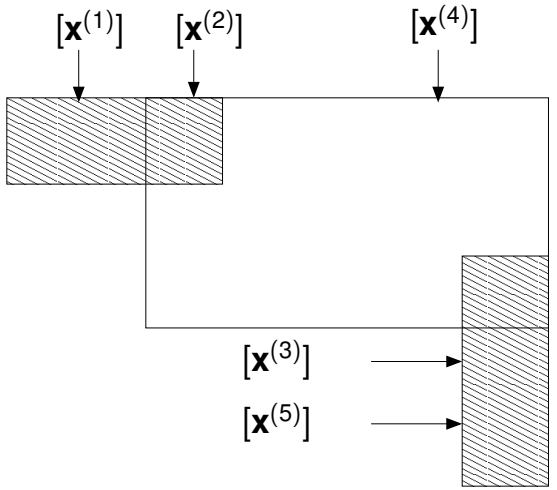
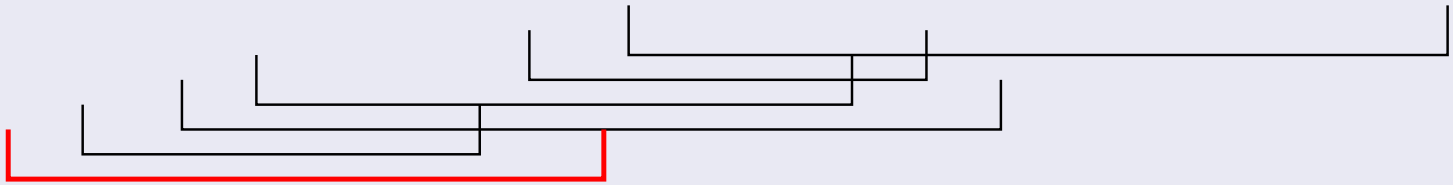


