

FRACALEIDO USAGE DOCUMENTATION

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INTRODUCTION

This is the usage documentation of Fracaleido, an application created for the 'Fractal' course at the Vienna University of Technology. Fracaleido features a simple GUI to generate so called Kaleidoscopic Fractals. Those fractals are Iterated Function Systems that usually consist of simple geometric transformations. The premise of this application is to combine such simple geometric operators with a few clicks to generate a new fractal and explore it within the same application. For a closer look on the technical side of Fracaleido see the technical documentation.

NAVIGATION

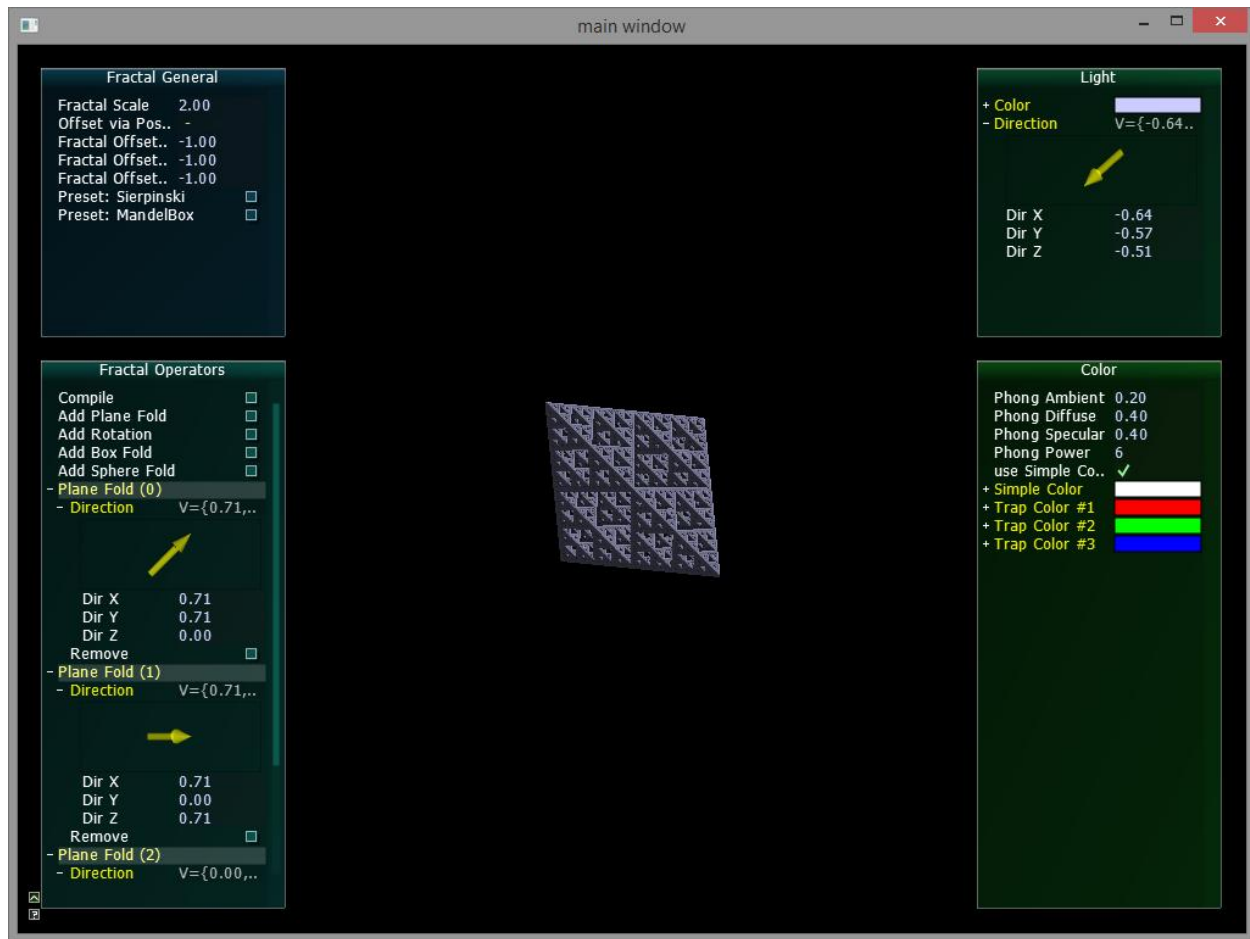
The user can travel through the 3D space by using the mouse and the keyboard. Below is the list of the user input and its effects:

Keyboard	
W, A, S, D	Moves the camera forward, left, backwards, right
Space, STRG	Moves the camera up, down
Mouse	
Right Mouse Button + Mouse Movement	Changes the viewing direction
Mouse wheel up/ down	Increases/decreases the movement speed

INTERACTION

In this section we take a closer look at the GUI of the application. The GUI was created using AntTweakBar (<http://anttweakbar.sourceforge.net/doc/>).

The GUI is separated into boxes, each of them with another purpose as seen in the screenshot below and described after it:



FRACTAL GENERAL

This box is all about the general fractals formula. The values presented in it alter the transformation of a point in the 3D space within an iteration of the distance estimator (for more information read the technical description). This transformation is as follows:

$$p = p * scale + offset$$

FRACTAL SCALE

Alters the scale parameter.

OFFSET VIA POS

If this option is checked, the offset vector will be set to the initial point in space. Otherwise the values for the offset of the point are taken from the three number input fields below

PRESETS

Those change the Fractal Operators and the general fractal parameters to produce to known fractals: The Sierpinski Tetrahedron and the Mandelbox.

FRACTAL OPERATORS

This box presents the geometric operators that are currently in use and provides options to add, remove and change them as well as compile them.

COMPILE

This button compiles the operators that are currently in use. When operators are deleted or added this button has to be pressed to actually apply the changes to the fractal formula.

ADD OPERATOR

Each one of those buttons adds a specific operator to the fractals formula. The operators will always be added to the end of the operator chain.

FRACTAL OPERATOR

After the buttons to add the operators, the list of the operators is shown which also features control to alter each operator's parameters. Each one of the lists entries can be collapsed and includes a button to remove the operator from the chain.

PLANE FOLD

A simple operation that mirrors a point from one side of the plane to the other. The folding is performed when the point lies behind the plane. In other words: when the distance to the plane is negative.

ROTATION

Simply rotates the point around an axis with a specific amount of degrees.

BOX FOLD

Folds a point from one space between two boxes to the space on the opposite side of them, inside out.

SPHERE FOLD

Moves a point from the inside of a sphere to the outside. This movement is depicted by two radii, the inner and the outer.

LIGHT

This box changes the directional light, which is used for rendering. Notice that no algorithm to produce shadows is implemented in this application.

COLOR

This changes the color of the light

DIRECTION

This changes the direction of the incoming light

COLOR

This box is changes the material and color properties of the fractal. For rendering the Phong lighting models are used.

Notice that the following values will not be normalized to generate a sum of one by the application, due to the limited GUI options from AntTweakbar. However, a sum of one should be ensured by the user.

PHONG AMBIENT

This value defines the ambient light contribution.

PHONG DIFFUSE

Represents the diffuse contribution factor of the Phong model.

PHONG SPECULAR

Represents the specular contribution factor of the Phong model.

PHONG POWER

Represents the power of the specular lobe of the Phong model.

USE SIMPLE COLOR

When this is checked, one simple color is used to paint the fractal. If not, a mixing of three colors which is determined by a so called orbit trap is used to paint the fractal with a texture.

SIMPLE COLOR

The color of the fractal, when only one color is used

TRAP COLOR #1

The first color to be mixed via the orbit trap.

TRAP COLOR #2

The second color to be mixed via the orbit trap.

TRAP COLOR #3

The third color to be mixed via the orbit trap.

ADDITIONAL DATA

This box is hidden and can be shown by clicking on the arrow in the lower left corner of the screen.

It shows the current camera position and direction as well as the frame rate