Triangle Genome User Documentation

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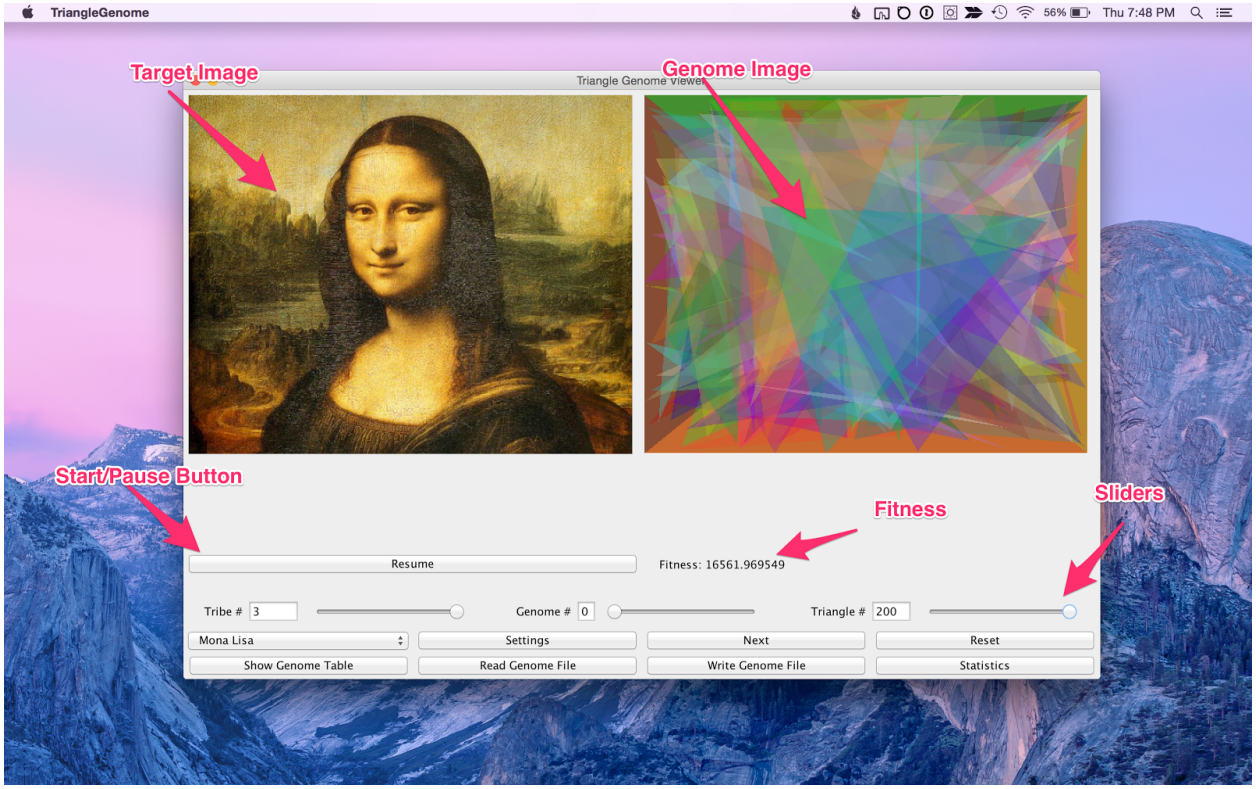
GUI



The target image is the image the genome is trying to match.

The Genome image is the current representation of the selected genome

Buttons

Buttons designated with PO mean they only work when the genetic algorithm is paused and the genetic algorithm has already been started.

