GtpStatistics
Collecting Statistics of Go Engines

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Features

- Runs a Go engine on every position in a game collection
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- Writes results to a data table
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- Produces HTML reports with plots and statistical data
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- Writes results to a **data table**
- Produces **HTML reports** with plots and statistical data
- Platform independent **Java** program
Average Plots

**RegGenMove**

**Score**

**Time**

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Histograms

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**RegGenMove**

-5 0

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**Score**

-50 0 50

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**Time**

0 50 100
Running the Go Engine

- **GtpStatistics** loops over all positions in a game collection
Running the Go Engine

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- The Go engine is synchronized with the position
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  - On every position
Running the Go Engine

- GtpStatistics loops over all positions in a game collection
- The Go engine is synchronized with the position
- Configurable commands are executed:
  - On start positions (before first move)
  - On every position
  - On final positions (after last move)
Requirements

- Go engine supports the **Go Text Protocol**

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Requirements

- Go engine supports the Go Text Protocol
- Implements useful commands

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Requirements

▶ Go engine supports the Go Text Protocol
▶ Implements useful commands
▶ Commands should never fail
▶ Plots are created for commands that return a number
▶ Implementing reg_genmove is recommended

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Invocation

Example

java -jar gtpstatistics.jar \
  -program "explorer -time 20" \
  -begin "cputime_reset" \
  -commands "ex_time_last_move,ex_score" \
  -final "cputime" \
GoSeigen50/*.sgf
RegGenMove

- GTP standard command `reg_genmove`

![GTP Statistics Graph](image)
RegGenMove

- GTP standard command `reg_genmove`
- Automatically executed as first command
RegGenMove

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- Testing prediction of expert moves
RegGenMove

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- Automatically executed as first command
- Result is compared to move in game
- Result value is transformed into 0 or 1

Useful for:
- Testing prediction of expert moves
- Comparing move generation with previous versions of the Go engine
Result Table

The result table is the data file produced by GtpStatistics. The filename is gtpstatistics.dat\(^2\).

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- Simple text format

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Result Table

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- Simple text format
- Easy to process with standard UNIX tools

\(^2\)Will be configurable in the future
The result table is the data file produced by GtpStatistics. The filename is `gtpstatistics.dat`².

- Simple text format
- Easy to process with standard UNIX tools
- Easy to import into spreadsheet programs

²Will be configurable in the future
Generation by Other Programs

It is possible to use GtpStatistics only for the HTML report generation and produce the result table by other programs.
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Requirements

- First column name is Game (file name recommended)
Generation by Other Programs

It is possible to use GtpStatistics only for the HTML report generation and produce the result table by other programs.

Requirements

▶ First column name is Game (file name recommended)
▶ Second column name is Move (ascending order)
Generation by Other Programs

It is possible to use GtpStatistics only for the HTML report generation and produce the result table by other programs.

Requirements

- First column name is *Game* (file name recommended)
- Second column name is *Move* (ascending order)
- No requirements on other columns
Generation by Other Programs

It is possible to use GtpStatistics only for the HTML report generation and produce the result table by other programs.

Requirements

- First column name is *Game* (file name recommended)
- Second column name is *Move* (ascending order)
- No requirements on other columns

Possible Applications
Generation by Other Programs

It is possible to use GtpStatistics only for the HTML report generation and produce the result table by other programs.

Requirements

- First column name is **Game** (file name recommended)
- Second column name is **Move** (ascending order)
- No requirements on other columns

Possible Applications

- Other board games (Checkers, Hex, ...)

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GtpStatistics
Generation by Other Programs

It is possible to use GtpStatistics only for the HTML report generation and produce the result table by other programs.

Requirements

- First column name is `Game` (file name recommended)
- Second column name is `Move` (ascending order)
- No requirements on other columns

Possible Applications

- Other board games (Checkers, Hex, . . . )
- Episodic machine learning tasks with discrete timesteps
Table Format

<table>
<thead>
<tr>
<th>File</th>
<th>Move</th>
<th>reg_genmove</th>
<th>ex_score</th>
<th>timelastmove</th>
</tr>
</thead>
<tbody>
<tr>
<td>GoSeigen.10.sgf</td>
<td>1</td>
<td>0</td>
<td>-6</td>
<td>0.01</td>
</tr>
<tr>
<td>GoSeigen.10.sgf</td>
<td>2</td>
<td>1</td>
<td>-3</td>
<td>0.09</td>
</tr>
<tr>
<td>GoSeigen.10.sgf</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1.14</td>
</tr>
</tbody>
</table>
### Table Format

```markdown
# Program: ..\linux\build\release\explorer -time 20
# Date: Thursday, July 7, 2005 10:40:33 PM MDT

# File Move reg_genmove ex_score timelastmove
GoSeigen.10.sgf 1 0 -6 0.01
GoSeigen.10.sgf 2 1 -3 0.09
GoSeigen.10.sgf 3 0 2 1.14

1. Comment lines with meta information
```
### Table Format

