

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

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# Outline

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

The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

- 1 The SLAM problem
- 2 The NVector constraint
- 3 Algorithm
- 4 Complexity issue

# The SLAM problem

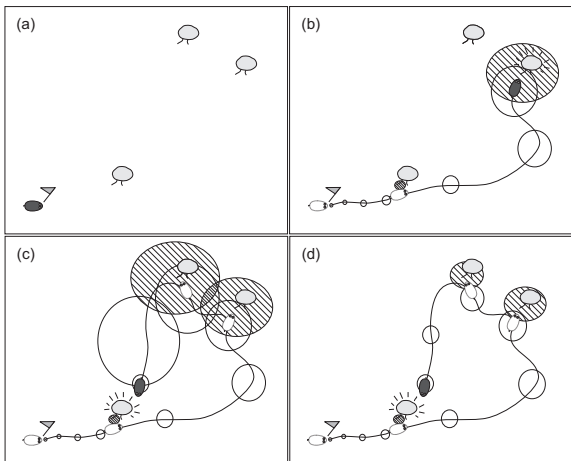
A Constraint on the Number of Distinct Vectors with Application to SLAM

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Complexity issue



Potential mistakes : omission, illusion, mismatching.

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Distinct  
Vectors with  
Application to  
SLAM

The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

- 1 The SLAM problem
- 2 The NVector constraint
- 3 Algorithm
- 4 Complexity issue

# The NVector constraint

A Constraint  
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Number of  
Distinct  
Vectors with  
Application to  
SLAM

The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

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

$$\text{atmost\_nvector}(n, \{\mathbf{x}^{(1)}, \dots, \mathbf{x}^{(k)}\}) \\ \iff |\{\mathbf{x}^{(1)}, \dots, \mathbf{x}^{(k)}\}| \leq n.$$

# The NVector constraint

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on the  
Number of  
Distinct  
Vectors with  
Application to  
SLAM

The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
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$$\begin{aligned} \text{atmost\_nvector}(n, \{\mathbf{x}^{(1)}, \dots, \mathbf{x}^{(k)}\}) \\ \iff \\ |\{\mathbf{x}^{(1)}, \dots, \mathbf{x}^{(k)}\}| \leq n. \end{aligned}$$

# The NVector constraint

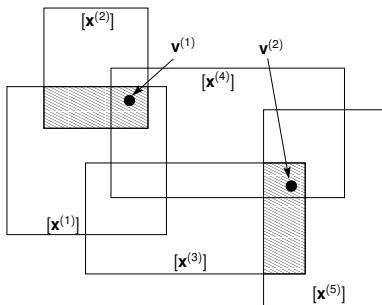
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The SLAM problem

The NVector constraint

Algorithm

Complexity issue



Initial state

# The NVector constraint

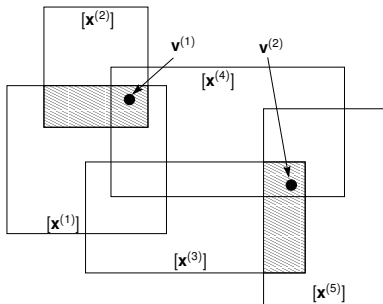
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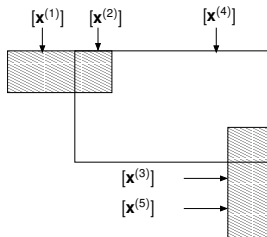
The NVector constraint

Algorithm

Complexity issue



Initial state



Final state

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Distinct  
Vectors with  
Application to  
SLAM

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problem

The NVector  
constraint

Algorithm

Complexity  
issue

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- 2 The NVector constraint
- 3 Algorithm**
- 4 Complexity issue

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A Constraint  
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Number of  
Distinct  
Vectors with  
Application to  
SLAM

The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

## In one dimension



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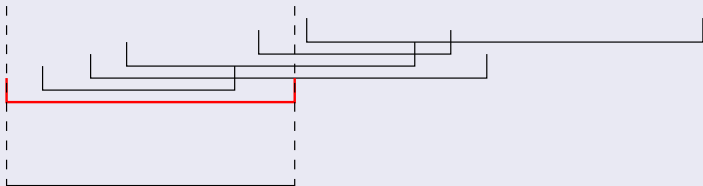
The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
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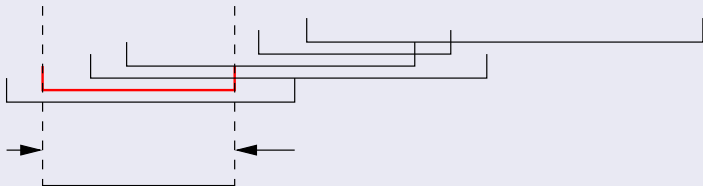
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The NVector  
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Algorithm

