

*Introducción a Discipulus
(clasificación y regresión con
Programación Genética)*

Discipulus

- <http://www.rmltech.com/>
- Clasificación y regresión con programación genética
- Evoluciona directamente código máquina (aunque puede generar código C o Java)
- Resultados equivalentes o mejores a otros métodos (redes de neuronas, etc.)
- Genera individuos (programas) y también equipos (teams) de una manera similar a bagging

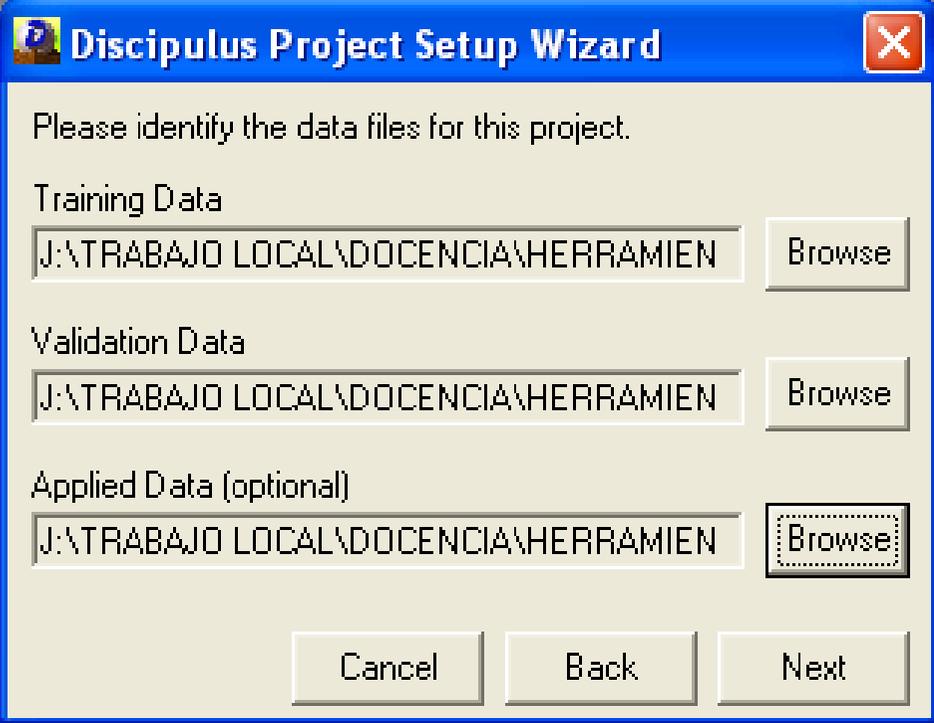
Limitaciones de Discípulus

- Únicamente problemas de clasificación o regresión (no Pacman y similares)
- Clasificación: únicamente biclase
- No admite mas de 45 atributos
- Todos los atributos deben de ser numéricos
- La versión de demostración, no permite ver el código máquina obtenido.

Formato de datos

- Sin cabecera (a diferencia de Weka)
- Atributos separados por espacios
- Usa tres ficheros:
 - Para aprendizaje: training y validation
 - Para test: validation

Datos de entrada



The image shows a Windows-style dialog box titled "Discipulus Project Setup Wizard". The dialog has a blue title bar with a question mark icon on the left and a close button (X) on the right. The main content area is light gray and contains the following text and controls:

Please identify the data files for this project.

Training Data

Validation Data

Applied Data (optional)

At the bottom of the dialog, there are three buttons: "Cancel", "Back", and "Next".

Usar configuración por omisión y go!



Ventana monitor overview

The screenshot displays the Discipulus software interface. The main window is titled "Discipulus - busca_pelota_project.bst" and includes a menu bar with "File", "Edit", "View", "Set Up Learning", "Run", "Interactive Evaluator", "Window", and "Help". Below the menu bar is a toolbar with icons for file operations and navigation. A "Data" window is open, showing tabs for "Training", "Validation", and "Applied", with a "Training chart" area below. The "Monitor Project" window is the primary focus, featuring tabs for "Overview", "Project History", "Project Detail", and "Current Run". The "Overview" tab is active, displaying project status and performance metrics.

