**MIDTERM PROPOSAL – 2D Expectation Maximization**

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**Research question(s):**

Partially observable expectation maximization using two agents(blue and yellow) on a 2-D matrix with a Gaussian mixture of blue and yellow distributions used to drop samples on the grid that the agents have to look for.

**Description of data to be used:**

The data would be generated using sampling from two gaussian distributions that would be used in our simulations.

**Planned methodology:**

Goal of Blue Agent: find and sit on square of maximal blue reward (peak of blue Gaussian).

Goal of Yellow Agent: find and sit on square of maximal yellow reward (peak of yellow Gaussian).

At each time step, a random sample is taken from distribution and dropped on grid.

At each time step, expectation maximization is performed until convergence and the predicted points of peak blue and yellow are reported to the agents.

At each time step, agents update their policies to take a step towards current perceived peak.

We could also, potentially, compare expectation maximization to alternative methods of belief update and see what allows agents to converge to Gaussian peaks the fastest.