The eigo Package

Enhanced Go Diagrams for LaTeX

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(developed with AI assistance)

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Abstract

The eigo package provides comprehensive tools for creating professional Go (Weiqi/Baduk) game diagrams in LaTeX documents. It offers enhanced features including multiple customizable stone colors, automatic numbering systems, geometric transformations, flexible board display options with enhanced borders, and full LuaLaTeX compatibility.

Contents

1 Introduction

Go is an ancient board game played on a grid of lines. Creating clear, professional diagrams for Go positions is essential for books, articles, and educational materials. The eigo package (Enhanced Igo) provides a modern, feature-rich solution for typesetting Go diagrams in LaTeX.

1.1 Features

- Full and partial board displays with automatic zone detection and enhanced borders
- Multiple stone colors (black, white, red, blue, green) with full customization
- Two additional custom colors (customone, customtwo) with dedicated commands

- Stone numbering with flexible automatic sequences
- Symbol placement (geometric shapes and custom text)
- Geometric transformations (rotations, mirrors, color swapping)
- Flexible sizing from tiny to massive boards with validation
- Coordinate display with customizable formatting
- Multiple board support for variations
- LuaLaTeX compatibility with proper UTF-8 handling
- Enhanced border display for complete board diagrams

1.2 Requirements

- Modern LaTeX distribution (TeX Live 2020+ recommended)
- TikZ package (for graphics)
- xcolor package (for colors)
- Optional: LuaLaTeX for best UTF-8 support

2 Package Options

The eigo package accepts several options to customize its behavior:

Option	Description
`color`	Enable colored stones and backgrounds (default)
`bw`	Black and white mode only
`frame`	Show board frame and background with enhanced borders
`noframe`	Hide board frame and background (default)
`coords`	Show coordinate labels
`nocoords`	Hide coordinate labels (default)
`debug`	Enable debug output

Example usage:

```
\usepackage[frame,coords]{eigo}
```

3 Basic Usage

3.1 Board Setup

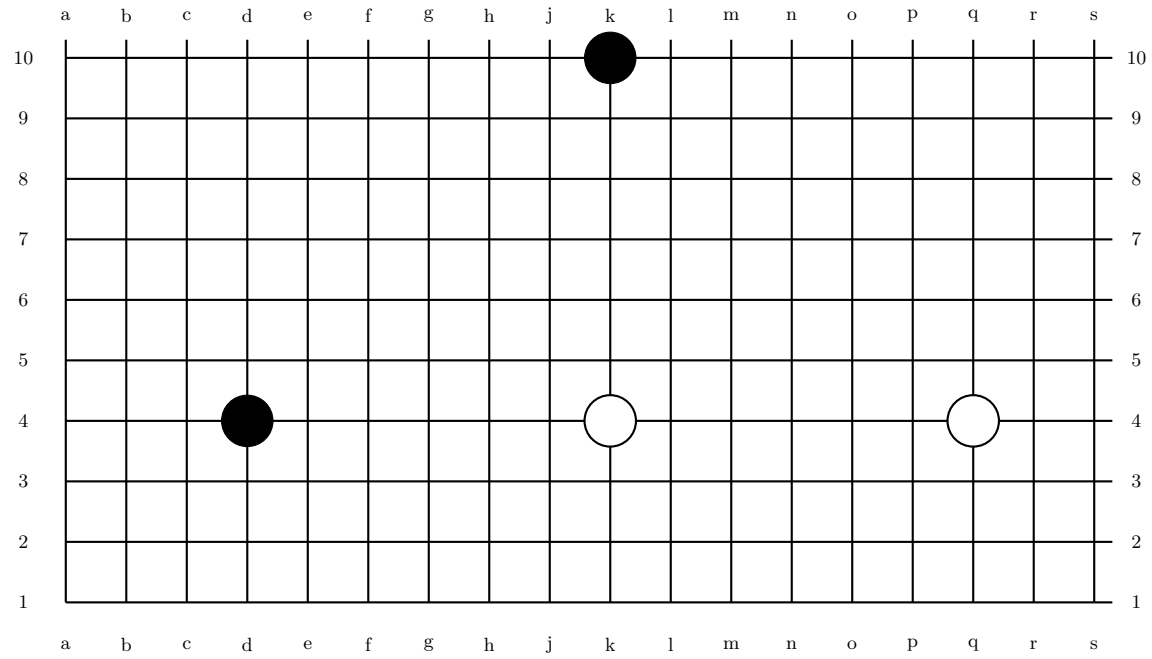
The default board size is 19×19, but you can change it:

```
\gobansize{19}  % Standard board
\gobansize{13}  % Smaller board
\gobansize{9}   % Beginner board
```

3.2 Placing Stones

Basic stone placement uses coordinate notation (letter + number):

```
\blackstones{d4,k10,q16}
\whitestones{d16,k4,q4}
```