Project Status

Total Runs Started:	5
Programs Evaluated:	602.536
Total Time:	0:00:21
Current Step:	1

Best Program

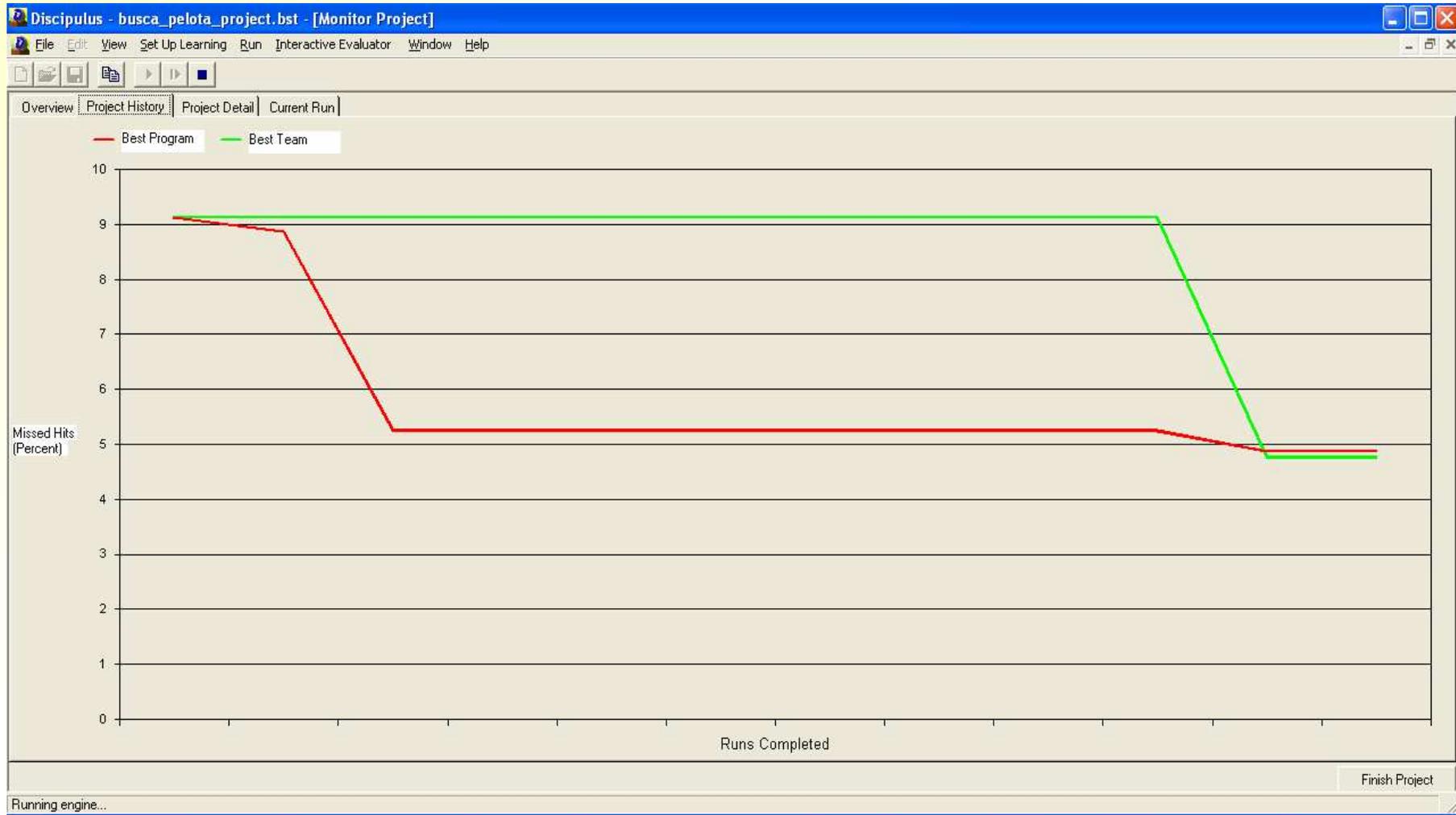
Training Hit Rate:	96,75 (86,52/99,68)
Validation Hit Rate:	92,75 (73,56/98,08)
T & V Hit Rate:	94,75 (80,04/98,88)
Weighted T & V Hit Rate:	94,7500
Applied Hit Rate:	92,90 (72,73/99,28)

Best Team

Training Hit Rate:	91,25 (61,80/99,68)
Validation Hit Rate:	90,50 (57,47/99,68)
T & V Hit Rate:	90,88 (59,63/99,68)
Weighted T & V Hit Rate:	90,8750
Applied Hit Rate:	90,16 (61,36/99,28)

