2.680 – Lab 9
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Brief explanation of strategy

For this first approach at the Collaborative Search exercise, John and I have chosen to focus on a statistical approach to hazard identification. Starting from the baseline mission, we have modified the HazardMgr code to register for the HAZARD_REPORT sent by the shore side community. The message is then processed and stored in a set of vectors that contain the "label", "weight" and "count" of each point-of-interest:

label: if a given HAZARD_REPORT contains data for a known point, the message processor will add the values of weight and count to the data stored in memory; otherwise, a new element will be created in each of the vectors to store the incoming values.

weight: the weight is the number of times a given point has been identified as a hazard; on every instance of HAZARD_REPORT, the weight is increased by 1 if the point is regarded as a hazard but remains unmodified otherwise (increase by 0).

count: stores the number of instances of HAZARD_REPORT received for a given point; it is increased by 1 every time and is compared with the weight to determine the probability that the point is truly a hazard or if it should be reported as one.

Upon receiving a REPORT_REQUEST, one of the vehicles (denominated the SLAVE vehicle) sends a message to its collaborator, which contains the detection data (label, weight, count) in local memory. The MASTER vehicle then merges its own data with the information received from the SLAVE to increase the statistical certainty for any given point. With a critical normalized weight given by the penalty system (in this initial version this has been manually set as $\geq 50\%$), the program is then able to determine whether a given point should be reported to the shore side as a potential hazard.