Visibility Contractors: Application to Mobile Robot Localization

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Résumé en anglais	Visibility is studied and used in several fields: computer graphics, telecommunication, robotics... For instance, in Computer-aided design (CAD) synthesis images are created by simulating light propagation in a scene. Visibility notions are then necessary to compute the visible objects from a point of view, and the shadow of those objects. In mobile robotics the visibility is used for path planning (visibility graph) and localization problems. This presentation is about visibility information for mobile robot localization. The objective is twofold. First a visibility notion based on segment intersections is presented. By considering a set-membership approach it is possible to develop contractors associated to this visibility relation. Then two applications of those visibility contractors to mobile robot localization are presented. The first one corresponds to the pose tracking of a team of robots. The idea is to use a Boolean information (the visibility between two robots: two robots are visible or not) in order to avoid the drifting of those robots (in order to maintain the precision of their position estimations). The second application corresponds to the processing of an original constraint for a set-membership global localization algorithm. This global localization algorithm is based on a CSP approach (Constraint Satisfaction Problem). Adding a visibility constraint to this CSP improves the accuracy of the algorithm.
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