Running engine... Finish Project

Ventana monitor project history



Ventana monitor project detail

The screenshot shows the 'Discipulus - busca_pelota_project.bst - [Monitor Project]' window. The interface includes a menu bar (File, Edit, View, Set Up Learning, Run, Interactive Evaluator, Window, Help) and a toolbar with icons for file operations and navigation. The main area is divided into tabs: Overview, Project History, Project Detail (selected), and Current Run. The 'Project Detail' tab displays a table with the following data:

Generations Without Improvement	Best Performance	Best Five Average	Number of Runs
10	0,908750	0,908750	14
30	0,937500	0,914750	14
40	0,940000	0,919500	14
50	0,947500	0,933750	14
60	0,947500	0,937000	14
100	0,951250	0,939250	5
160	0,951250	0,939250	5

At the bottom of the window, there is a status bar with the text 'Running engine...' and a 'Finish Project' button.

Ventana monitor current run

The screenshot displays the 'Discipulus - busca_pelota_project.bst - [Monitor Project]' window. The 'Current Run' tab is active, showing the following data:

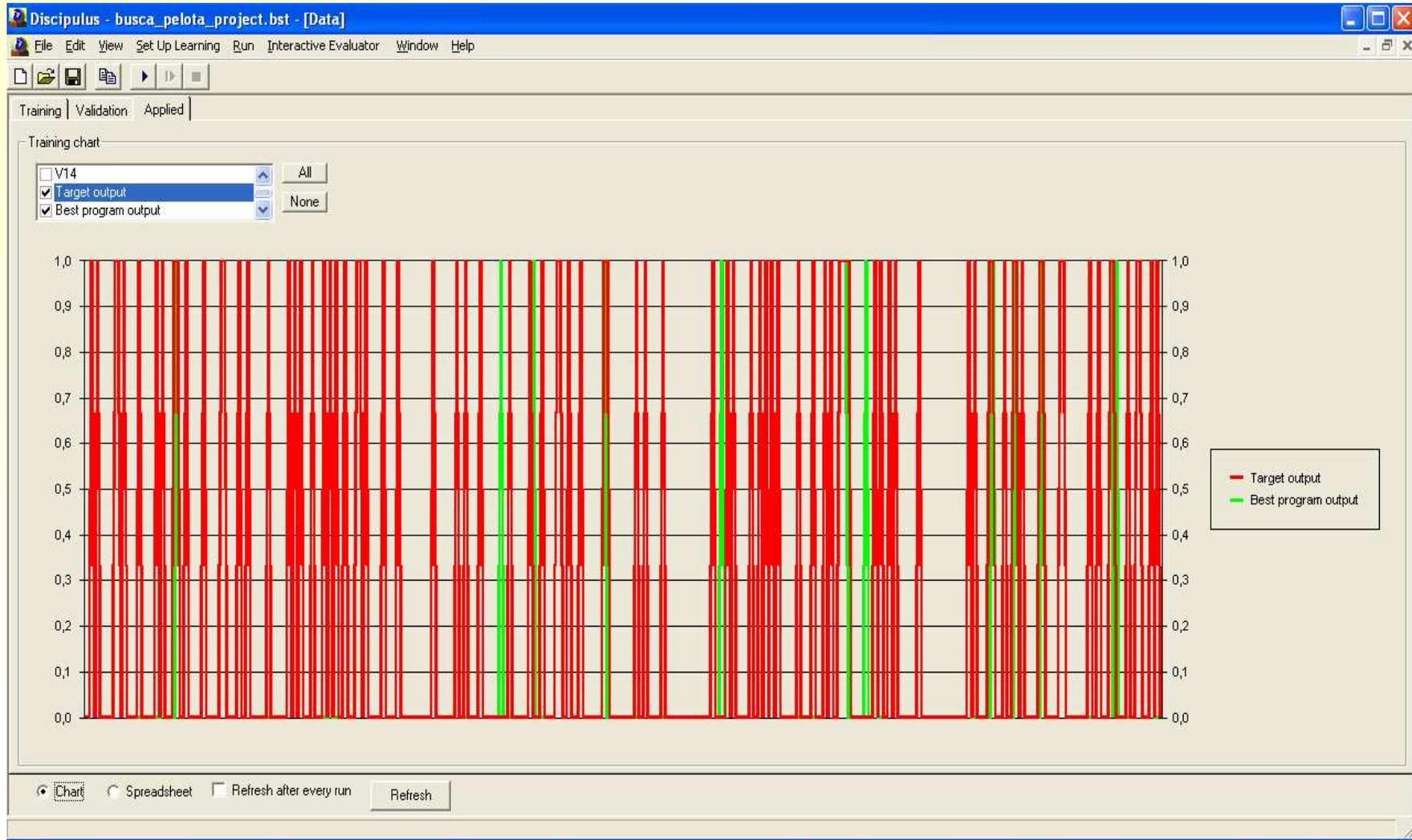
Status	
Generations Since Start:	23
Generations Without Improvement:	22