3.3 Displaying Boards

Show the complete board with enhanced borders:

```
\showfullgoban
```

Show a specific zone:

```
\showgoban[c3,m11]    % Rectangle from c3 to m11
\showgoban[k10]       % 5x5 area around k10
```

4 Stone Colors and Customization

4.1 Available Colors

The package supports seven stone colors:

- `\blackstones`{positions}
- `\whitestones`{positions}
- `\redstones`{positions}
- `\bluestones`{positions}
- `\greenstones`{positions}
- `\customonestones`{positions} – Custom color 1 (default: purple)
- `\customtwostones`{positions} – Custom color 2 (default: orange)

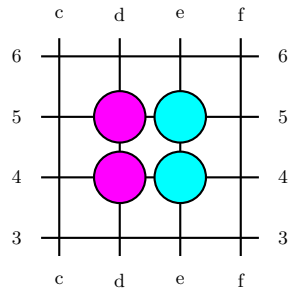
4.2 Color Customization

You can customize all stone colors using RGB values:

```
\eigoblackcolor{0,0,0}          % Standard black
\eigowhitecolor{255,255,255}    % Standard white
\eigoredcolor{200,0,0}          % Dark red
\eigobluecolor{0,0,200}         % Dark blue
\eigogreencolor{0,150,0}        % Dark green
\eigocustomonecolor{128,0,128}  % Purple (default)
\eigocustomtwocolor{255,165,0}  % Orange (default)
```

Example with custom colors:

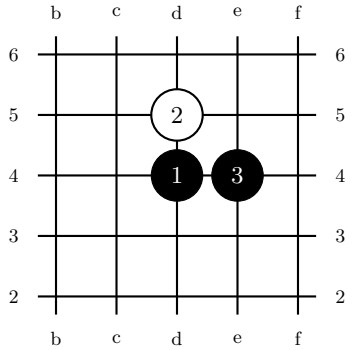
```
\eigocustomonecolor{255,0,255}  % Bright magenta
\eigocustomtwocolor{0,255,255}  % Cyan
\customonestones{d4,d5}
\customtwostones{e4,e5}
```



4.3 Manual Numbering

Add numbers to stones using optional parameter:

```
\blackstones[1]{d4}
\whitestones[2]{d5}
\blackstones[3]{e4}
```

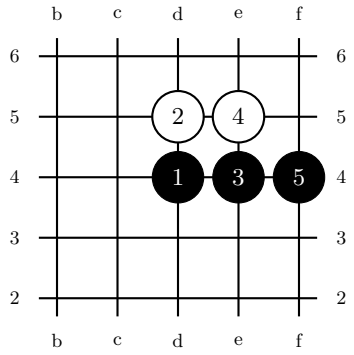


4.4 Automatic Numbering

4.4.1 Alternating Colors

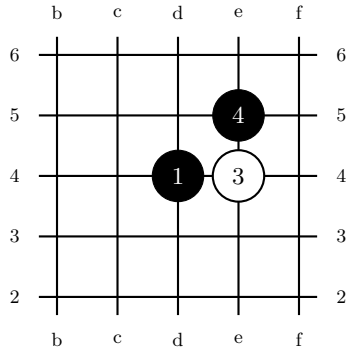
`\autoblackfirst`[n]{positions} starts with black stone numbered n, then alternates:

```
\autoblackfirst[1]{d4,d5,e4,e5,f4}
```



The automatic numbering system supports skipping positions by using dashes:

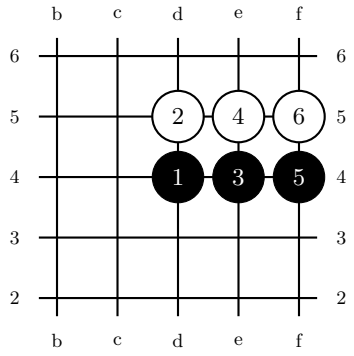
```
\autoblackfirst[1]{d4,-,e4,e5}  % Skip d5, continues numbering
```



4.4.2 Monochrome Sequences

For same-color sequences with increment of 2:

```
\blackn[1]{d4,e4,f4}      % Numbers: 1,3,5
\whiten[2]{d5,e5,f5}      % Numbers: 2,4,6
```



