User Documentation

<u>B.A.R. G.A.M.E.</u>
Better Arithmetic Reasoning Generated by Acknowledging Minority Experiences

<u>Group 7</u>

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Demo 1

May 2, 2012

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So what is B.A.R. G.A.M.E.?

B.A.R.G.A.M.E. stands for Better Arithmetic Reasoning Generated by Acknowledging Minority Experiences.

This is a project for the Rutgers University Electrical and Computer Engineering course:
14:332:452 Software Engineering

This application is based on the **El Farol Bar Problem**, also known as **Minority Game** in Game Theory. An more in depth explanation of the Minority Game can be found at:
http://en.wikipedia.org/wiki/El_Farol_Bar_problem

For more information about the B.A.R. G.A.M.E. application visit our website at:

http://bargame.info/

Main Window

This window is the first window that is presented to the User when the application has been started. The user inputs data into the desired fields and will be given warnings if the input is invalid for a specific field.

Some of the field groups a User has to choose from include:

- Tutorial
- Population Variables
- Bar Capacity
- Graph Manipulation

Capacity of Bars and other Population variables are explained more in detail in the "Bar Capacity" and "Population Variables" Section's of this help document.
Once all the parameters of the Simulation have been inputted, You are ready to Simulate! To begin press the "Simulate" Button.

Tutorial

In this section, we would like to supply a few sample scenarios in which our Application would normally be used for. We feel this application excels in it giving accurate estimations of dynamic flow of populations interacting with objects of interest (i.e. different stocks, bars, amusement park rides, etc.)
Below we illustrate one fullly defined simulation to help you get familiar with the GUI interface and different options available to you.

Sample 1: Stock Market

Suppose you are a stock broker that invests only in the top 8 best performing stocks of the current year. You can at maximum purchase 10,000 stocks a day at the New York Stock Exchange. The purchases on each day are unique and a trend should emerge after a certain amount of time showing the optimized purchasing ratio. You also know that each of the stocks have a potential max quantity of 2,000 shares to be potentially bought. You want to decide which stocks to invest and in what combination in order to make the most money for the remaining fiscal year.

Once you application is launched, we can deduce the following for the given situation:

- Purchasing a stock(1) is analogous to "going to a bar" with one Agent, and vice versa.
- You are limited to purchasing a maximum of 10,000 stocks a day.
- There are 8 potential stocks to choose from
- Each stock has 2,000 shares in it.

From there we can treat, stock purchases as Agents, the eight(8) distinct stocks as different bars each of which have a static capacity of 2,000. So plug in the following:

- Number of Bars: 8
- Enter either input for Percent Based as 2,000/10,000 which is = 20 or Static Based as 2000
- Number of Agents: 10000

Click Simulate!

Now another window will pop up to display data.
To begin the simulation, click the "Start Simulation" button. Once you press this the simulation will begin.

To view the different statistics of inputted data, click on either dropdown and choose the graph of interest. Note that up to two(2) graphs can be displayed *simulataneously in **real-time!***

For more information on the different types of graphs available click here.

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Bar Capacity

Bar Capacity is a category that manipulates the bar property of the simulation.
Variables that can be modified are:

- [Number of Bars](#)
- [Percent Based](#)
- [Static Based](#)

Delimeters are a comma (,), colon (:), or period(.). You may input one number for the capacity which will be used for all bar capacities.

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Number of Bars

"Number of Bars" sets how many bars are available for agents to go to in the simulation.

The valid range for this is 1-255 bars.

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Percent Based

When the radio button for "Percent Based" is enabled, it tells the simulation that the bar's capacity will be based on a percentage of the current population.

The valid range for this is 1-100 percent.

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Static Based

When the radio button for "Static Based" is enabled, it tells the simulation that the bar's capacity will be based on a constant number.

The valid range for this is 1-16,348 agents.

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Population Variables

Population Variables is a category that manipulates what happens to the population in the simulation. Variables that can be modified are:

- [Number of Agents](#)
- [Death](#)
- [Marriage](#)
- [Birth](#)

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Number of Agents

"Number of Agents" tells the simulation how many agents are in the town.

The valid range for this is 1-16,348 agents.

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Groups

"Groups" tells the simulation that agents can form groups. Within groups, agents will chose a strategy based on their previous history and the group's choice of strategy

This can be checked "on" or "off" by clicking the box.

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Group Size

"Group Size" represents the maximum number of agents allowed in a group.

The minimum value is one and the maximum value is (numberofagents) / 2 * (numberofbars).

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Mortality

"Mortality" tells the simulation that agents can die and be born. The simulation will keep track of agents' age and determine death based on a guassian distribution, and agents will be born based on a random probablitiy.

This can be checked "on" or "off" by clicking the box.

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Average Age

"Average Age" represents the median of the gaussian distribution that age is based on.

The valid range for this is 1-100.

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Score Dropping

"Score Dropping" tells the simulation that agents can get rid of a strategy if it falls below a certain threshold percent.

This can be checked "on" or "off" by clicking the box.

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Alpha

"Alpha" represents the threshold percent of when a strategy is dropped.

The valid range for this is 1-100 percent.

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Simulation/Graph Window

This is the window that comes up once a simulation is underway. This window includes two(2) graph plots to visualize two(2) different statistics at the same time while the simulation is running or is paused. Above each graph plot is a drop down menu which contains the different graphs that can be displayed. This window also features a slider near the bottom. This slider can alter the speed at which the simulation progresses to the next round. Lastly, there is an update button that needs to be clicked when different graph types are selected.

- Types of Graphs
- Speed per Round
- Start Simulation Button
- Update Button

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Types of Graphs

- [Number of Bars that Won](#)
- [Number of Winners](#)
- [Average Score of All Stategies](#)
- [Best Strategy's Score](#)
- [Wins Per Location](#)

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Number of Bars that Won

This graph shows the number of bars that won.

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Number of Winners

This graph shows the number of winners.

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Average Score of All Strategies

This graph shows the average score of all strategies.

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Best Strategy's Score

This graph shows the score of the best strategy.

21 / 25

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Wins per Location

This graph shows the number of wins per location.

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Number of Deaths

This graph shows the number of deaths per round.

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Speed per Round

By moving the slider to the left, the delay between rounds increases, to a maximum of a one second interval. When the slider is at the right end, there is no delay between rounds.

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Start Button

This button begins and pauses the simulation.

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