Performance	
Training Fitness:	0,3687
Validation Fitness:	0,3925
T&V Fitness:	0,3806
Applied Fitness:	0,3977
Training Hit Rate:	91,25 (61,80 / 99,68)
Validation Hit Rate:	90,50 (57,47 / 99,68)
T&V Hit Rate:	90,88 (59,63 / 99,68)
Applied Hit Rate:	90,16 (61,36 / 99,28)

Selected Parameters	
Population Size:	1024
Max Program Size:	512
Max number of FPU Registers:	3
DSS Subset Size:	64
Percent by Difficulty:	50,00
Crossover Rate:	70,66
Homologous Crossover Rate:	58,35
Mutation Rate:	96,74

At the bottom right of the window is a 'Finish Project' button. The status bar at the bottom left reads 'Running engine...'.

Ventana data



Informe final: best programs

The screenshot shows the Discipulus software interface. The main window is titled "Discipulus - busca_pelota_project.bst" and has a menu bar with "File", "Edit", "View", "Set Up Learning", "Run", "Interactive Evaluator", "Window", and "Help". Below the menu bar is a toolbar with icons for file operations and navigation. A "Monitor Project" window is open, displaying a "Reports" window. The "Reports" window has tabs for "Best Programs", "Input Impacts", and "Team Solutions". The "Best Programs" tab is active, showing a table with the following columns: Hit Rate, Class 1 Hit Rate, Class 0 Hit Rate, Weighted Hit Rate, and Run Number. The table contains 20 rows of data. At the bottom of the "Reports" window, there is a dropdown menu for "Statistic Displayed" set to "Training and Validation Data", and buttons for "View Results" and "Analyze Program".

Hit Rate	Class 1 Hit Rate	Class 0 Hit Rate	Weighted Hit Rate	Run Number
095,1250	082,8749	098,5602	095,1250	2
094,7500	080,0400	098,8808	094,7500	2
094,7500	080,6147	098,7200	094,7500	2
094,7500	081,7513	098,3995	094,7500	2
094,6250	079,4782	098,8808	094,6250	2
094,6250	079,4782	098,8808	094,6250	2
094,1250	078,3676	098,5602	094,1250	7
094,0000	079,5428	098,0790	094,0000	5
094,0000	079,5428	098,0790	094,0000	5
094,0000	079,5428	098,0790	094,0000	5
094,0000	078,9681	098,2387	094,0000	5
094,0000	079,5428	098,0790	094,0000	5
094,0000	078,9423	098,2408	094,0000	7
094,0000	078,3676	098,4005	094,0000	7
094,0000	078,9423	098,2408	094,0000	7
094,0000	078,9423	098,2408	094,0000	7
094,0000	078,3676	098,4005	094,0000	7
093,7500	075,5457	098,8797	093,7500	8
093,7500	075,5457	098,8797	093,7500	8
093,5000	076,1204	098,3984	093,5000	8
093,5000	074,3962	098,8797	093,5000	8
093,3750	073,2597	099,0405	093,3750	8
093,0000	069,8760	099,5197	093,0000	8

Informe final: input impact

The screenshot shows the 'Discipulus - busca_pelota_project.bst' application window. A 'Monitor Desktop' window is open, displaying a 'Reports' window. The 'Reports' window has three tabs: 'Best Programs', 'Input Impacts', and 'Team Solutions'. The 'Input Impacts' tab is active, showing a table with the following data:

Input	Frequency (1.00=100%)	Average Impact	Maximum Impact
v[00]	0,33		
v[01]	1,00		
v[02]	1,00		
v[03]	0,30		
v[04]	0,37		
v[05]	0,43		
v[06]	0,30		
v[07]	0,37		
v[08]	0,00		
v[09]	0,33		
v[10]	0,20		
v[11]	0,00		
v[12]	0,10		
v[13]	0,57		
v[14]	0,43		

At the bottom of the 'Reports' window, there are three buttons: 'Save', 'Stop Calculating', and 'Calculate Impacts'.