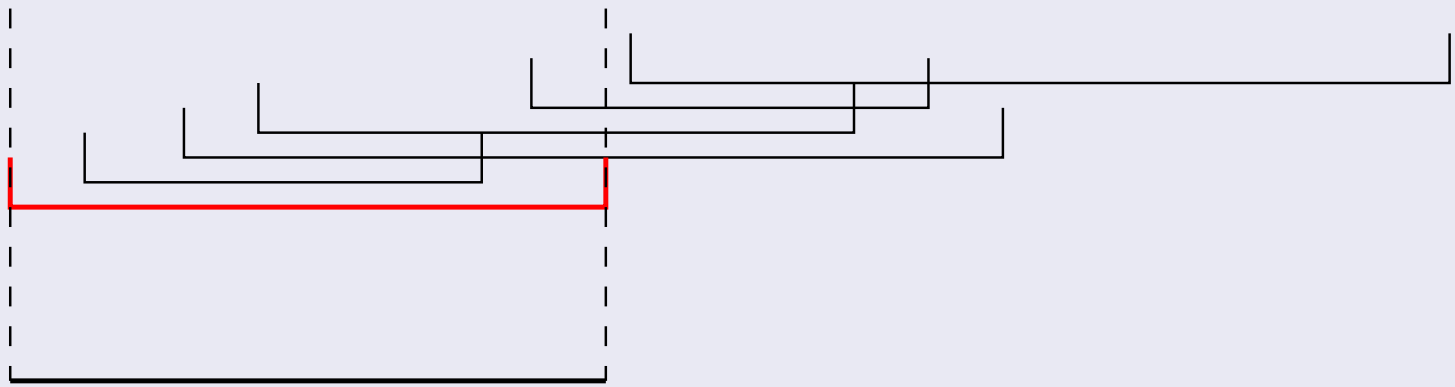
Final state

Outline

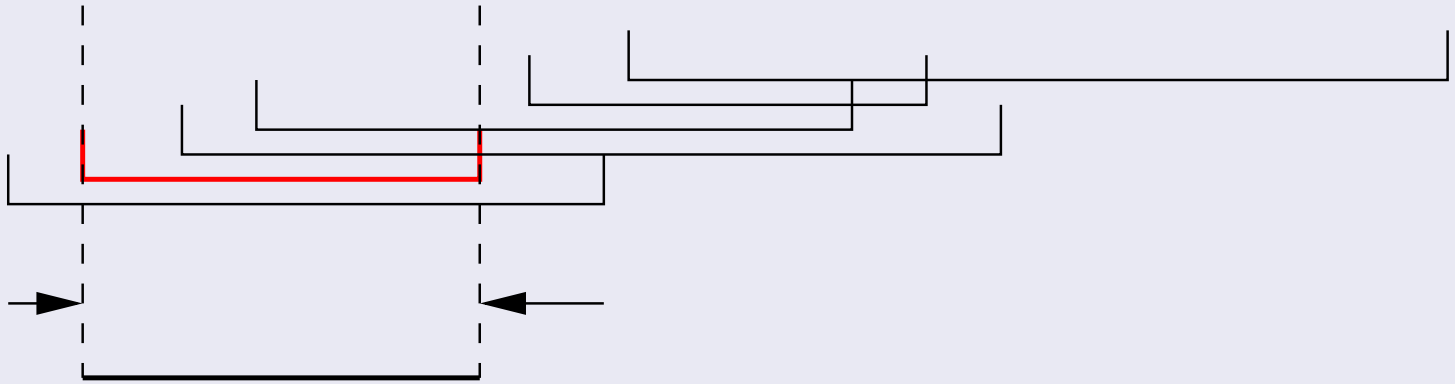
In one dimension



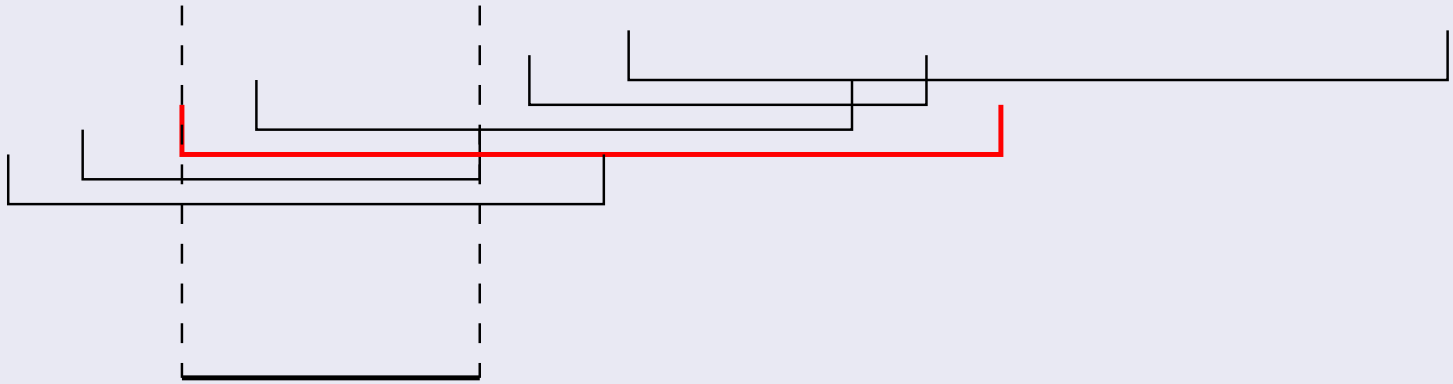
In one dimension



