

Mandel -- The Mandelbrot Set

Introduction

The **Mandel** program produces a display of the Mandelbrot set, named for Benoît Mandelbrot who "discovered" it. The program produces a visual representation of the set by iterating $z^2 + c$ over each point of the complex plain and determining whether or not that iteration is bounded. Points for which the iterations are bound are members of the set; points for which the iterations are unbound may be displayed in color based on the number of iterations before their absolute value passed the boundary limit of $1 + \sqrt{2}$.

I have seen various programs which display or print the Mandelbrot set, and even a couple for Windows. However, the speed at which these programs could calculate the set has irritated me -- I don't have a Cray or even a math co-processor. **Mandel**, however, will calculate using fixed-point arithmetic to considerably speed the process. Also, 32-bit 386 instructions may be used to speed the calculations even further.

Menus

File -- Open, Save, Save As..., Print, Printer Setup...

These functions will be implemented in the next version; see below (**Ordering**) for more information.

File -- Save Setup

Saves the current environment, including color scheme, window size, calculation method, iteration limit and execution priority.

File -- Revert

Applies the last saved setup values to the current window.

Edit -- Select All

Selects the entire image for spawning or copying to the clipboard. See **Selecting and Zooming** below.

Colors -- Scheme

Displays a dialog box allowing the selection of a color scheme. The image does not have to be recalculated when changing color schemes. The available color schemes are part of the Mandel program; in the next version, they may be created or edited. The Wrap Palette option indicates whether Mandel should repeat the color scheme over the range of possible iteration counts, resulting in a banded appearance. The Random color scheme causes Mandel to randomly select 200 colors. Many of the color schemes are designed for 256-color displays; each color will be mapped to the nearest solid color on 16-color displays.

Colors -- Rotate

Rotates the current color scheme and redisplay the image.

Colors -- Animate

Continuously rotates the current color scheme using AnimatePalette, producing interesting visual effects. Available only on palette-based displays (generally 256 or more colors).

Colors -- Shuffle

Shuffles the current color scheme and redisplay.

Colors -- Sort

Sorts the current color scheme from light to dark, dark to light, or by spectrum. I need to work on the Spectrum sorting -- it does not currently produce the desired effect, though what it does do could be considered interesting.

View -- Options

Displays a dialog box for specifying computational options, which include: method of computation, priority and iteration limit.

View -- Coördinates

Displays and allows changes to the current X and Y extents being drawn. The step value (Δ) is computed based on the X range; consequently, the Y maximum is computed based on the step and the current window height.

View -- Statistics

Displays statistics from the current or last computation, updated approximately every two seconds. The current computation method is displayed at the top so that the various methods may be compared for efficiency.

Selecting and Zooming

A portion of the image may be selecting by dragging. The shape of the selected area is constrained by the dimensions of the current window. Once an area is selected, a set of buttons will appear:

Zoom

Zooms in, in the current window, to the selected area and recomputes for that area.

Spawn

Zooms in, in a new window, to the selected area and computes for that area. Current options, such as selected palette, are passed to the new window.

Copy

Copies the selected area to the clipboard in DIB (Device-Independent Bitmap) format.

Cancel

Cancels the select operation.

Restrictions

64-bit fixed point arithmetic is not yet implemented; its selection will result in 32-bit math.

Very small extents may result in a step value of zero, which will fill the window with a single color.

Sorting colors after animating or rotating with Wrap Palette off may result in the loss of some colors.

Paintbrush does not recognize DIB format in the clipboard and will not paste **Mandel** images.

Clicking **OK** in the Coordinates dialog without changing the values may result in recomputation because of rounding.

Sorting colors by Spectrum produces incorrect but interesting results.

Priority translates to the number of points to compute on each pass; consequently, slower computational methods may effectively take over the machine at relatively low priorities.

Ordering

Mandel is distributed as freeware; feel free to distribute, but please include this file. If you would like to receive the latest version (with complete source code), which includes the ability to save and retrieve images in multiple formats, additional computational modes, printing and color scheme editing, please send **\$25.00** to:

**Cerious Software
7015 Thorncliff Drive
Charlotte, NC 28210**

Please also send any suggestions or comments to this address.