Distancia_Bola real
Angulo_Bola real
Vale_Bola { 0, 1 }
X real
Y real
Angulo real
Distancia_Contrario1 real
Angulo_Contrario1 real
Vale_Contrario1 real
Distancia_Contrario2 real
Angulo_Contrario2 real
Vale_Contrario2 { 0, 1 }
Distancia_SuPorteria real
Angulo_SuPorteria real
Vale_SuPorteria { 0, 1 }

Informe final: calculate impact

The screenshot shows the Discipulus software interface. The title bar reads "Discipulus - busca_pelota_project.bst - [Reports]". The menu bar includes "File", "Edit", "View", "Set Up Learning", "Run", "Interactive Evaluator", "Window", and "Help". The main window has three tabs: "Best Programs", "Input Impacts", and "Team Solutions". The "Input Impacts" tab is active, displaying a table with the following data:

Input	Frequency (1.00=100%)	Average Impact	Maximum Impact
v[00]	0,33	03,42857	05,00000
v[01]	1,00	03,84167	07,75000
v[02]	1,00	37,44167	63,50000
v[03]	0,30	01,44444	02,50000
v[04]	0,37	01,13889	01,75000
v[05]	0,43	00,27778	00,50000
v[06]	0,30	00,00000	00,00000
v[07]	0,37	00,00000	00,00000
v[08]	0,00	00,00000	00,00000
v[09]	0,33	00,00000	00,00000
v[10]	0,20	00,00000	00,00000
v[11]	0,00	00,00000	00,00000
v[12]	0,10	00,75000	01,00000
v[13]	0,57	03,01471	05,00000
v[14]	0,43	07,14583	17,50000

To the right of the table, a list of variables to be calculated is displayed:

- Distancia_Bola real
- Angulo_Bola real
- Vale_Bola { 0, 1 }
- X real
- Y real
- Angulo real
- Distancia_Contrario1 real
- Angulo_Contrario1 real
- Vale_Contrario1 real
- Distancia_Contrario2 real
- Angulo_Contrario2 real
- Vale_Contrario2 { 0, 1 }
- Distancia_SuPorteria real
- Angulo_SuPorteria real
- Vale_SuPorteria { 0, 1 }

At the bottom right of the window, there are three buttons: "Save", "Stop Calculating", and "Calculate Impacts".

Informe final: team solutions

Discipulus - busca_pelota_project.bst - [Reports]

File Edit View Set Up Learning Run Interactive Evaluator Window Help

Best Programs | Input Impacts | Team Solutions

Best Teams Summary

Team Size	Hit Rate	Class 1 Hit Rate	Class 0 Hit Rate	Weighted Hit Rate
1	097,2500	089,8876	099,3569	097,2500
3	097,5000	091,0112	099,3569	097,5000
5	097,5000	091,0112	099,3569	097,5000
7	097,2500	089,8876	099,3569	097,2500
9	097,5000	091,0112	099,3569	097,5000

Selected Team Detail Performance

Vote (Class1 : Class0)	Hit Rate	Percent of Total Examples
0:3	097,468354430380	79,00
1:2	100,000000000000	0,25
2:1	088,888888888889	2,25
3:0	098,648648648649	18,50

Data Set Used: Training Data

View Results View Code

Team solutions con application data

The screenshot shows the Discipulus software interface with the following components:

- Window Title:** Discipulus - busca_pelota_project.bst - [Reports]
- Menu Bar:** File, Edit, View, Set Up Learning, Run, Interactive Evaluator, Window, Help
- Navigation Bar:** Includes icons for file operations and navigation.
- Tabbed Interface:** Three tabs are visible: Best Programs, Input Impacts, and Team Solutions (which is selected).
- Best Teams Summary:** A table with 5 columns: Team Size, Hit Rate, Class 1 Hit Rate, Class 0 Hit Rate, and Weighted Hit Rate. The data is as follows:

Team Size	Hit Rate	Class 1 Hit Rate	Class 0 Hit Rate	Weighted Hit Rate
1	092,0765	072,7273	098,2014	092,0765
3	092,6230	072,7273	098,9209	092,6230
5	092,6230	072,7273	098,9209	092,6230
7	092,6230	072,7273	098,9209	092,6230
9	092,6230	072,7273	098,9209	092,6230
- Selected Team Detail Performance:** A table with 3 columns: Vote (Class1 : Class0), Hit Rate, and Percent of Total Ex... The data is as follows:

Vote (Class1 : Class0)	Hit Rate	Percent of Total Ex...
0:3	092,542372881356	80,60
1:2	050,000000000000	1,09
2:1	066,666666666667	0,82
3:0	096,875000000000	17,49
- Data Set Used:** Applied Data
- Buttons:** View Results, View Code

Opciones avanzadas

Advanced Options

Single Run Termination

Generations Without Improvement: 300

Generations Since Start of Run: 1000

Use Adaptive Termination: Settings...

