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Path planning

The path planning algorithm proposed is an hybrid between **uniform box clustering** heuristic approach and **vector fields.**

Uniform box clustering (now **UBC**) divides space into uniform fixed-sized cubes. Depth points from the disparity map are truncated to the box containing them. This method enlightens computation by limiting the space perception resolution to just the needed. A good box size approach might be to choose the robot's bounding box size. This way it is easier to find out wether a path is wide enough for the robot.

Vector fields (now **VF**) is a good method for finding an optimal collision-free path. This method can benefit from UBC by reducing the number of vectors computed. FV works by assigning repulsive forces to obstacles and attractive forces to objectives. A vector field is computed regarding the repulsive and attractive forces and the smoothest vector path (the one that curves less) is considered the optimal collision-free path. To reduce computation cost, the vector field can be computed at the boxes' corners (alternatively on mid edges for 2D path planning).

Hybrid implementation merges benefits from UBC and VF to **reduce computation cost** for path planning. UBC creates a block world perspective, where obstacles are truncated into boxes. A fast analysis algorithm eliminates (marks as obstacles) too narrow pathways. From this simplified and fixed-scale matrix VF computes the optimal path.