Perceptron

(v. 1.0b 2010)

Introduction

Perceptron is a fractal video feedback simulator with a variety of extraordinary effects.
Home page: http://bitbucket.org/mrule/perceptron/downloads.

The classical video feedback is an artistic technique that uses a video camera and a TV screen. The camera is pointing at the screen that is simultaneously broadcasting the output from the camera. By using the camera alone, we can see a variety of fractal spirals, and a number of pixel-related or saturation-related effects that stem from the electronic components. Perceptron does not simulate the latter two. With a single mirror located next to the TV screen, we can additionally create fractal trees, and by adding even more mirrors, complex IFS fractals. [1]

Perceptron does not simulate the classical video-camera setup exactly. Instead, it uses a two-dimensional computer screen only, in order to transform its contents recursively. In the process, it applies any given complex function f(z, c) that produces a Julia fractal, a pullback effect (with rotation) that multiplies the resulting Julia fractal, a reflection transform and the set of coloring techniques. The coloring techniques stem from the boundary condition check performed on the point z' = f(z, c). They are the outside coloring method, the gradient function, the fade-to color modes, and the color filter.

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References:
[1] http://classes.yale.edu/fractals/Labs/VideofeedbackLab/VideofeedbackLab.html

Find out more online…
http://en.wikipedia.org/wiki/Video_feedback
http://en.wikipedia.org/wiki/Conformal_pictures
http://en.wikipedia.org/wiki/Fractal