5 Symbols and Markup

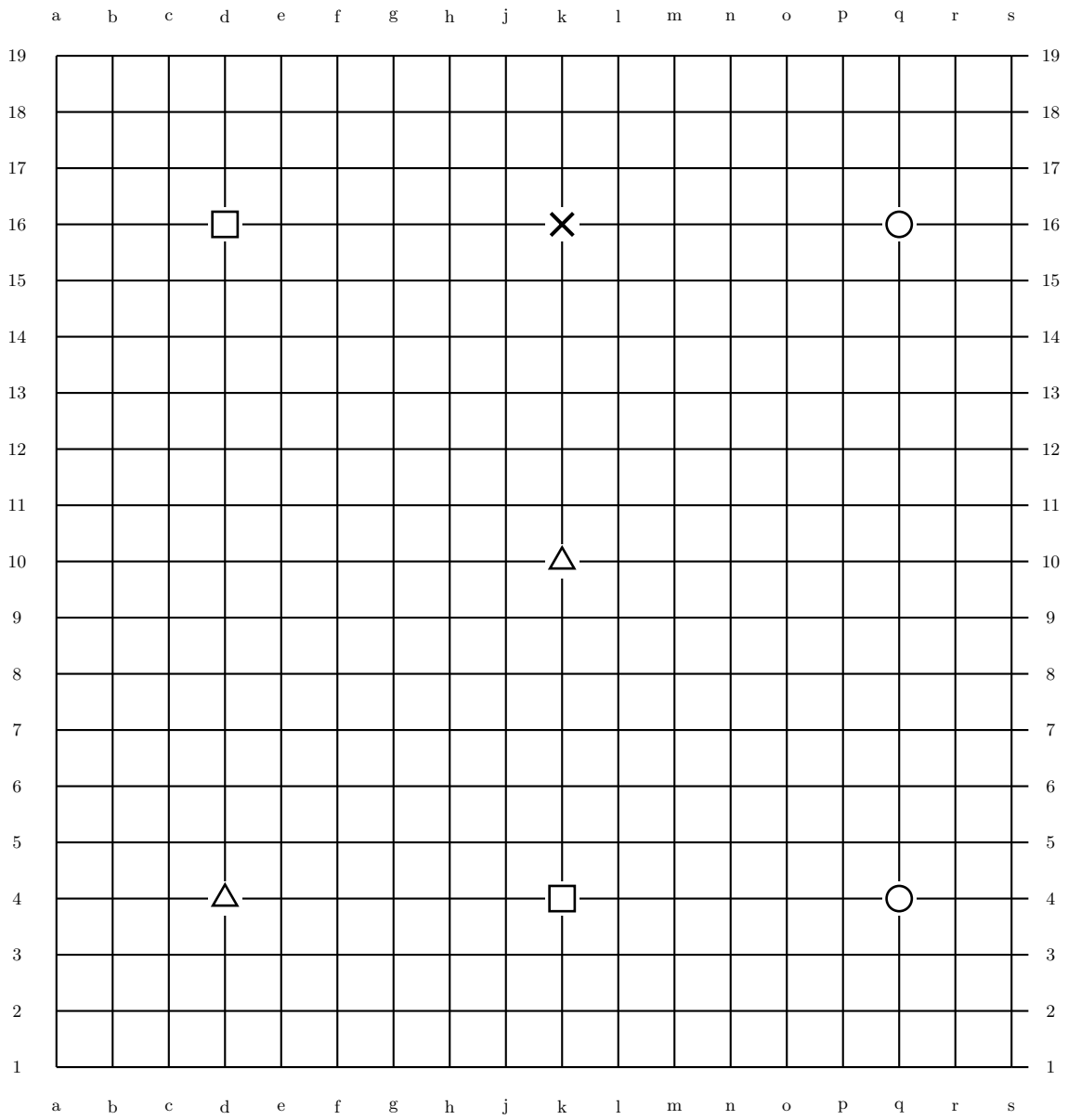
5.1 Geometric Symbols

Place symbols on empty intersections:

```
\gobansymbol{d4,k10}{\eigotriangle}
\gobansymbol{d16,k4}{\eigosquare}
\gobansymbol{q4,q16}{\eigocircle}
\gobansymbol{k16}{\eigocross}
```

Available symbols:

- `\eigotriangle` – Triangle
- `\eigosquare` – Square
- `\eigocircle` – Circle
- `\eigocross` – Cross



5.2 Text Labels

Use custom text as symbols:

```
\gobansymbol{d4,e5}{A}
\gobansymbol{k10}{X}
```

6 Board Transformations

6.1 Rotations

Rotate the current board position:

```
\eigorotate{90}   % 90 degrees clockwise
\eigorotate{180}  % 180 degrees
\eigorotate{270}  % 270 degrees clockwise
```

6.2 Mirrors

Mirror the board along different axes:

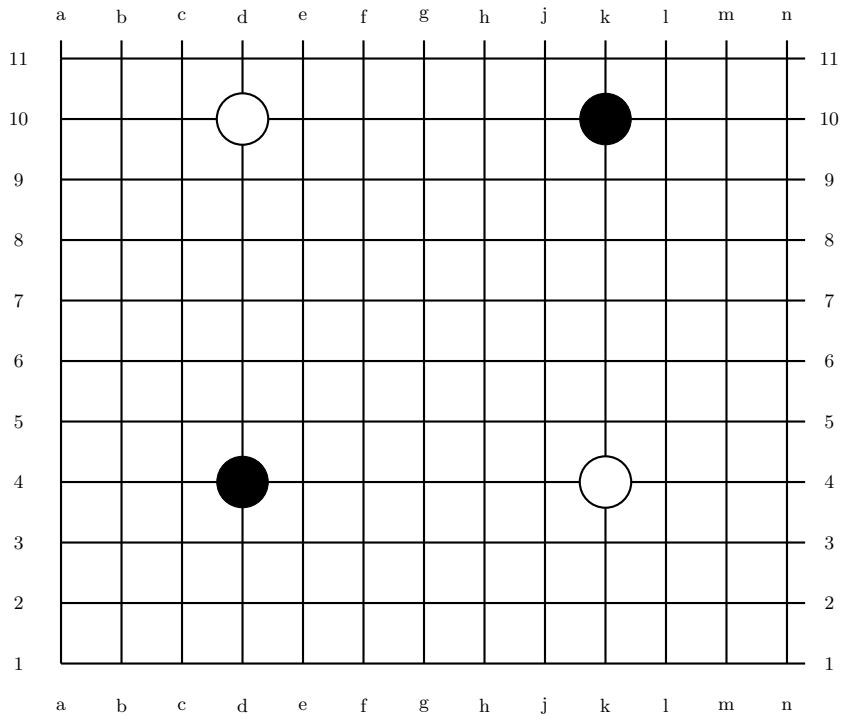
```
\eigomirrorh       % Horizontal mirror
\eigomirrorv       % Vertical mirror
\eigomirrordiag    % Diagonal mirror
```

6.3 Color Operations

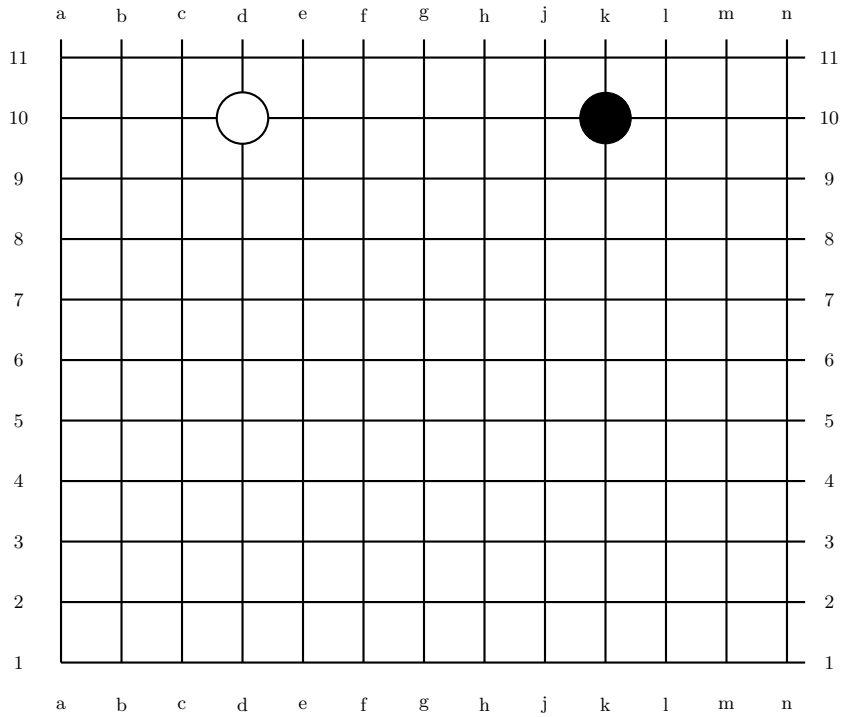
```
\eigoswapcolors    % Swap black and white stones
```

6.4 Example: Transformation Chain

Original position:



After 90° rotation:



7 Board Sizing

7.1 Predefined Sizes

ENHANCED: Extended range of predefined sizes with validation:

```
\tinygoban        % 4mm per intersection
\smallgoban       % 6mm per intersection
\normalgoban      % 8mm per intersection (default)
\largegoban       % 12mm per intersection
\hugegoban        % 16mm per intersection
\massivegoban     % 20mm per intersection
```

7.2 Custom Sizing with Validation

Set exact unit size with automatic validation:

```
\eigounitsize{10mm}
```

The package will issue warnings for very small (<2mm) or very large (>20mm) unit sizes. Get current size information:

```
Current unit size: \theeigountisize
Size information: \eigosizeinfo
```

Current unit size: 22.76219pt
Current goban unit size: 22.76219pt

8 Multiple Boards

Work with multiple board positions simultaneously:

```
\usegoban{1}
\blackstones{d4,k10}
```