Batch Run Termination

Maximum Number of Runs: 300

Stepping

Enabled

Initial GwI: 80

Runs to complete at each level: 10

Output Files

Efficiency Report

Details Report

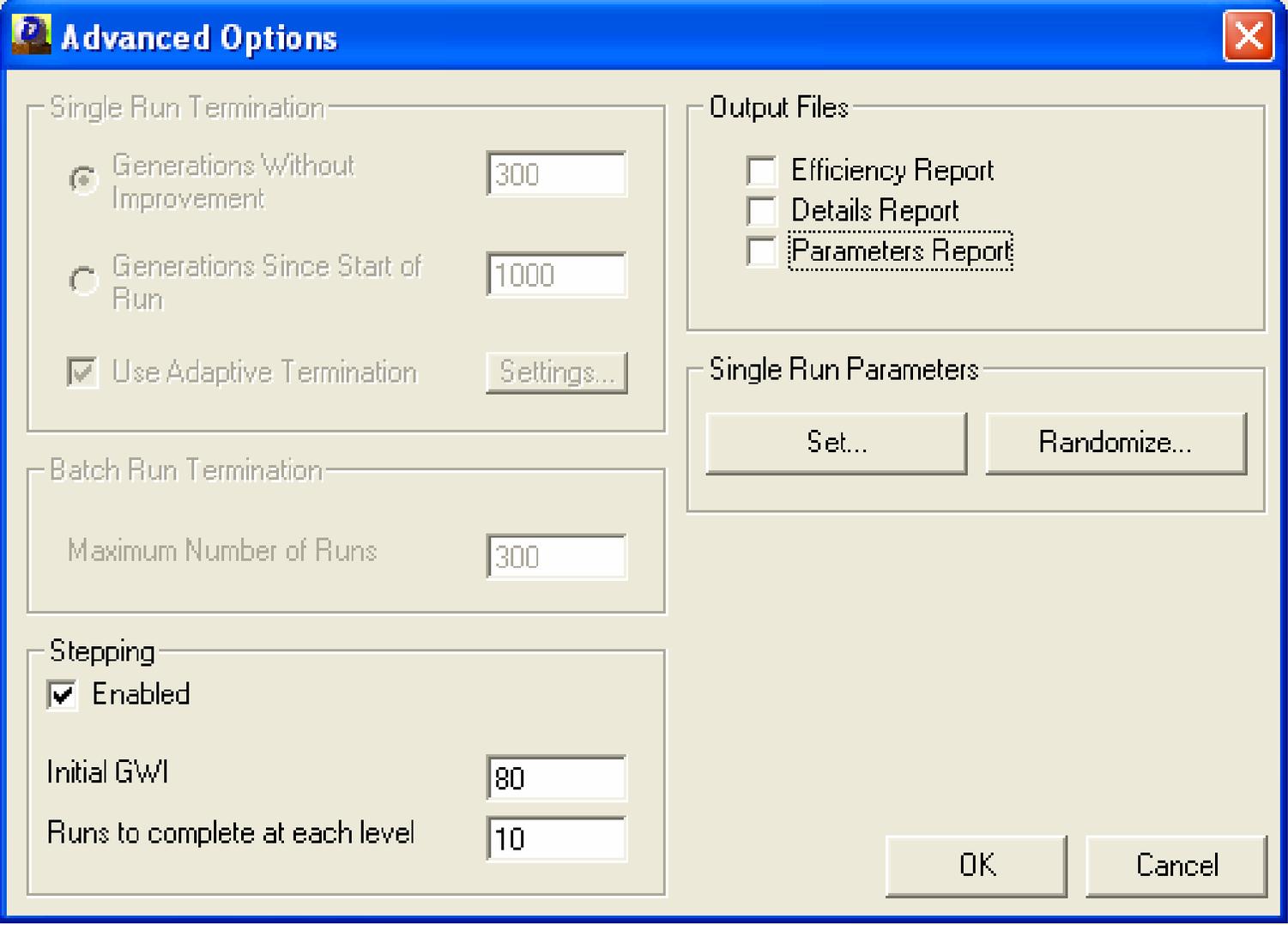
Parameters Report

Single Run Parameters

Set... Randomize...