Complexity  
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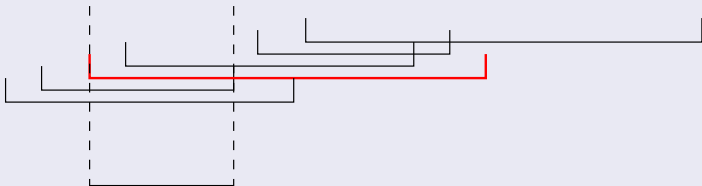
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The NVector  
constraint

Algorithm

Complexity  
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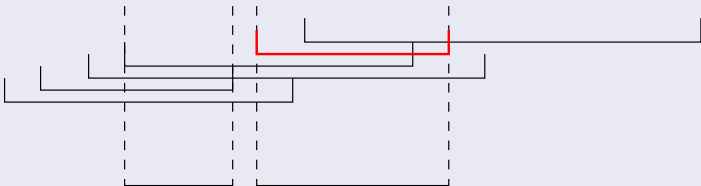
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The NVector  
constraint

Algorithm

Complexity  
issue

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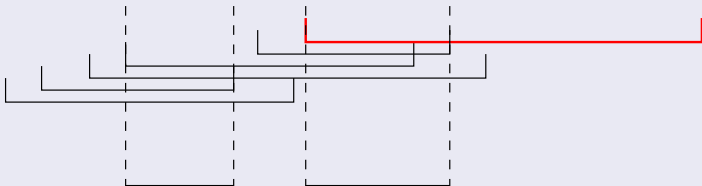
The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
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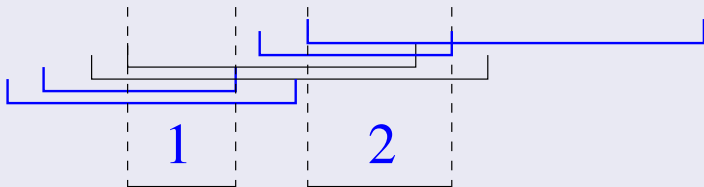
The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

In one dimension



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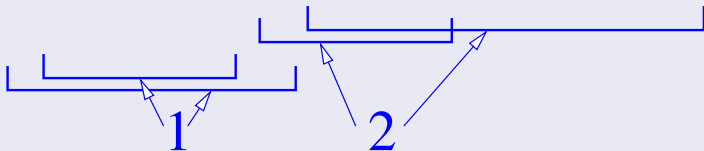
The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
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Application to  
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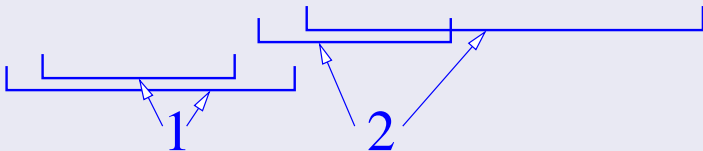
The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

In one dimension



This process can be repeated on every dimension.

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Vectors with  
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SLAM

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Complexity  
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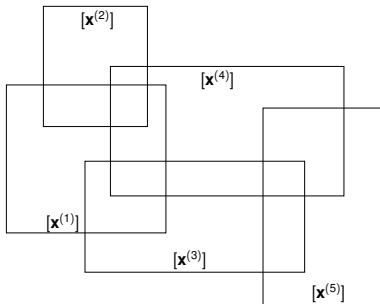
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Application to  
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The SLAM  
problem

The NVector  
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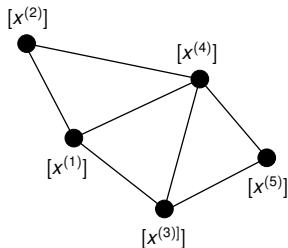
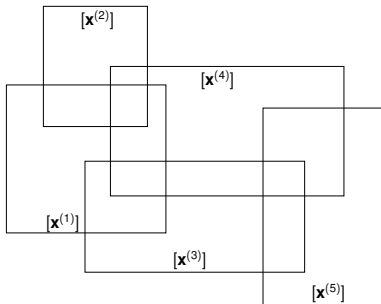
Algorithm