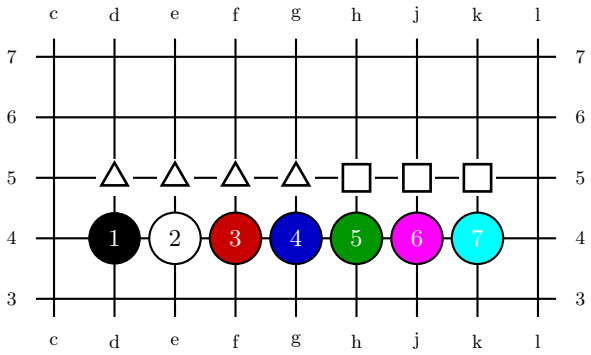
```
\usegoban{2}
\blackstones{d4,k10,q16}
\whitestones{d16}

\usegoban{1}  % Switch back to board 1
\showgoban[d4]

\usegoban{2}  % Switch to board 2
\showgoban[d4]
```

Current board number: 1

9 Complete Feature Overview

9.1 All Stone Colors with Numbering

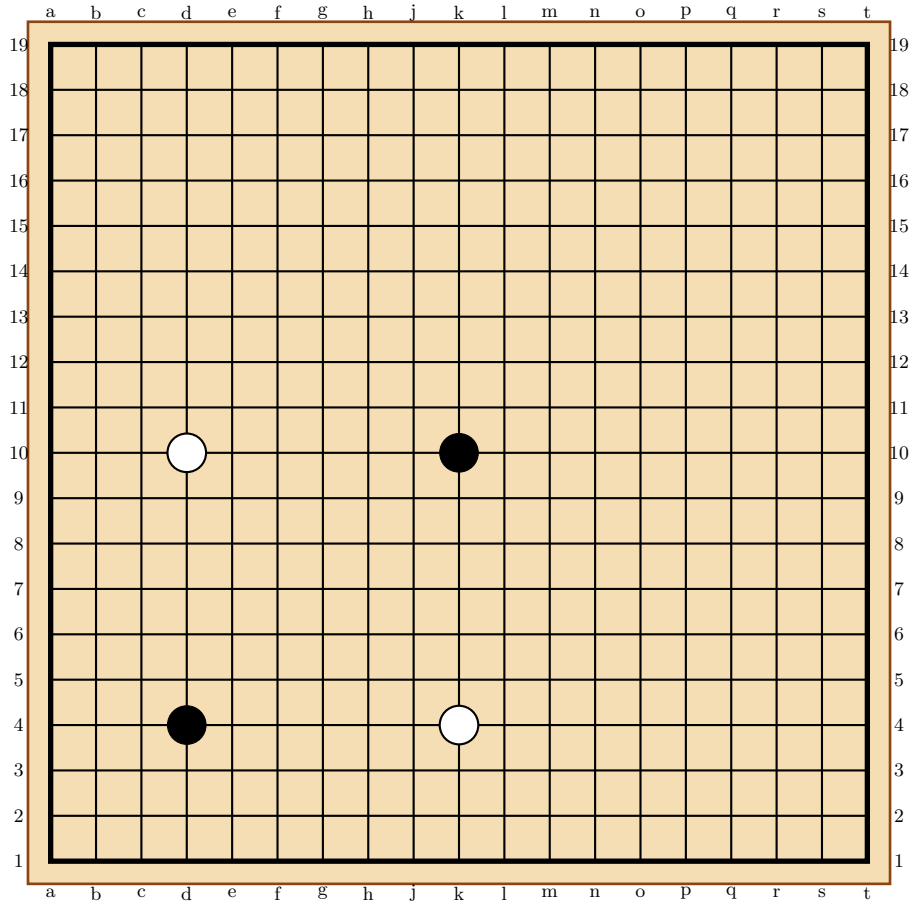
```
\cleargoban
\blackstones[1]{d4}
\whitestones[2]{e4}
\redstones[3]{f4}
\bluestones[4]{g4}
\greenstones[5]{h4}
\customonestones[6]{j4}
\customtwostones[7]{k4}
\gobansymbol{d5,e5,f5,g5}{\eigotriangle}
\gobansymbol{h5,j5,k5}{\eigosquare}
```



