UIR - Project Report

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Used Solution

I tried to satisfy as many options from the scoring table as possible. I satisfied the following:

1. **Report (1 pt)** You are reading it at the very moment.
2. **Code Style (2 pts)** I tried hard to make my code short, clear, and modular. All important stuff is coded in small functions. Variable and function names are short but descriptive. Comments included where appropriate.
3. **Mapping M1+M2 (1+2 pts)** I use a dynamic size grid map, starting with 1x1 size and resizing as required.
4. **Frontiers F1+F2+F3 (1+2+7 pts)** I used all possible methods - centroids, k-means clustering, and mutual information entropy calculation. I used raytracing for the F3 tasks as requested to obtain maximum points.
5. **Planning P1+P2+P3 (1+2+4 pts)** I used all possible methods - closest frontier, highest mutual information gain, and TSP solution. Because these methods are mutually exclusive I included an argument parameter that allows you to select any of them. Read more in the Parameters section.
6. **Additional Extensions A1+A3 (5+0 pts)** I used the greedy goal, fully centralized multi-robot simple task-allocation. All robots are initialized in a single script Explorer.py. Sadly I didn't have enough time to implement the more advanced multi-robot methods.

Total sum (if everything is correct): **28 pts**.

How to Run

The "Explorer.py" file has a main method inside and is runnable. Tested with Python 3.9. There is one required argument described in the following section.

Command example:

python3.9 Explorer.py p1
python3.9 Explorer.py p2
python3.9 Explorer.py p3

Parameters

My robot accepts a single argument used to change the planning method and accepts 3 different values.

Use value "p1" to use the F2 frontier selection method and P1 planning method.
Use value "p2" to use the F3 frontier selection method and P2 planning method.
Use value "p3" to use the F2 frontier selection method and P3 planning method.

Using this parametrization, I simultaneously satisfied the mutually exclusive P1, P2, and P3 tasks.