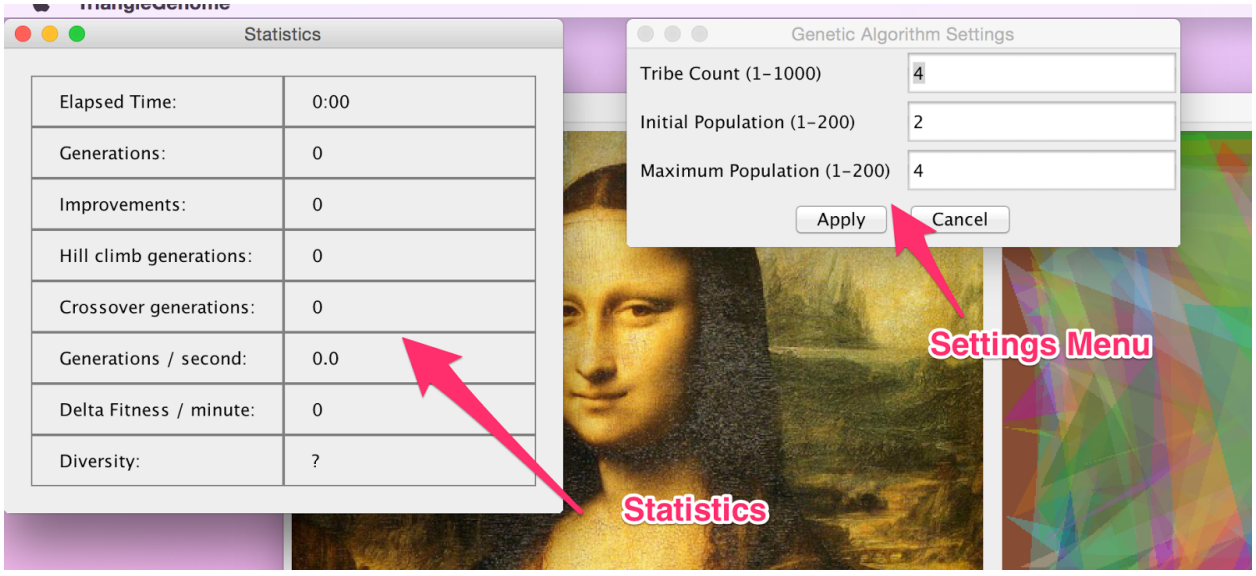
- **Start/Pause/Resume:** starts the genetic algorithm with specified tribes and population sizes.
- **Image Selection Box**: Selection of images to try, starts as Mona Lisa

- **Settings:** allows the user to specify number of tribes (each runs on a thread), initial population and maximum population (with found good defaults).
- **Next (PO):** runs the next genetic algorithm loop in all tribes
- **Reset:** resets the genetic algorithm to empty and uninitialized, deletes all data
- **Show Genome Table (PO)**: shows the current genetic table for the displayed genome in a new window, does not update
- **Load Genome File (PO):** load a saved genome (xml or txt) into the current tribe's population
- **Write Genome File (PO):** write a genome to a file (xml and txt format are valid selections, xml is default)
- **Statistics:** show the statistics in another window including running time for the current run

Sliders

- **Tribe #:** selects which tribe to view in the genome viewer, the text field can also be used, value is only changed on pressing enter
- **Genome #:** selects which genome of a tribe's population to view in the genome viewer, the text field can also be used, value is only changed on pressing enter
- **Triangle #:** Selects how many of the overlapping triangles to display 0-200

Settings and Statistics



The settings menu allows setting:

- Number of tribes to run with
- Initial population of each tribe
- Maximum population of each tribe

Statistics Window

Statistics shows:

- Elapsed time
- Generations (hill and crossover)
- Improvements
- Hill climbing generations
- Crossover generations
- Generations per second
- Delta fitness/min: This is how much fitness has changed in the last minute
- Diversity: This is the average hamming distance of genomes in a tribe

General Information

Triangle Genome tries to recreate a target image selected from the GUI through a combination of hill climbing and genetic breeding (crossover). The generated image is created first using 200 overlapping triangles of randomly chosen size and color and then using a genetic algorithm to improve the fitness of the generated image. Fitness is calculated using the square of the Euclidean distance between all pixel color values of an image, and then is divided by the pixel count. (Color values are red, green, and blue).