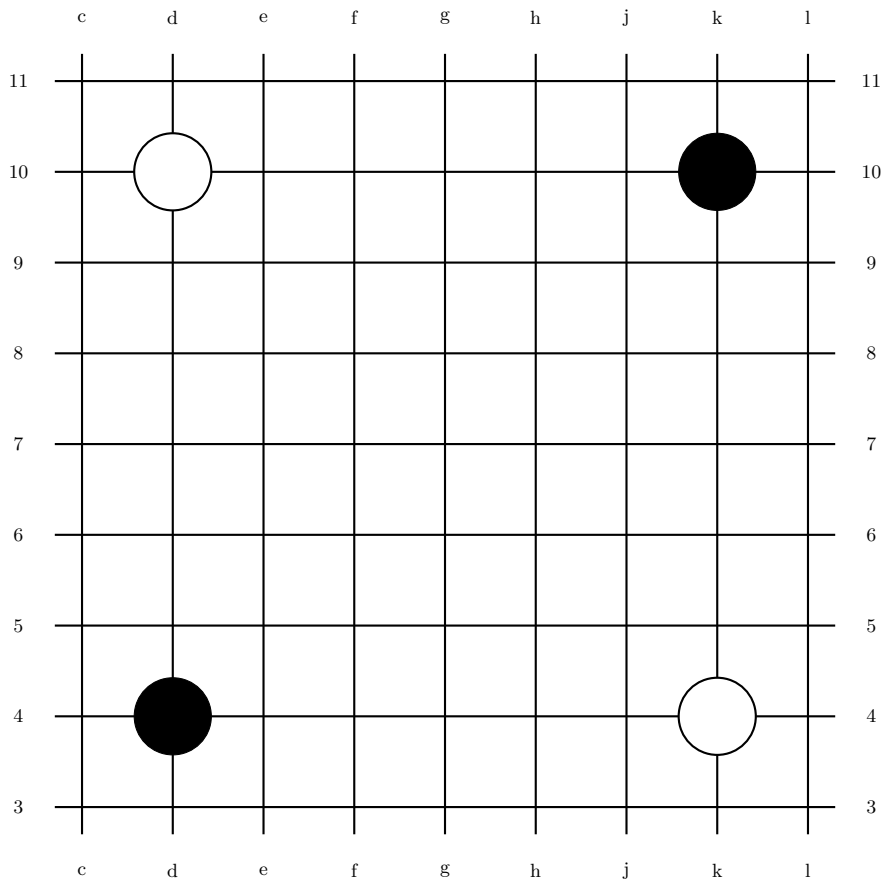
This example demonstrates all seven stone colors with numbering and symbols.

9.2 Size and Frame Combinations

9.2.1 Small + Frame



9.2.2 Large + No Frame



10 Coordinate System

10.1 Position Format

Positions use standard Go notation:

- Columns: a–t (skipping 'i')
- Rows: 1–19 (or board size)
- Examples: `d4`, `k10`, `q16`

10.2 Coordinate Display

Enable coordinates with package option or commands:

```
\eigocoords        % Enable coordinate display
\eigonocoords      % Disable coordinate display
```

Customize coordinate appearance:

```
\eigocoordscale{0.8}      % Scale factor
\eigocoorddistance{0.7}   % Distance from board
```

11 Enhanced Board Display

11.1 Border Enhancement

Complete board diagrams feature enhanced borders for better visual definition:

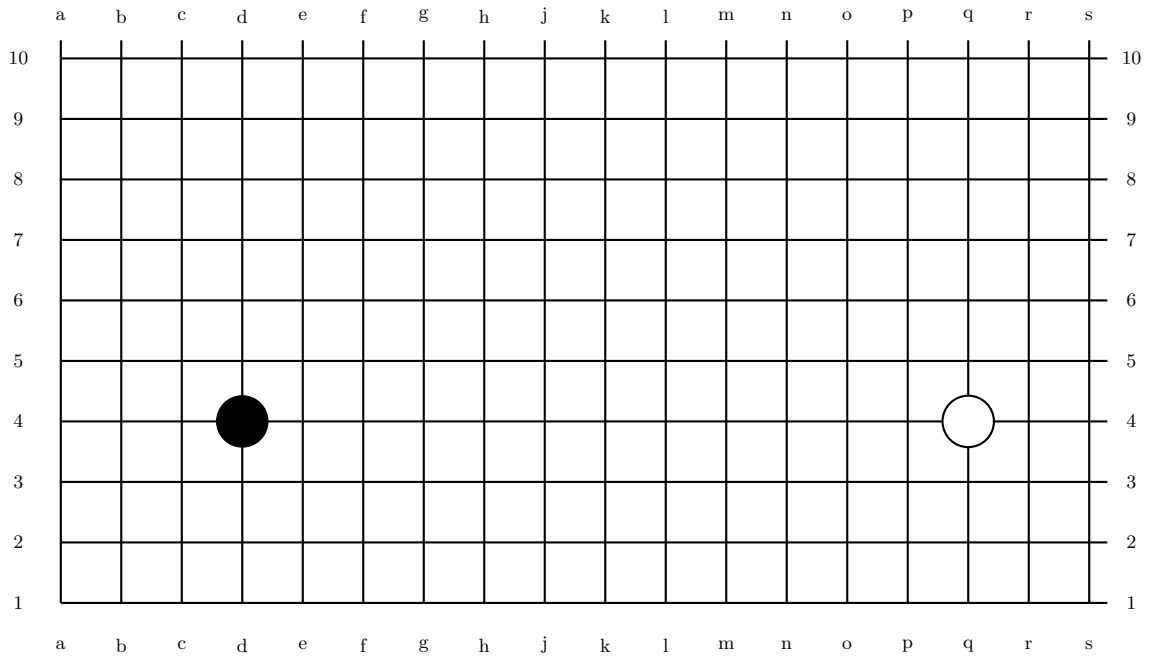
```
\eigoframe          % Enable enhanced frame display
\eigonoframe        % Disable frame display
```

