|  |  |  |
| --- | --- | --- |
| **No** | **Class** | **Responsibilities** |
|  | Logger | * Responsible for all logging * Log() |
|  | Config | * Abstract class * Read(filename) implemented method, will read file on to string * Get() – abstract * Validate() ­– abstract |
|  | Training | * Singleton * Get() - populate training * Validate() - validate training * Logs entries |
|  | Settings | * Singleton * Get() – populate settings * Validate() – validate training * Logs entries |
|  | Lucy | * Entry Point * main() * Interacts with GeneticProgramManager for program execution * Shows results |
|  | GeneticProgramManager | * Execute()   + Initialize()   + Iterates Generations     - Interacts with Population to evaluate fitness of population     - Test for stop condition using Population.BestIndividual.FitnessValue and MaxDuration     - If stop condition met return Population.BestIndividual.FitnessValue.ToString()     - If stop condition not met interact with Population to produce next generation ProduceNextGeneration() * Initialize() –   + interacts with settings to load settings   + interacts with training to load training data   + interacts with Population to create initial population   + returns population |
|  | Population | * InitializePopulation():   + Iteration: 1 to Initialpopulationsize     - Create new individual * EvaluatePopulationFitness()   + Iterates through population’s Individuals and interacts with Individual to calculate fitness * ProduceNextGeneration (uses settings)   + p = FitnessSelectionOperator.Select(last population)   + next = p   + next.add(crossover.performcrossover(p))   + next.add(mutation.mutate(p))   + return next : Population |
|  | Individual | * Constructor to create tree/Individual   + Interact with tree to create tree * Calculate Fitness   + Iterate through training data     - Interact with tree resolve tree value     - Aggregate results into fitness value * ToString() – overridden method to produce the tree in string format |
|  | BinaryTree | * Has responsibility to create Tree   + Constructor to create tree * ResolveTreeValue() – evaluates single training data set 🡪 float |
|  | FitnessSelectionOperator | Execute(p:Population)   * Select best fit of current population based upon settings.keeper threshold * Select weighted random using current population * Returns Population |
|  | CrossoverOperator | Execute(p:Population)   * Performs crossover on some of the population to produce new individuals * Returns a population of new individuals produced by crossover |
|  | MutationOperator | Execute(p:Population)   * Performs mutation on some of the population to produce new individuals * Returns a population of new individuals produced by mutation |
|  | RandomNumberGenerator | GetInt(r1,r2)   * Gets random int between 1 and 2 * Static class * Used by any class in need of a random numbers |