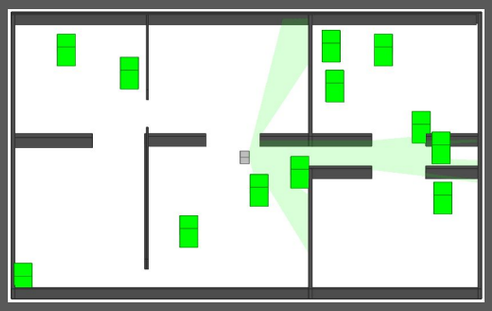
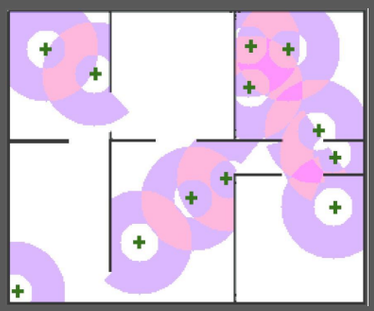
Task-Aware Waypoint Sampling for Robotic Planning



A robot is planning to complete tasks within a continuous space M.

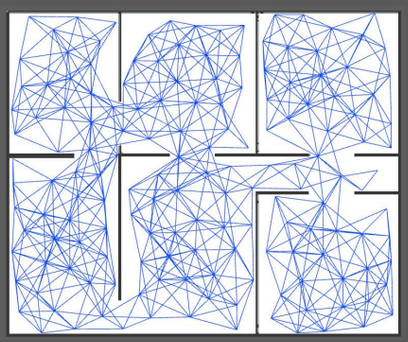
The space is too complex for me! I need abstraction.

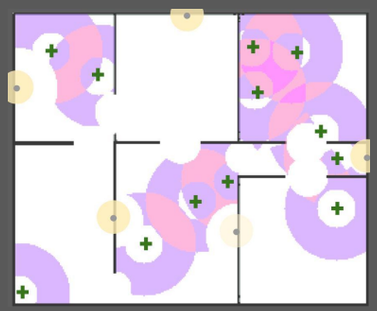


The probability of completing activities is known. Machines (green cross) can be reached from within the pink rings, which represent this probability.

The probabilities are combined into a cost function, C: M x A → [0,1] .

A *dense* symbolic representation of the space is generated to capture the connectivity information.

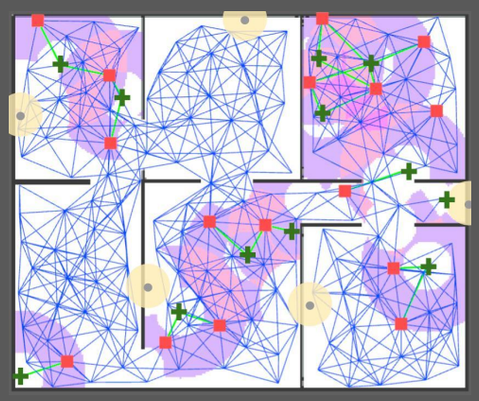


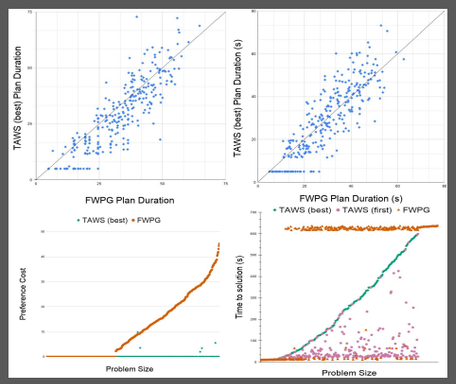


Other preferences are added to the cost function. For example, avoid obstructing first aid kits mounted on the walls.

Waypoints (red) are sampled from the *dense* roadmap - based on the underlying probability distribution - to be used for task planning.

Resampling: (a) more waypoints to find a better solution (b) fewer waypoints if the planning task is still too complex.





This approach produced plans of **shorter duration** that are **found more quickly** (compared to using discretisation without sampling) and **comply with soft preferences**.

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