When frame display is enabled, complete boards show:

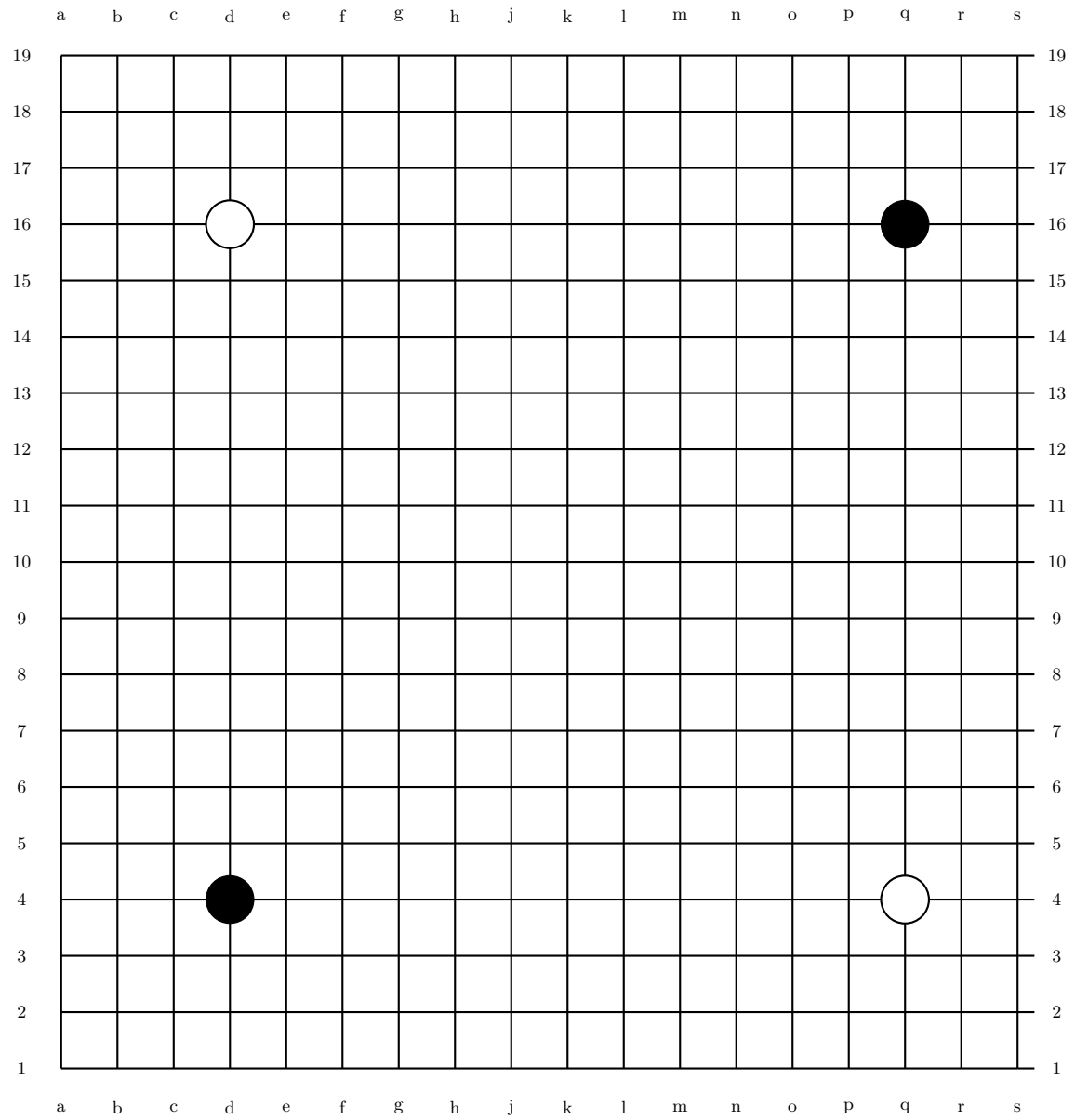
- Thick border (2pt width) around the entire board
- Colored background in color mode
- Professional appearance suitable for publication

11.2 Frame vs No-Frame Comparison

No frame (partial view):



With enhanced frame (same area):



12 Board Management

12.1 Clearing Positions

Clear entire board:

```
\cleargoban
```

Clear specific zone:

```
\cleargoban[d4,k10]  % Clear rectangle
\cleargoban[k10]     % Clear 5x5 around k10
```

