Localization 1: Dudek-Romanik-Whitesides Localization

Visibility cell decomposition

Visibility cell decomposition

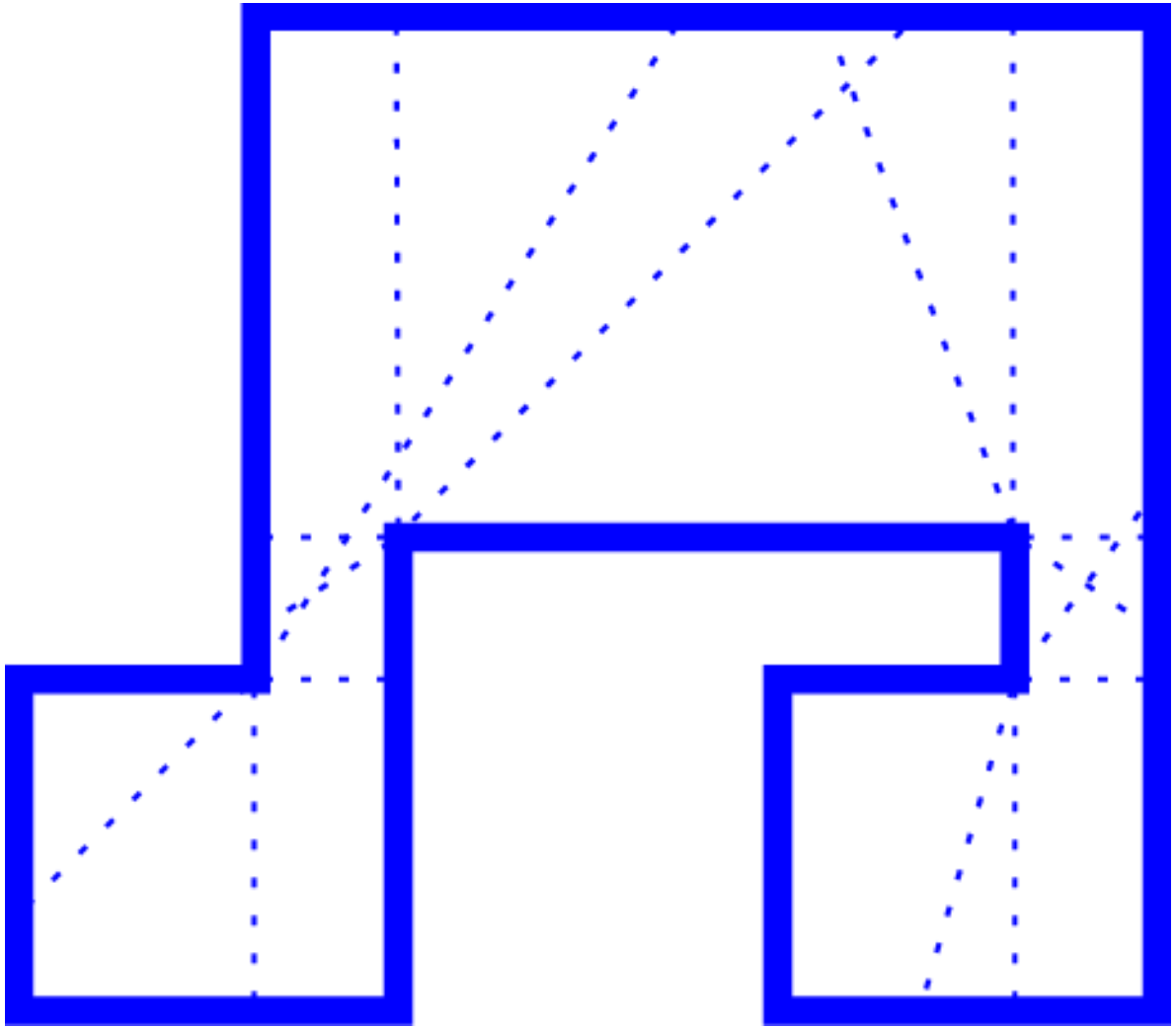
Visibility cell decomposition: Divide the environment polygon by drawing rays

- outward from each pair of **mutually visible vertices**, and
- outward from the incident edges of each **reflex vertex**.

Why?

When the robot crosses one of these boundaries its visibility polygon gains or loses a vertex.

