

Mathematical Foundations of Computer Graphics & Vision



Graded Exercise 2

Today!

- Info
- Handout, exercise 2
- Q&A

Info

Next week

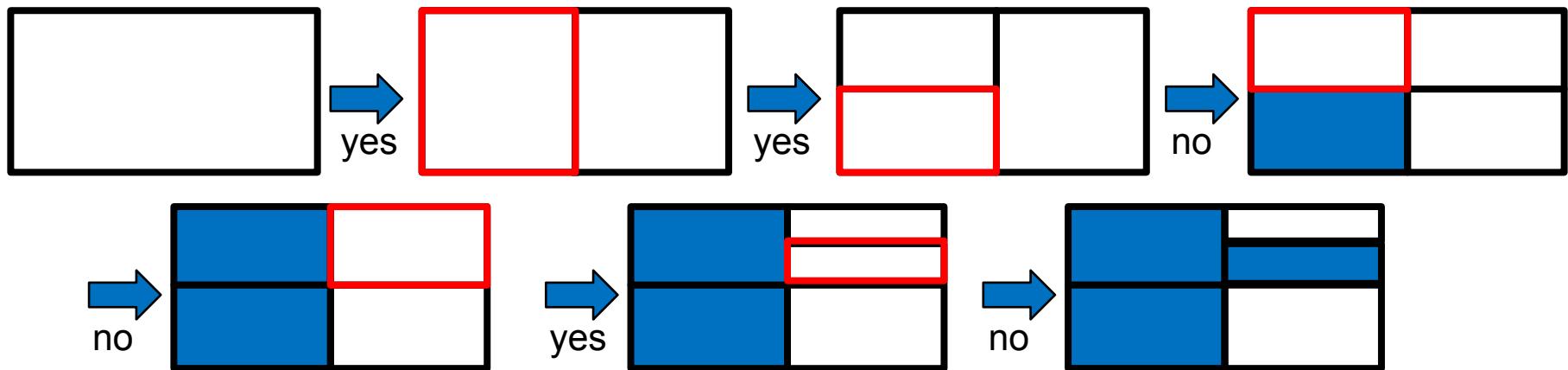
- Deadline for Exercise 1: 12.03.2024 at 23:59

Today

- New exercise, deadline in 2 weeks (26.03.2024 at 23:59)

Exercise 2

Branch and Bound



Exercise 2

Branch and Bound for image translation

Translation model:

$$\Theta = (T_x, T_y) \in \mathbb{R}^2$$

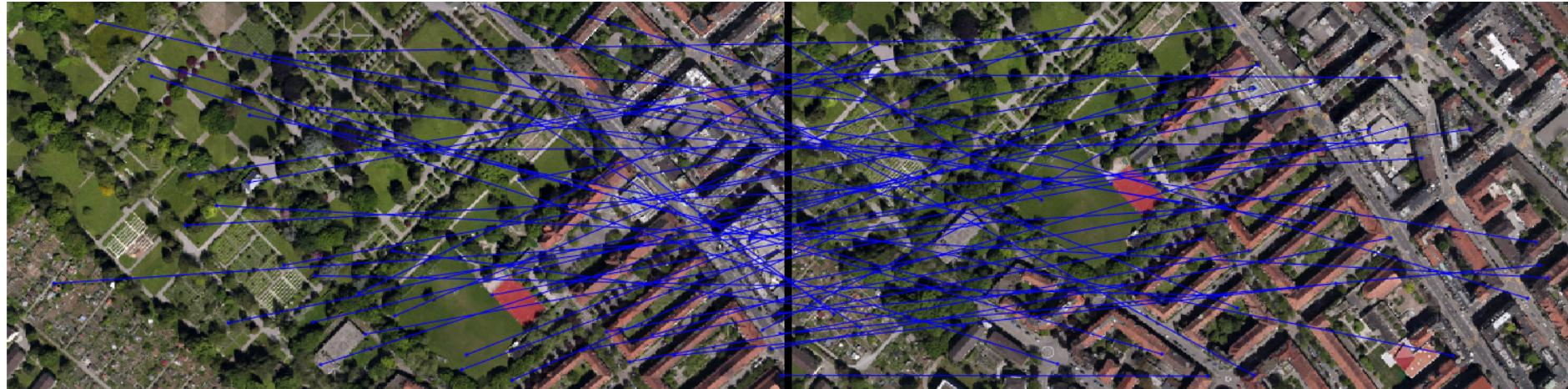


Exercise 2

Branch and Bound for image translation

Translation model:

