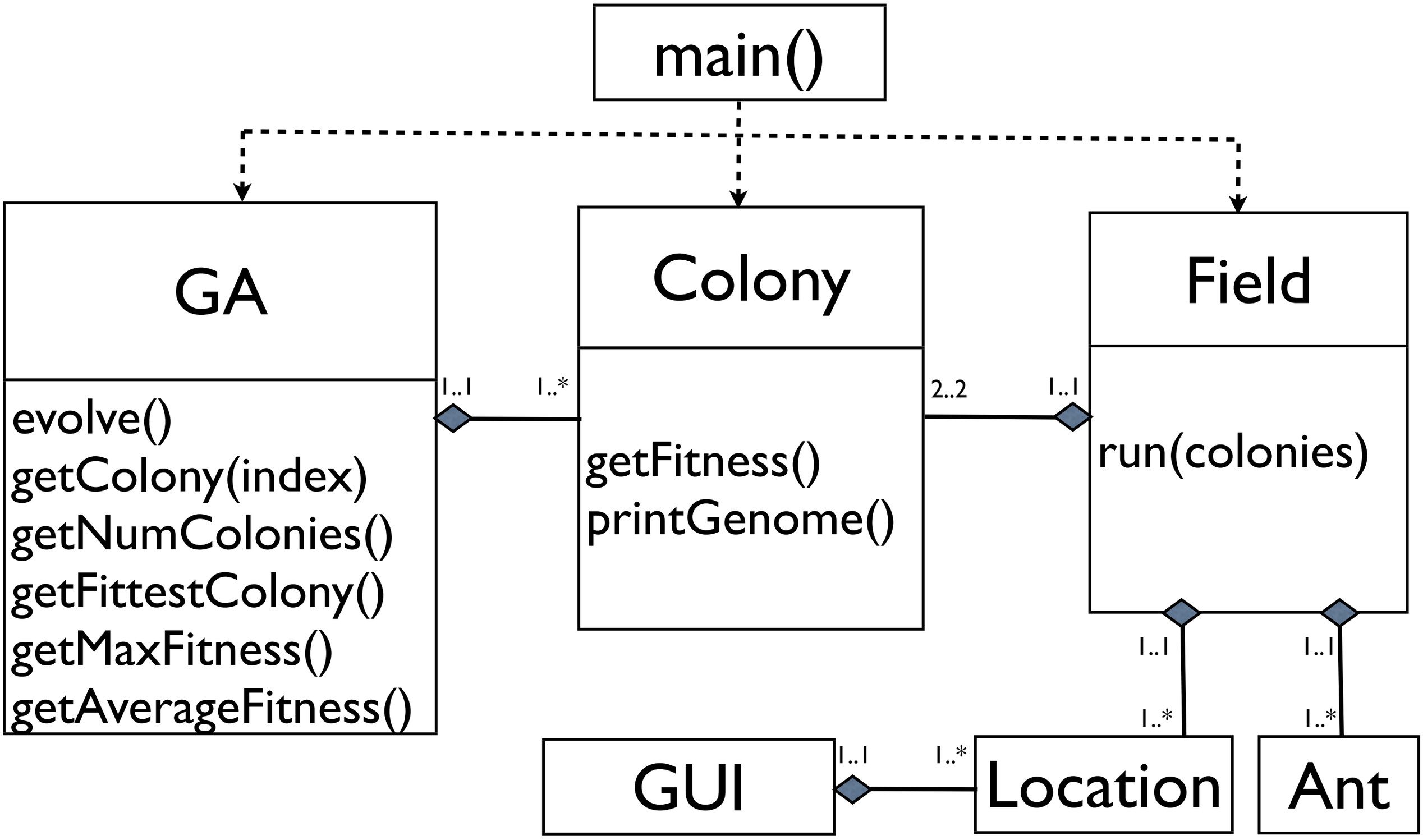
AntBots GA

Overview

- Foraging ants can inspire search algorithms for swarm robotics. (land mines, etc)
- Our AntBots exist on a 2d grid with seeds scattered across it.
- AntBots allows us to evolve search behavior using GAs to optimize the search for objects in their environment.
- In the version you have there are two teams/colonies of AntBots that can act cooperatively or competitively.

Class Relationships



Program Flow

```
Instantiate GUI, GA1, and GA2

for 0 to n_generations
{
  for 0 to n_interactions
  {
     Instantiate a Field

     pick a colony from GA1 and one from GA2

     place the 2 colonies in the Field

     for 0 to n_steps { Field::run() }
   }
   GA1::evolve(); GA2::evolve()
}
```

Field::run()

- Iterates over all the ants associated with each colony.
- The colony's genome determines the probability that the ant will chose a particular action.
- Each ant can drop pheromone, pick a direction to move, pick up a seed, use site fidelity, choose to follow a pheromone trail, etc (see parameter table on the website)

GA::evolve()

- Uses mutation, crossover, tournament selection, etc. to create a new generation of colonies determined by the fitness of the previous population.
- In competitive colonies the proportion of seeds collected is the basis for fitness.
- In cooperation mode the total number of seeds collected is the basis for fitness.