The objective in this project is to find the optimum route between the beginning node and the final node of a sensory network. 100 nodes are created in 1100*1100 space. Each node is created in 110*110 space so that the nodes wouldn't be too close.

Generate_nod.m generates 100 nodes and assign random energies to each node: 10J, 20J and 30J. the initial pheromone of each route is set to 1 and the radius of signal propagation is 150m. dist_calc.m calculates the distances of the nodes and put them into a matrix. To avoid choosing a radius longer than 150m, the distances more than 150m are set to infinite. Each packet contains 4096 bits which its transmission energy in distance d is calculated as follows:

$$E_{Tx}(k, d) = E_{elec} * k + E_{amp} * k * d^2$$

The energy for receiving each packet is also calculated through formula below:

$$E_{Rx}(k) = E_{elec} * k$$

So the total energy in a route with L nodes is:

$$E(X) = 2 * (L - 1) * E_{elec} * k + E_{amp} * k * \sum_{i=1}^{L-1} d_{i,i+1}^2$$

The cost function is defined as below:

$$f(X) = \frac{E(X) * L}{E_{Min} * E_{Avg}}$$

We implement the code with 20 ants in 1000 epochs. Every time we have a source node and a sink node and the energy of this route is calculated by energy_calc.m. to move from one node to another we need to know the possible options that is calculated using possible_choices.m in which we use roulettewheel.m. To calculate the cost we use find_path.m.