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Exercise 2

Branch and Bound for image translation

Translation model:

$$\Theta = (T_x, T_y) \in \mathbb{R}^2$$



Exercise 2

- Problem can be formulated as:

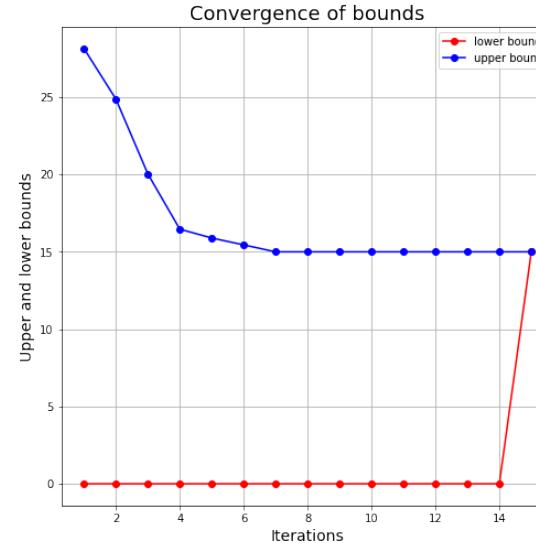
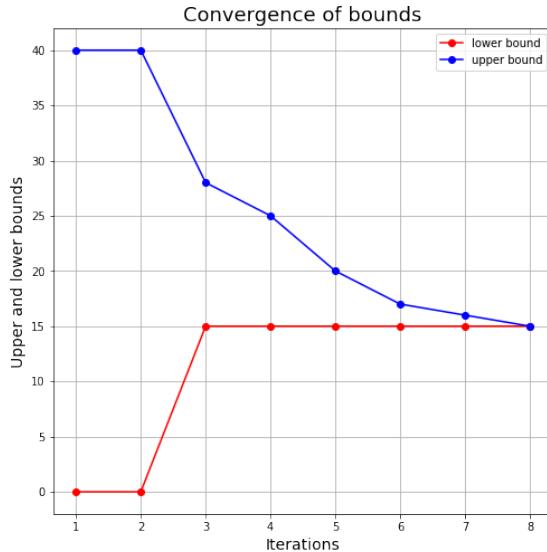
$$\max_{\Theta, S_I} \text{card}(S_I)$$

$$\text{s.t. } |x_i + T_x - x'_i| \leq \delta, \forall i \in S_I \subseteq S$$
$$|y_i + T_y - y'_i| \leq \delta, \forall i \in S_I \subseteq S$$

- Introduce identification binary z
- Need to derive it in the canonical form of LP (reformulate bilinear, absolute terms)
- Iteratively solve LP with tightened bounds from BnB
- For each region compute:
 - Upper bound of inliers by LP
 - Lower bound by any feasible solution, e.g. point in the center of the region

Exercise 2

Branch and Bound for image translation



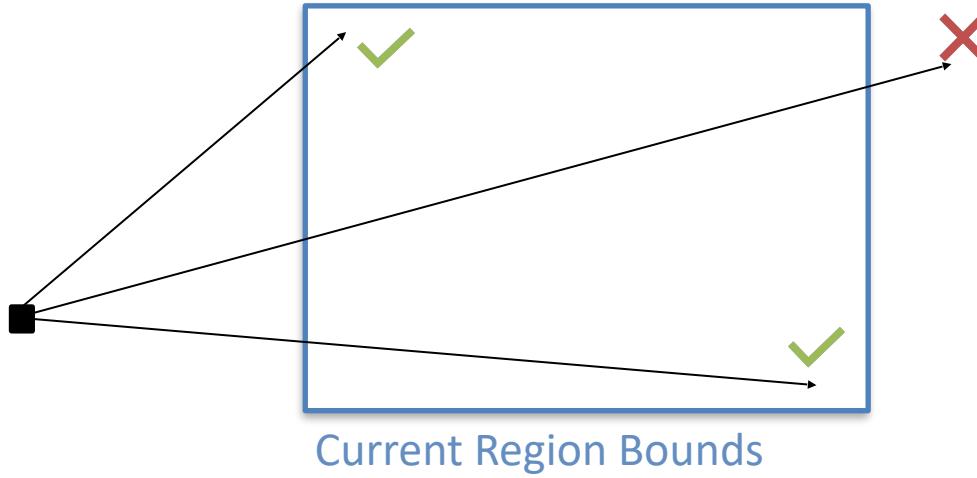
Convergence depends on the initial bounds and your strategy