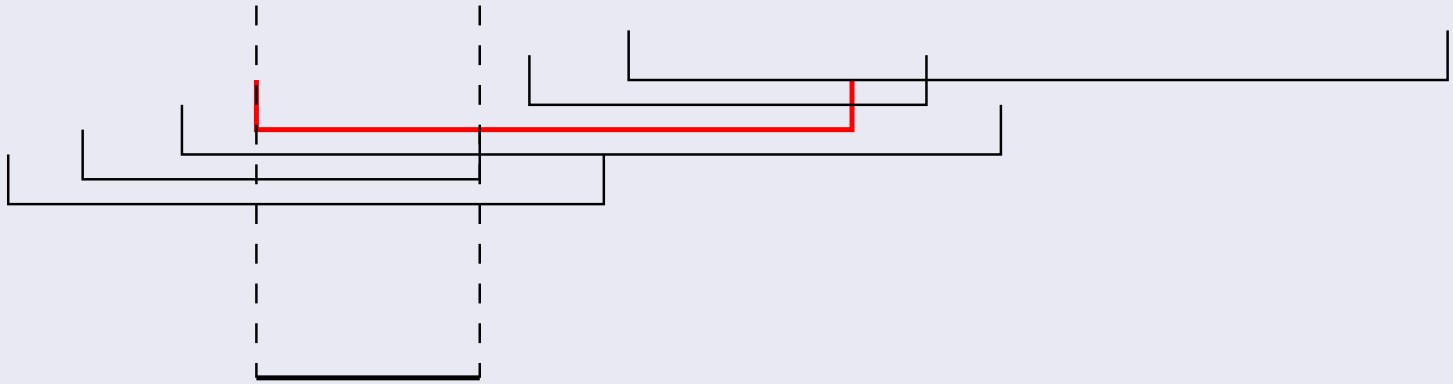
In one dimension



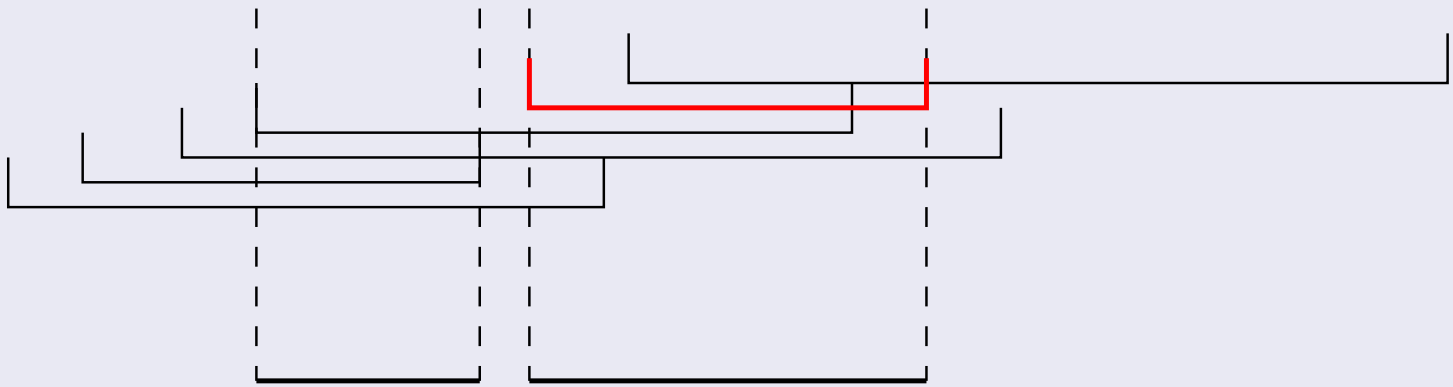
In one dimension



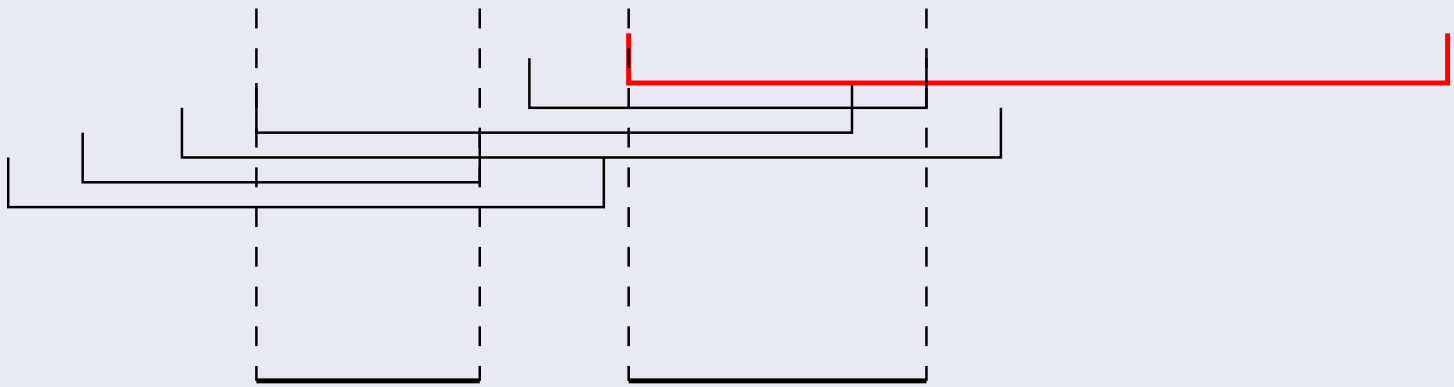
In one dimension