Complexity  
issue



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on the  
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Vectors with  
Application to  
SLAM



The SLAM  
problem

The NVector  
constraint

Algorithm

Complexity  
issue

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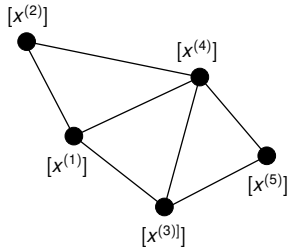
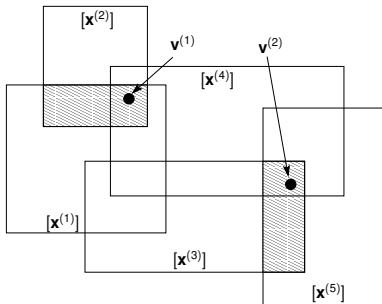
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The SLAM problem

The NVector constraint

Algorithm

Complexity issue



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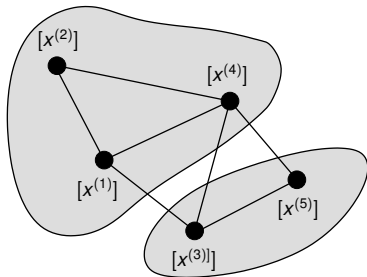
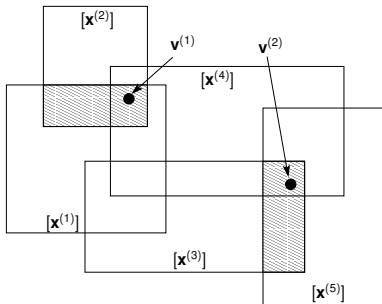
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The SLAM problem

The NVector constraint

Algorithm

Complexity issue



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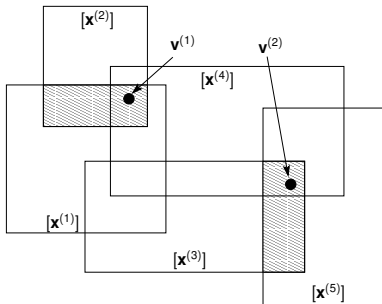
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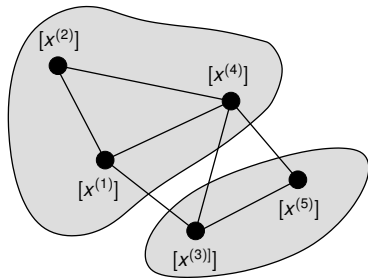
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Algorithm

Complexity  
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Detections



Rectangle graph

# Complexity issue

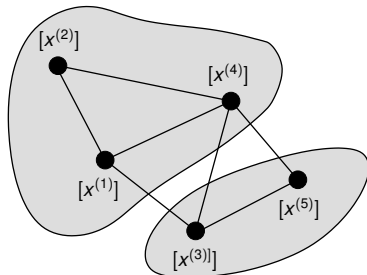
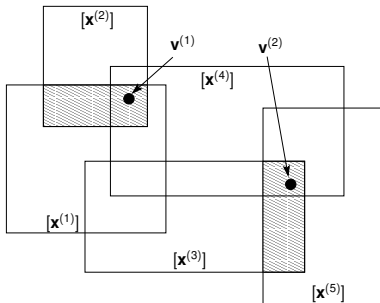
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The SLAM problem

The NVector constraint

Algorithm

Complexity issue



Detections

Rectangle graph

RCP

Can a rectangle graph be partitioned into  $n$  cliques ?

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problem

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constraint

Algorithm

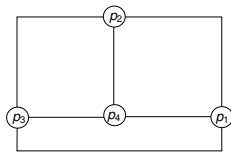
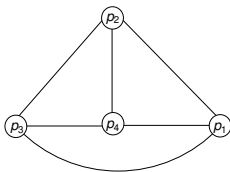
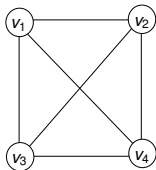
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From planar vertex cover to rectangle clique partition

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Number of  
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Vectors with  
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SLAM

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problem

The NVector  
constraint

Algorithm

Complexity  
issue