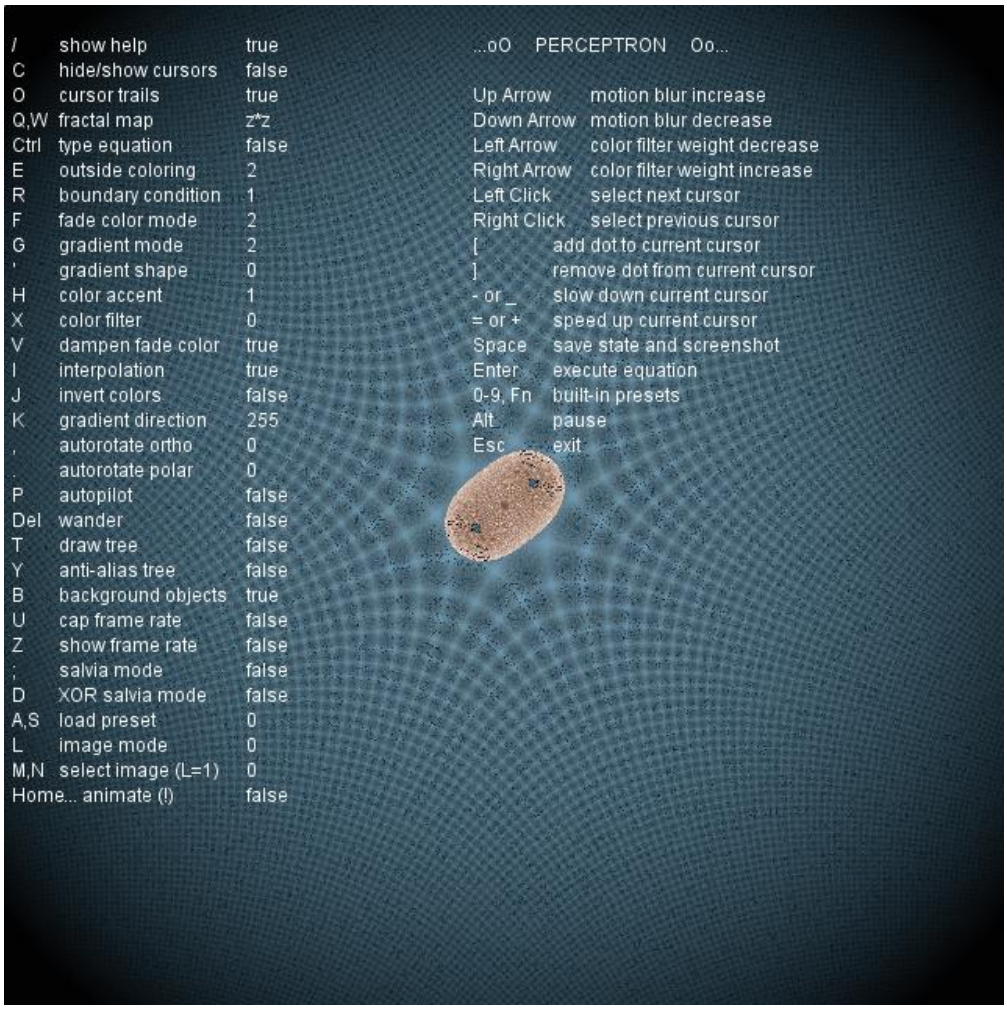
How to run

Download and unpack Perceptron zip archive to any folder, such as My Documents. Install Java from www.java.com. Enter the unpacked folder Perceptron and double-click **perceptron.jar**. It runs on all platforms. If you wish to alter the source code and compile the project, download and install Net Beans from http://java.sun.com/javase/downloads/widget/jdk_netbeans.jsp.

Usage

Keyboard Controls

To start, press down arrow and left arrow a few times. The arrows control the screen update delay and the fog effects. Read the on-screen help by pressing the key **/** (slash).



The Mouse Controls

The mouse controls any one of the four cursors. Click left or right mouse button to select the cursor.

Yellow cursor: sets the color gradient parameters, offset and slope.
Blue cursor: controls the pullback, (mimics the camera distance and rotation).
Red cursor: sets the parameter c of the complex function (e.g. $z^2 + c$), (mimics the camera position).
Dragonfly (black cursor): controls the amount and type of color filtering (contrast) when combined with the X switch.

Activating the rotating three-dimensional fractal Tree will bring up an additional, temporary set of cursors that control the tree. The Tree is an IFS fractal for artistic purposes, which you can bring about when you press T.

Important notes

The screen resolution can be changed in the settings file, perceptron\resource\Settings.txt. In addition, you can add your own **complex functions** to the list within the file or type them in during runtime by pressing CTRL once, typing the equation and pressing Enter. Later, press CTRL again to stop editing the equation. Hint: you can play with the colorful letters by typing text anywhere on the screen without pressing enter.

Press button L to enter **the image mode**, and M or V to change the current image. The image mode preloads all the images found in the folder perceptron\resource\images. It then transforms any single image recursively with the given complex function. This is a feature separate from the main fractal-generating engine.

The save option will save the state (preset) and the screenshots (two consecutive frames) in the My Documents folder (or anywhere else as you select). Choose a unique save filename each time to prevent accidental overwriting of the existing files!

To load a preset, Perceptron currently preloads all the presets found in the folder perceptron\resource\presets. During runtime, you can browse one by one preset by pressing A or S. The preset technology cannot capture all the aspect of the ever-evolving fractals due to the issues of chaos. However, the states spawn evolution to the fractal you were seeing. Other issues of the beta version are about the incomplete state parameters. Some presets are hard-coded into the program. They are accessible by numbers and function keys.

The animate option will save the consecutive frames to the folder *animate* within the Perceptron's base directory. Warning: this creates a very large number of PNG image files that you need to bind together into a motion picture by using Virtual Dub http://www.virtualdub.org. Empty the folder animate before recording another animation to avoid overwriting files! In **Virtual Dub**, click on file > open, from the File type drop down select "Image Sequence". Select the first image in the folder animate, and Virtual Dub will then automatically import all other pictures that follow in numerical order. Click video > frame rate and choose a frame rate for your movie. The higher the frame rate, the more images are shown per second (25FPS will show 25 pictures per second). Effectively, you can produce higher frame rate and smoother video than the Perceptron managed to calculate and save, but the process requires time. Change video and audio compression if needed. The video compression will be essential for storing the final video, due to large file sizes. Finally, click file > save as avi.

Short list of basic options

Boundary Conditions (R)

0	Rectangular Window (as the "limit circle")
1	Limit Circle (for classical Julia sets)
2	Elastic Limit Circle
3	Horizontal Window
4	Vertical Window
5	Inverse Oval Window
6	No Window

7 Framed Window (with colored frame)
8 Convergent bailout condition (for Newton fractals)

Outside Coloring Methods (E)

0 Color Fill
1 Edge Extend
2 Reflect
3 Sketch
4 Sketch II
5 Fuzzy

Color Gradients (G)

0 No Gradient
1 Simple Gradient
2 Accented Gradient

Color Filters (X)

0 None
1 RGB
2 Mush

Fade Color Modes (F)

0 Black
1 White
2 Mid-Screen Pixel Hue
3 Not Mid-Screen Pixel Hue
4 Mid-Screen Pixel Hue Rotate
5 Hue Rotate