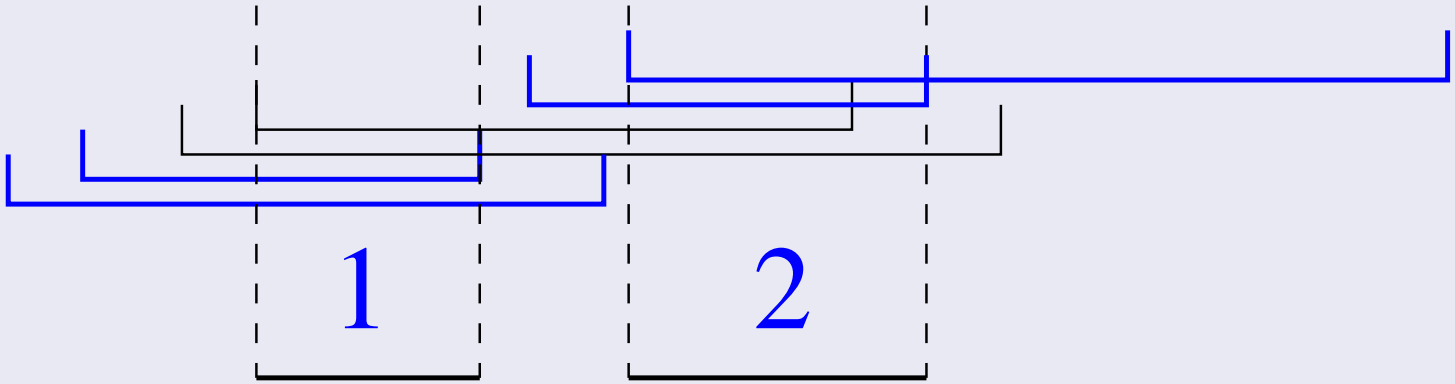
In one dimension



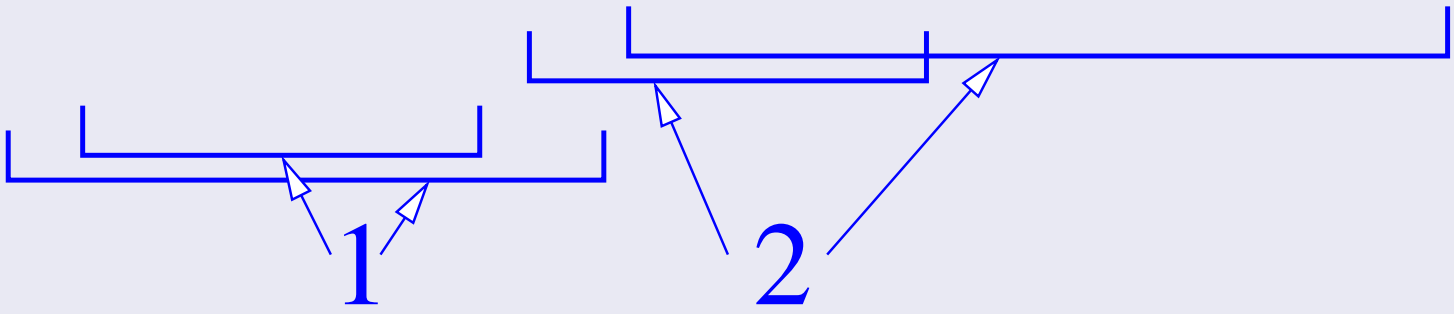
In one dimension



In one dimension

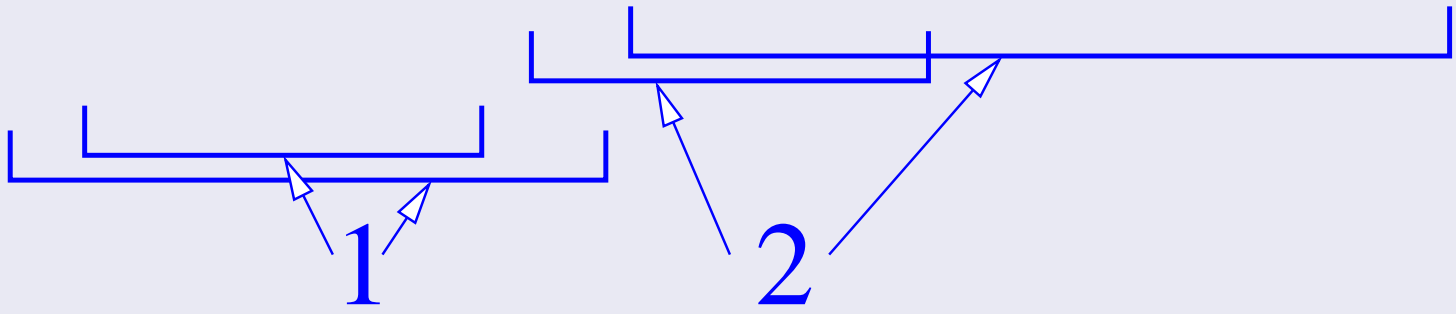