OK Cancel

Parámetros (set)

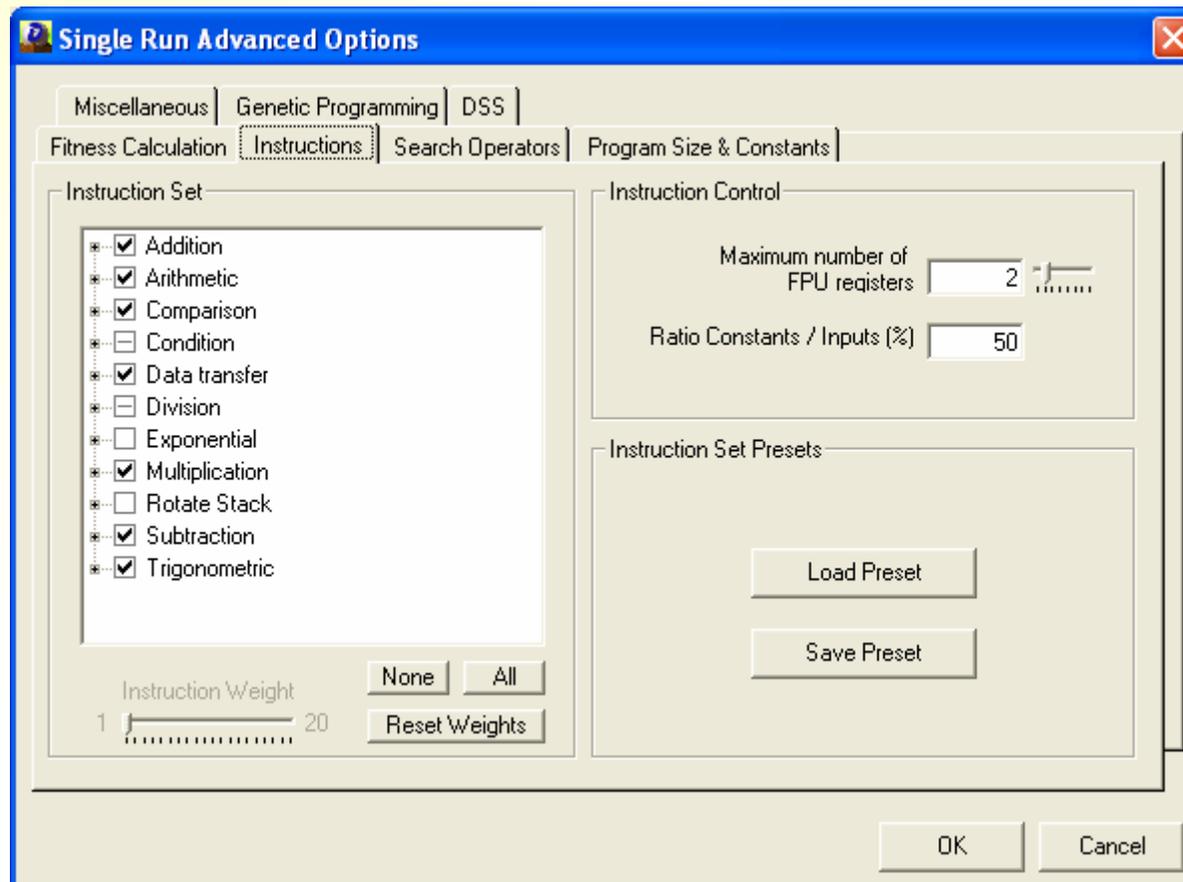


The image shows a software dialog box titled "Advanced Options" with a blue title bar and a close button (X) in the top right corner. The dialog is divided into several sections:

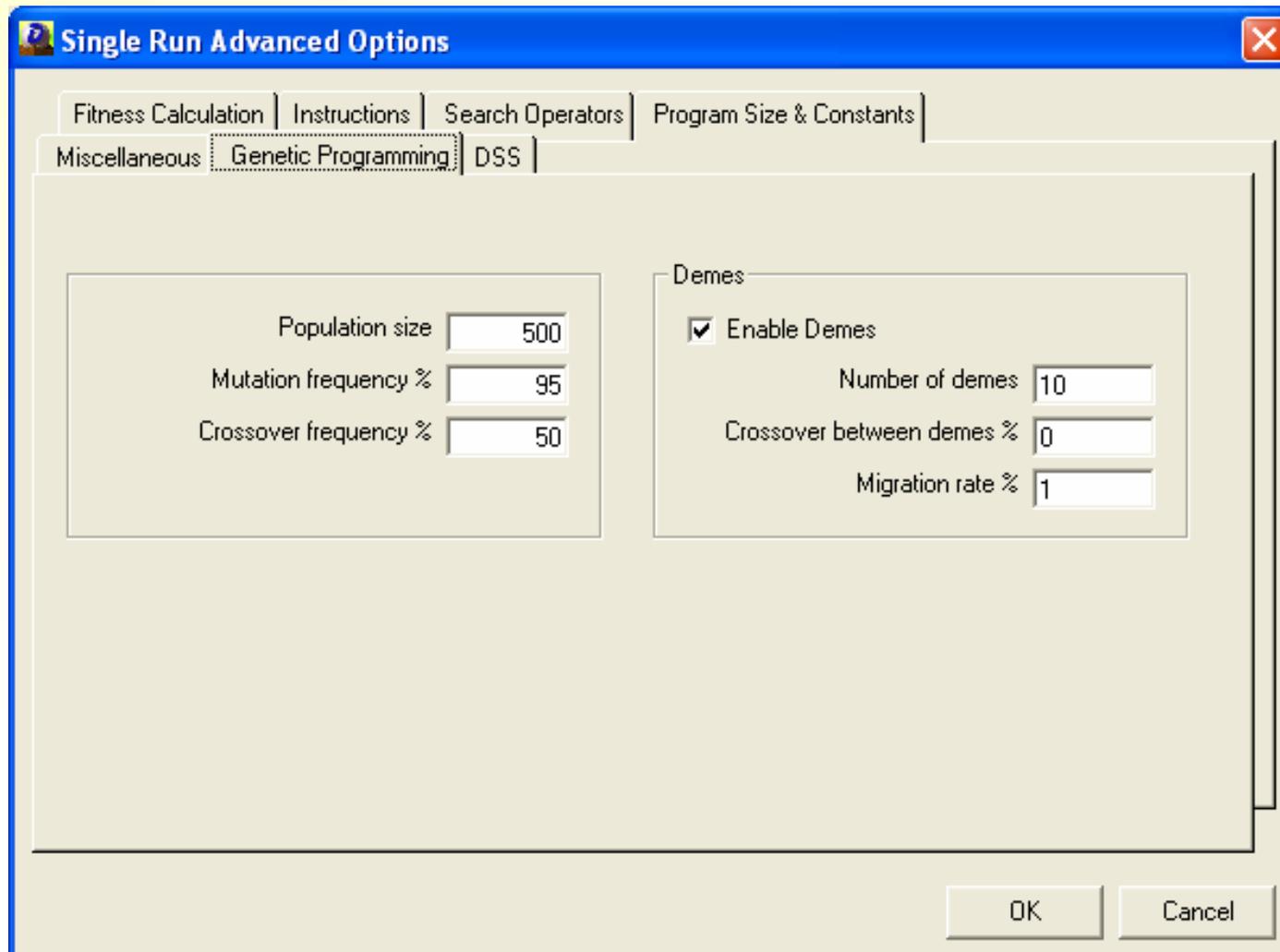
- Single Run Termination:** Contains three radio buttons and a checkbox. The first radio button is selected and labeled "Generations Without Improvement" with a text box containing "300". The second radio button is labeled "Generations Since Start of Run" with a text box containing "1000". The third checkbox is checked and labeled "Use Adaptive Termination" with a "Settings..." button next to it.
- Batch Run Termination:** Contains a text box labeled "Maximum Number of Runs" with the value "300".
- Stepping:** Contains a checked checkbox labeled "Enabled", a text box labeled "Initial GWI" with the value "80", and a text box labeled "Runs to complete at each level" with the value "10".
- Output Files:** Contains three unchecked checkboxes: "Efficiency Report", "Details Report", and "Parameters Report". The "Parameters Report" checkbox is highlighted with a dotted border.
- Single Run Parameters:** Contains two buttons: "Set..." and "Randomize...".

At the bottom right of the dialog are "OK" and "Cancel" buttons.

Primitivas y terminales



Parámetros principales



Randomización automática de parámetros (cuales)