Exercise 2

Required outputs:

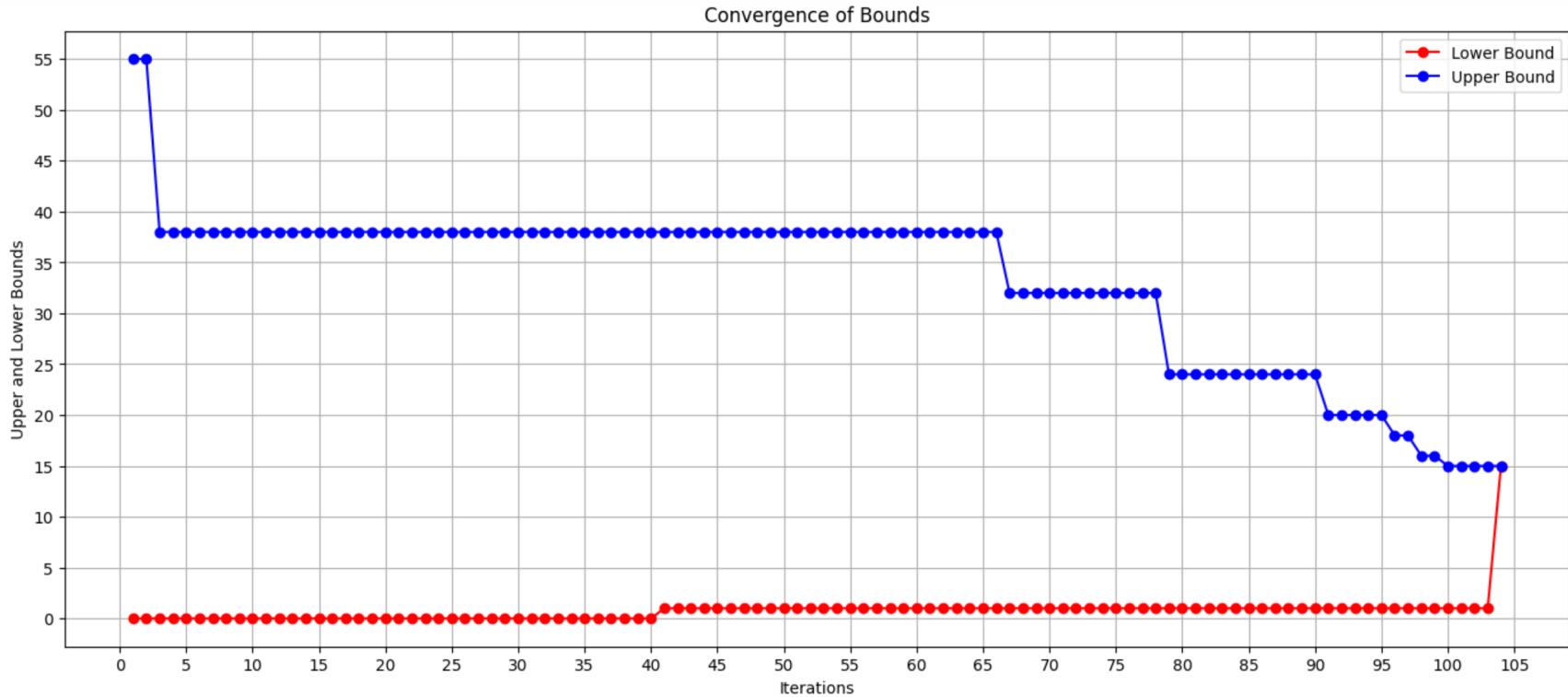
- Derivations
- Code
- Results of the model (inliers/outliers)
- Figures for found inliers and convergence of bounds

Naive Upper Bound



Implemented in the provided notebook

Naive Upper Bound



End of Handout 2

Questions?