In one dimension



Algorithm

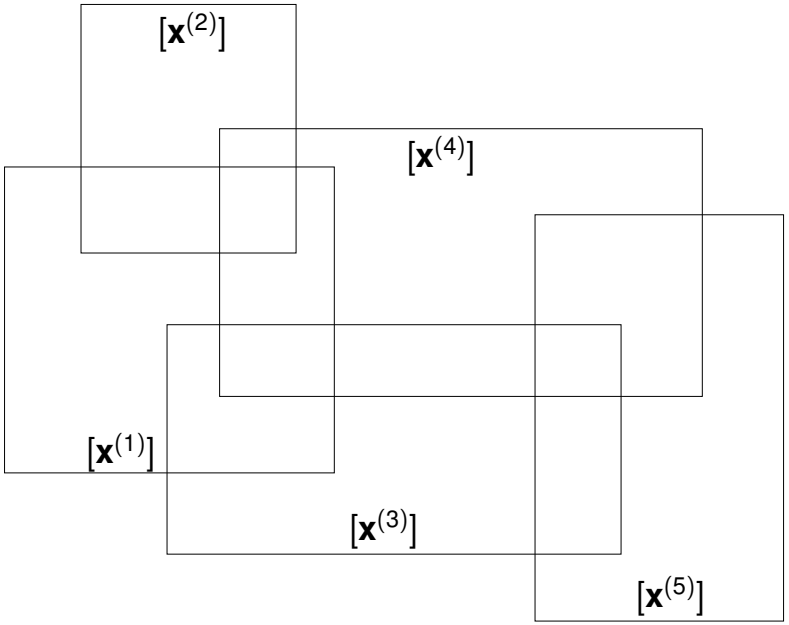
In one dimension



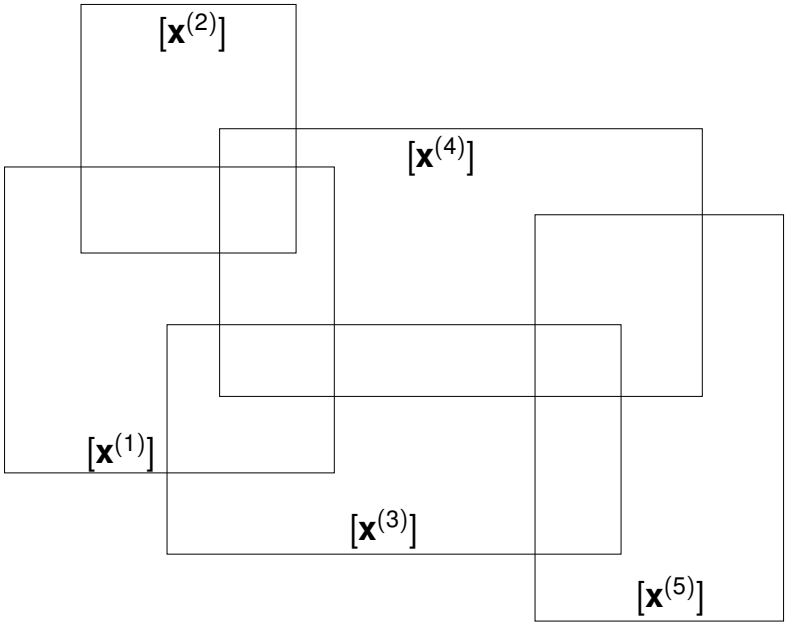
This process can be repeated on every dimension.