Clear specific positions:

```
\eigoclear{d4,e5,k10}
```

12.2 Information Commands

Get board information:

```
Board size: \theeigobsize
```

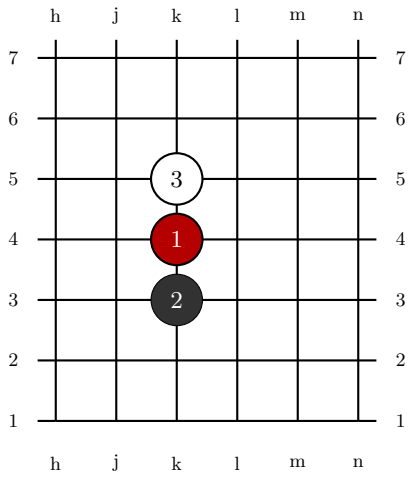
```
Current board: \theeigobnum
Unit size: \theeigountisize
```

Board size: 19, Current board: 1

13 Advanced Examples

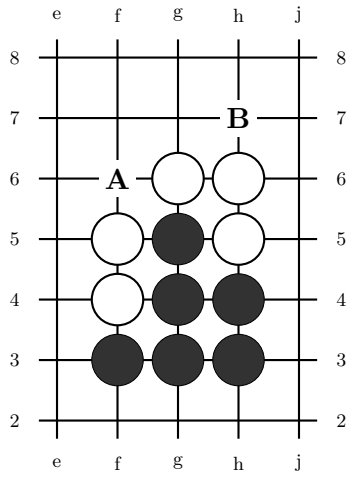
13.1 Game Sequence with Custom Colors

```
\cleargoban
\gobansize{19}
\normalgoban

 Customize colors for this example
\eigoblackcolor{50,50,50}      % Dark gray instead of black
\eigoredcolor{180,0,0}         % Deep red

 Opening moves
\blackstones{d4,q16}
\whitestones{d16,q4}

 Approach and response with custom color
\redstones[1]{k4}
\autoblackfirst[2]{k3,k5}

\showgoban[h1,n7]
```



13.2 Problem Diagram with Enhanced Display

```
\cleargoban
\eigoframe  % Enable enhanced borders
\blackstones{f3,g3,h3,g4,h4,g5}
\whitestones{f4,f5,g6,h5,h6}
\gobansymbol{f6}{A}
\gobansymbol{h7}{B}

\showgoban[e2,j8]
```



13.3 Variation Analysis with Custom Stone Colors

Using multiple boards and custom colors for clear differentiation:

```
 Main line
\usegoban{1}
\eigocustomonecolor{0,100,0}    % Dark green
\blackstones{d4,k10}
\whitestones{d10,k4}
\customonestones[1]{k16}        % Main line move

 Variation
\usegoban{2}
\eigocustomtwocolor{100,0,100}  % Dark purple
\blackstones{d4,k10}
\whitestones{d10,k4}
\customtwostones[1]{q4}         % Variation move
```

14 Package Implementation

14.1 Internal Storage

The package uses a sophisticated storage system to handle:

- Stone colors and positions with full customization support
- Stone numbers
- Symbols and markup
- Multiple board states with independent color settings

14.2 Enhanced Border System

The enhanced border system provides:

- Configurable border width (`\eigo@border@width`, default 2pt)
- Automatic detection of full vs partial board display
- Smart background color management based on frame and color options
- Professional appearance for publication-quality diagrams

14.3 Color Management

The color system includes:

- Seven distinct stone colors with full RGB customization
- Dynamic color redefinition during document processing
- Color mode switching (color/bw) with proper fallbacks
- Default color palettes optimized for readability

14.4 LuaLaTeX Compatibility

The package includes enhanced LuaLaTeX support:

- UTF-8 character definitions with `\newunicodechar`
- Proper font encoding detection and handling
- Compatibility with luatex85 for older LuaTeX versions
- Robust handling of special characters in all engines

15 Troubleshooting

15.1 Common Issues

Stones not appearing: Check position notation (no 'i' in columns).
Colors not changing: Ensure color commands are called before stone placement.
Board too large/small: Use size commands or `\eigounitsize` with validation.
Borders not showing: Enable frame mode with `\eigoframe` and use full board display.
Custom colors reverting: Color changes affect subsequent stone placements only.
UTF-8 errors: Use LuaLaTeX for best compatibility or ensure proper input encoding.

15.2 Debug Mode

Enable debug output for troubleshooting:

```
\usepackage[debug]{eigo}
```

This provides detailed console output about:

- Position parsing and validation
- Board operations and transformations
- Color definitions and changes
- Size validation warnings
- Zone detection and rendering

16 Comparison with Other Packages

Package	Features	Advantages of eigo
igo	Black & White Go diagrams	Multiple customizable colors, enhanced borders

17 License and Acknowledgments

Inspired by the igo package and enhanced with modern LaTeX techniques and comprehensive Go diagram requirements for professional publication.

Development note: This package was developed by Marc Levivier with AI assistance for code generation, documentation, and testing. The design decisions, feature requirements, and final implementation remain under human authorship.

18 Version History

v1.0 (2025-09-06) Complete feature set with enhanced borders, full color customization, extended size options, improved LuaLaTeX support, and comprehensive validation