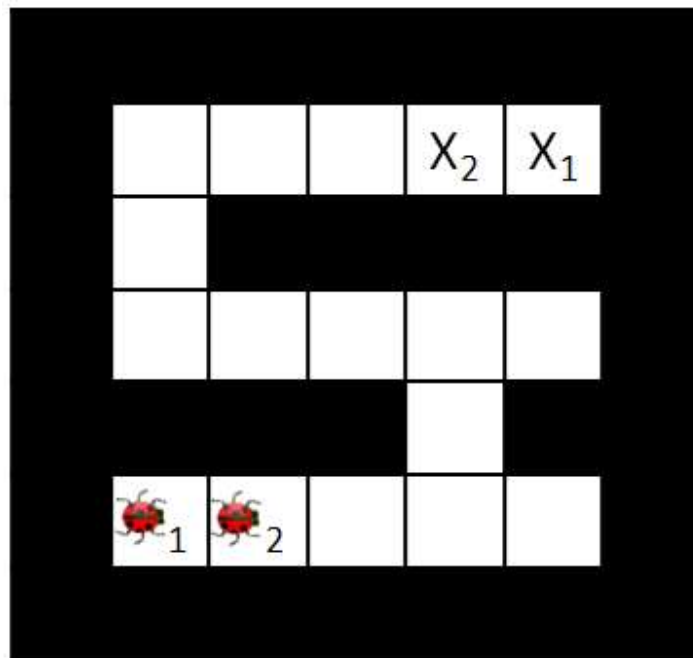


hw1_search_q6_hive_minds_swarm_movement

Question 6: Hive Minds: Swarm Movement

9/9 points (ungraded)

You control K insects, each of which has a specific target ending location X_k . No two insects may occupy the same square. In each time step all insects move **simultaneously** to a currently free square (or stay in place); adjacent insects cannot swap in a single time step.



Which of the following is a minimal correct state space representation?

- ☒ K tuples $((x_1, y_1), (x_2, y_2), \dots, (x_K, y_K))$ encoding the x and y coordinates of each insect. ✓
- ☐ K tuples $((x_1, y_1), (x_2, y_2), \dots, (x_K, y_K))$ encoding the x and y coordinates of each insect, plus K boolean variables indicating whether each insect is next to another insect.

- ☐ K tuples $((x_1, y_1), (x_2, y_2), \dots, (x_K, y_K))$ encoding the x and y coordinates of each insect, plus MN booleans indicating which squares are currently occupied by an insect.
- ☐ MN booleans $(b_1, b_2, \dots, b_{MN})$ encoding whether or not an insect is in each square.

What is the size of the state space?

- ☐ MN
- ☐ 2^{MN}
- ☐ KMN
- ☒ $(MN)^K$ ✓
- ☐ $(MN)^K 2^K$
- ☐ $(MN)^K 2^{MN}$
- ☐ $2^K MN$
- ☐ 2^{MNK}

Which of the following heuristics are admissible (if any)?

- ☐ Sum of Manhattan distances from each insect's location to its target location.
- ☐ Sum of costs of optimal paths for each insect to its goal if it were acting alone in the environment, unobstructed by the other insects.
- ☒ Max of Manhattan distances from each insect's location to its target location.

☒ Max of costs of optimal paths for each insect to its goal if it were acting alone in the environment, unobstructed by the other insects.

☐ Number of insects that have not yet reached their target location.



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✓ Correct (9/9 points)