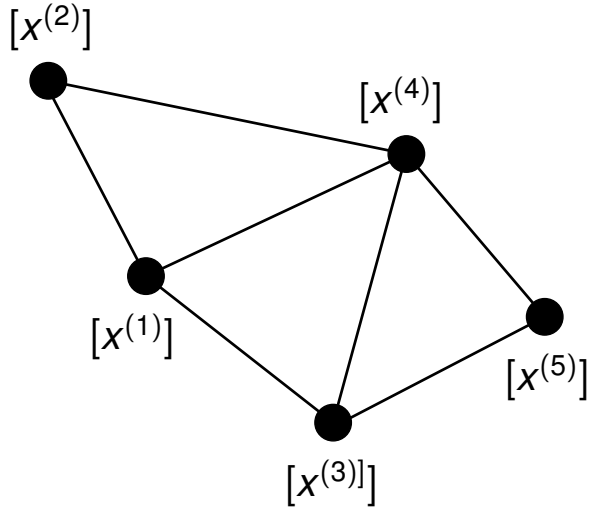
Outline

Complexity issue

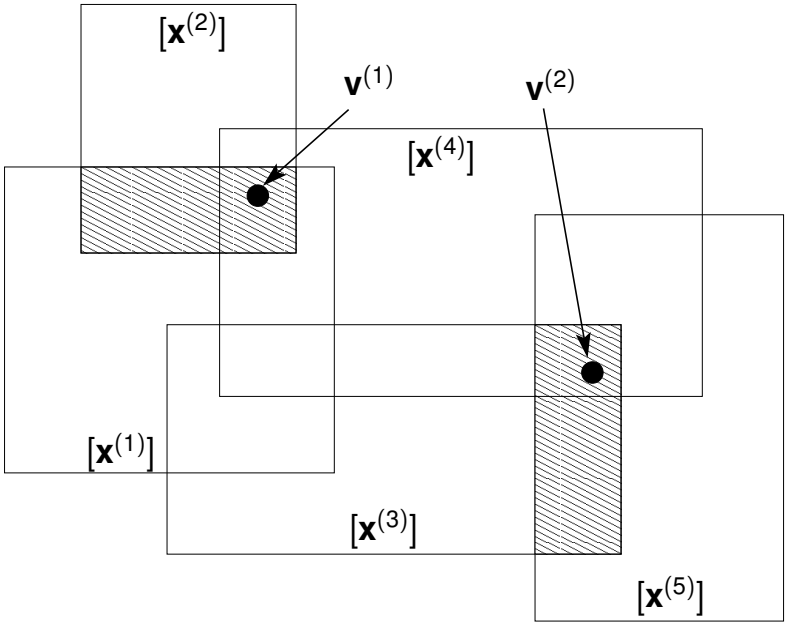


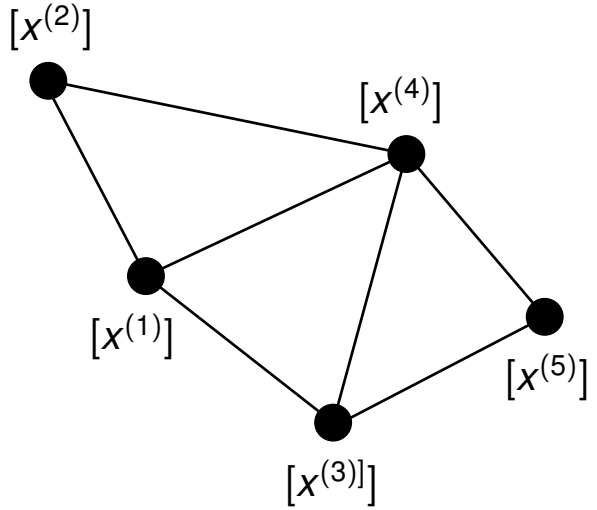
Complexity issue





Complexity issue





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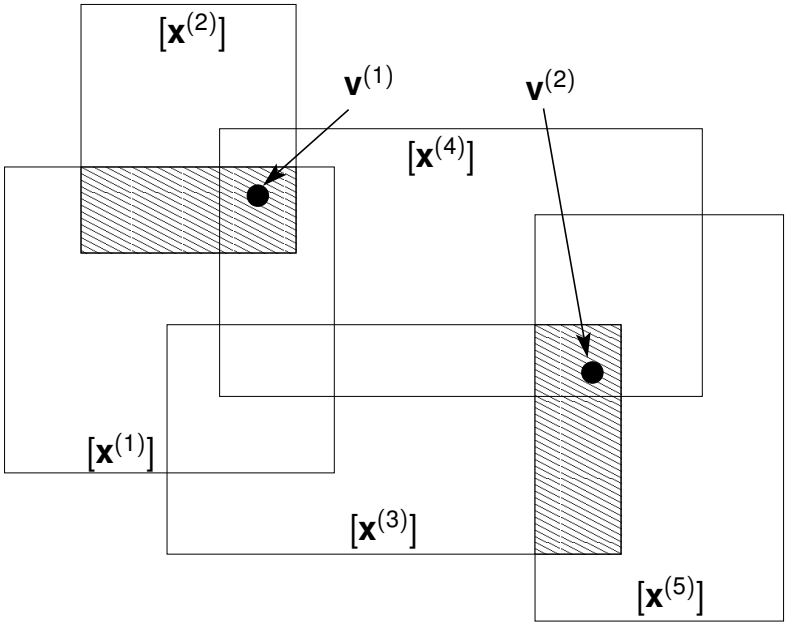