# Program: ../linux/build/release/explorer -time 20
# Date: Thursday, July 7, 2005 10:40:33 PM MDT
#
#File	Move	reg_genmove	ex_score	timelastmove
GoSeigen.10.sgf	1	0	-6	0.01
GoSeigen.10.sgf	2	1	-3	0.09
GoSeigen.10.sgf	3	0	2	1.14

1. Comment lines with **meta information**
2. **Empty** comment line
### Table Format

```plaintext
# Program: ../linux/build/release/explorer -time 20
# Date: Thursday, July 7, 2005 10:40:33 PM MDT
#
#File     Move reg_genmove ex_score timelastmove
GoSeigen.10.sgf 1 0 -6 0.01
GoSeigen.10.sgf 2 1 -3 0.09
GoSeigen.10.sgf 3 0 2 1.14
```

1. Comment lines with meta information
2. Empty comment line
3. Comment line with column titles
### Table Format

# Program: ../linux/build/release/explorer -time 20
# Date: Thursday, July 7, 2005 10:40:33 PM MDT
#
# File       Move  reg_genmove  ex_score  timelastmove
GoSeigen.10.sgf 1   0       -6        0.01
GoSeigen.10.sgf 2   1       -3        0.09
GoSeigen.10.sgf 3   0       2         1.14

1. Comment lines with **meta information**
2. **Empty** comment line
3. Comment line with **column titles**
4. **Table data** (separator is TAB)
Report Generation

▶ Generates a HTML report
Report Generation

- Generates a HTML report
- Hyperlinks from summary view to command and game views
Report Generation

- Generates a HTML report
- Hyperlinks from summary view to command and game views
- Auto-scaled and colored plots
Invocation

Example

```
java -jar gtpstatistics.jar \
   -analyze gtpstatistics.dat \ 
   -output reports/gtpstatistics
```
Summary View

▶ Average plots by move number
Summary View

- **Average plots** by move number
- **Histograms** for all positions
Summary View

- **Average plots** by move number
- **Histograms** for all positions
- **Statistics** for all positions
Summary View

- **Average plots** by move number
- **Histograms** for all positions
- **Statistics** for all positions
- **Game table** with results of start and final commands
Summary View

- **Average plots** by move number
- **Histograms** for all positions
- **Statistics** for all positions
- **Game table** with results of start and final commands

**Note on Standard Error:** Statistics for all positions can underestimate the standard error due to correlations of positions within a game.
Command View

Average plot by move number
Command View

- **Average plot** by move number
- **Statistics and histograms** for positions at a move number (selected)
Command View

- **Average plot** by move number
- **Statistics** and **histograms** for positions at a move number (selected)
- Histograms for all and **final** positions
Command View

- **Average plot** by move number
- **Statistics and histograms** for positions at a move number (selected)
- Histograms for all and **final** positions
- Plots by move number for **all games**
Game View

- Plots by move number for all commands
Game View

- Plots by move number for all commands
- Table with all command results
Future Work

- Clean up source code; fix bugs
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- Separate count plots for each command
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- Separate count plots for each command
- Cumulative plots
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▶ Write out data tables for each plot
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- Conversion of responses for more commands (analog to reg_genmove)
Future Work

▶ Clean up source code; fix bugs
▶ Separate count plots for each command
▶ Cumulative plots
▶ Write out data tables for each plot
▶ Conversion of responses for more commands (analog to reg_genmove)
▶ Handle collection of test positions (loadsgf)
Future Work

- Clean up source code; fix bugs
- Separate count plots for each command
- Cumulative plots
- Write out data tables for each plot
- Conversion of responses for more commands (analog to reg_genmove)
- Handle collection of test positions (loadsgf)
- Run or generate reports only for move range
Future Work

- **Clean up source code; fix bugs**
- Separate **count plots** for each command
- **Cumulative plots**
- Write out **data tables** for each plot
- **Conversion of responses** for more commands (analog to `reg_genmove`)
- Handle collection of test **positions** (`loadsgf`)
- Run or generate reports only for **move range**
- Make report generation more **configurable**
Future Work

- Clean up source code; fix bugs
- Separate count plots for each command
- Cumulative plots
- Write out data tables for each plot
- Conversion of responses for more commands (analog to reg_genmove)
- Handle collection of test positions (loadsgf)
- Run or generate reports only for move range
- Make report generation more configurable
- Add statistics for one random position per game
Future Work

- Clean up source code; fix bugs
- Separate count plots for each command
- Cumulative plots
- Write out data tables for each plot
- Conversion of responses for more commands (analog to reg_genmove)
- Handle collection of test positions (loadsgf)
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- ...