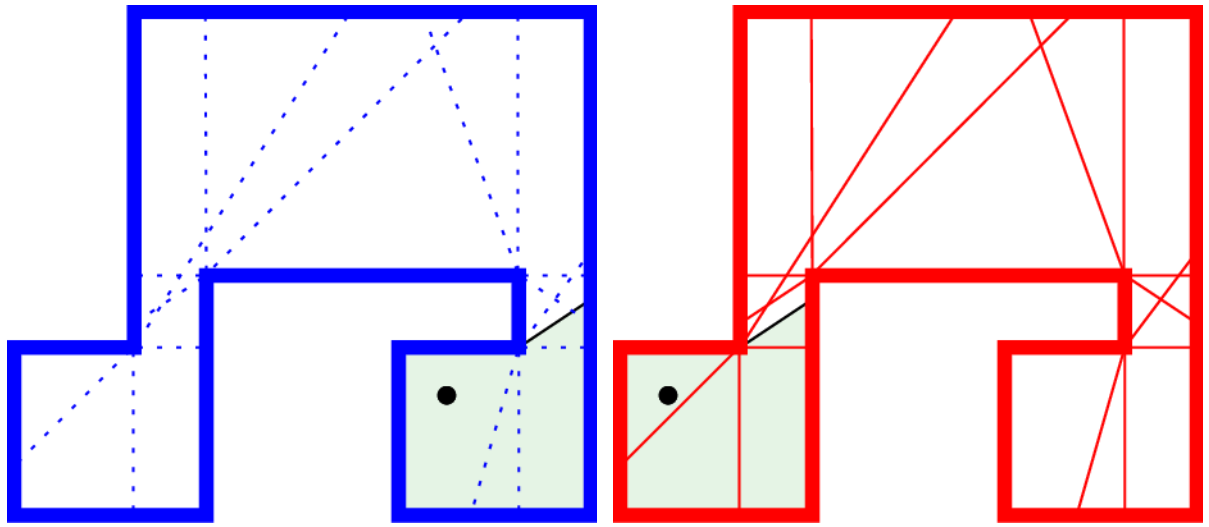
Visibility cell decomposition



Environment overlays

How does the visibility cell decomposition help us?

- Form an **overlay** with one copy of the environment for each candidate.
- **Translate** each copy so that the candidate state is at the origin.



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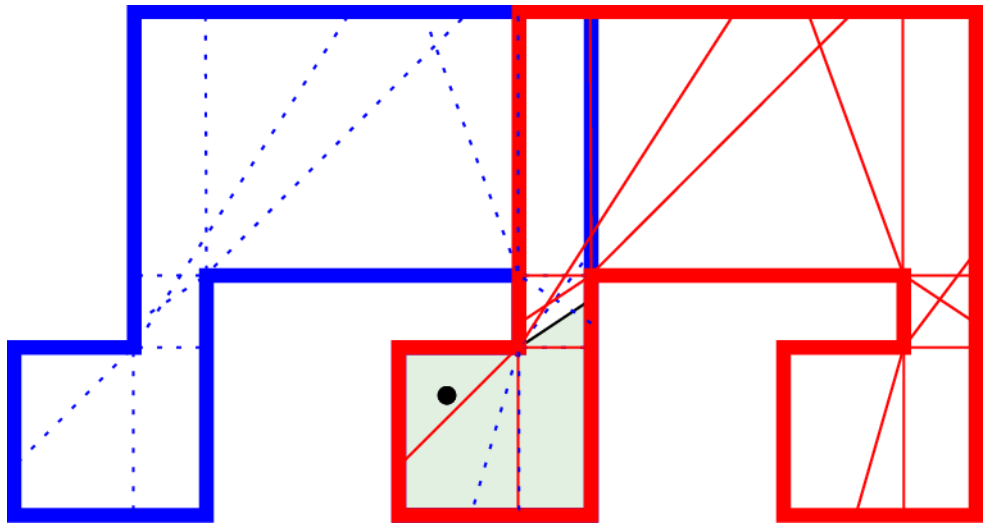

Hypothesis elimination algorithm

Algorithm:

- If there is only one candidate, generate a leaf node and stop.
- Otherwise, compute the overlay, including visibility cell decompositions, for all of the candidate states.
- Choose a destination that moves to a different cell in some, but not all, of the overlay layers. Generate an internal node with this motion.
- For each candidate: Compute the visibility polygon at the new position.
- For each unique visibility polygon: Recursively compute a decision tree for the corresponding candidates.