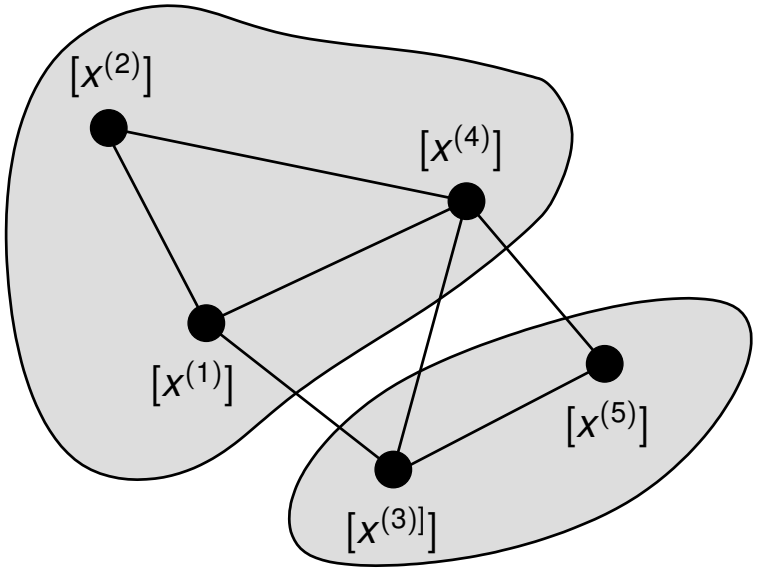

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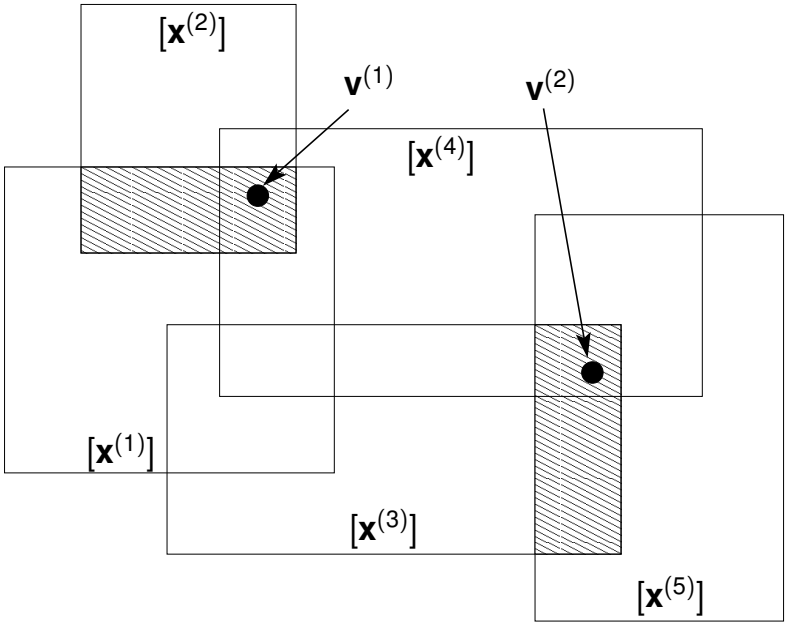
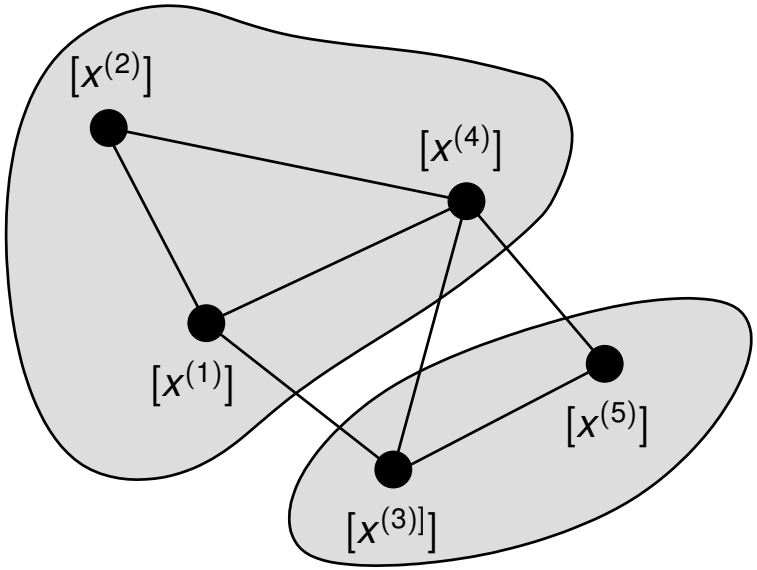
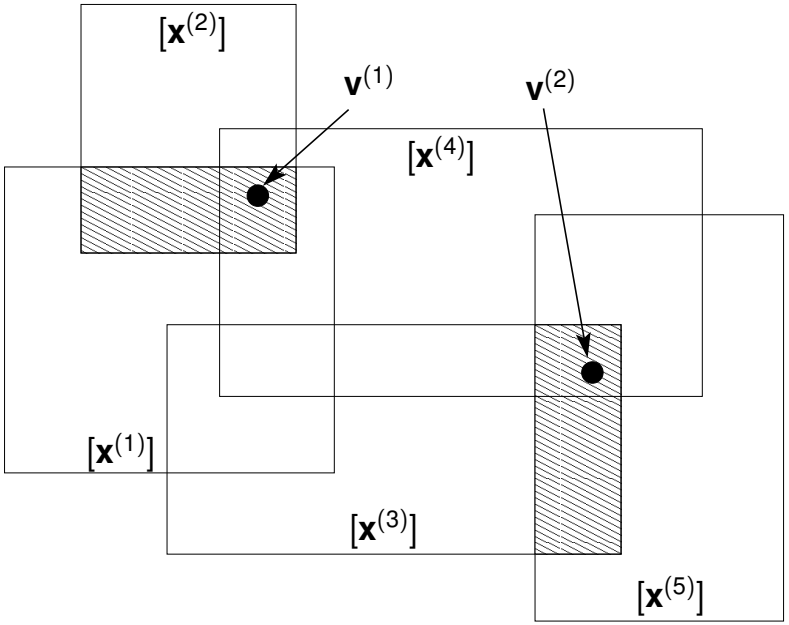


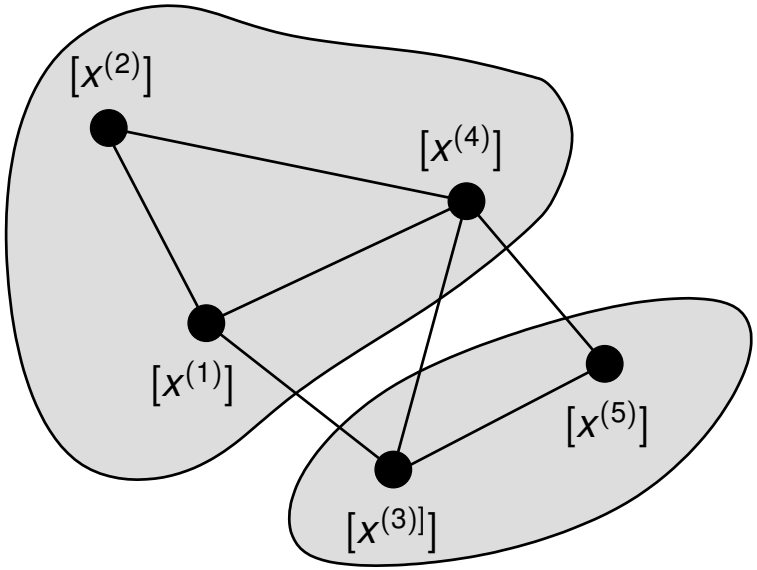
Detections



Rectangle graph

Complexity issue





Detections

Rectangle graph

RCP

Can a rectangle graph be partitioned into n cliques ?

Complexity issue

From planar vertex cover to rectangle clique partition

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