DrawJong 2.0
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About DrawJong:

DrawJong is a visualizer based on chaotic attractors. It is named after the De Jong attractor, now one of five chaotic attractors that can be rendered by DrawJong.

In addition to its visual capabilities, DrawJong is also a complex, two-oscillator chaotic wave terrain synthesizer with frequency modulation (FM). To generate sound, all of the x values of the selected equation are loaded into one wavetable, while all of the y values are loaded into another. These two wavetables can be scanned by oscillators of varying table sizes, and these two oscillators can modulate each other's frequencies.

How to Use:

When you first start up DrawJong, you will see the De Jong equation rendered in orange. It's x values are rendered across the top as a waveform, while the y values are on the bottom. You should see six buttons: Figure, Colors, Synth, Screenshot, Help, and Credits. To interact with the mathematics of the function, you can either use the pop-up menus from the buttons, or use DrawJong's gesture controls.

Gesture Controls:

- One-finger swipe controls Coefficients A (x-axis) and B (y-axis).
- Two-finger swipe controls Coefficients C (x-axis) and D (y-axis).
- Pinch to scale figure size.
- Double tap with one finger to randomize the background color.
- Double tap with two fingers to randomize the particle colors.

Coeffs:

These controls affect the geometry and rendering of the current attractor.

- “Points” controls the number of data points computed and rendered. If you are on a first generation iPad, you should lower this value, as this is the most processor-intensive setting.
- The four “Coefficients” control the geometry of the visuals, and also greatly affect the sound.
- “Position” moves the figure around in space.
- “Line Mode” uses lines instead of points to render the current attractor. This will not affect the sound in any way, but provides different aesthetics.
- “Animated Mode” turns on a modified version of the algorithm that constantly updates the location of every point. This version is very noisy, and works best at low frequencies. Currently, Animated Mode works only on the De Jong and Clifford attractors.
- “Gesture Controls” enables touch-screen control of the figure.

Visual:

These controls affect the colors of both the current figure and the background. On this menu, you can also select the current attractor.

- “R,” “G,” and “B” affect the red, blue, and green components, respectively.
- “Alpha Blending” will make the individual points of the figure slightly transparent. Colors will build up in areas of high point density. Use this for a more three-dimensional image. However, if you want black points, you will have to turn off alpha blending.
- “Waveform Colors” will enable the coloration of the top and bottom waveforms. The color of these waveforms follows the color of the particles.
- "Attractor" selects which set of equations that DrawJong will render. To find out more about these attractors, please see "Types of Attractors" below.

Synth:

These controls affect the sound generating engine in DrawJong.

- “Frequency” controls the number of times the current table is scanned per second by the oscillators. This shouldn't be confused with “pitch,” as the wavetables being scanned are extremely complex. The top slider for each frequency is a “coarse” slider, which changes frequency at a much greater rate than the “fine” slider, which is below it.
- “Gain” controls the volume of each oscillator.
- “FM Mode” sets whether the oscillators modify each other's frequencies. “None” means the oscillators won't affect each other. “X->Y” means that X will modulate Y, and “Y->X” means that Y will modulate X. The amount of modulation present is set with the “Modulation Depth” slider. While explaining FM Synthesis is beyond the scope of this manual, if you are interested, I highly recommend reading the Wikipedia article and moving on from there.
- “Table Sizes” determine the size of each oscillator's wavetable, in samples. In general, a small wavetable will provide you with less noisy, more stable waveforms with distinct pitches, while larger tables become extremely noisy. However, larger wavetables can be very sonically interesting at lower frequencies. Experiment!
- “Display” changes whether or not the wavetables are rendered visually.

Please note that you can drag the current table across the waveform! To do this, drag from the table's left edge (The tables are the blue or red boxes on top of the waveform).

Screenshot

This button will save a copy of the currently rendered figure to your iPad's photo album. Your sound may stutter while the image is being saved. If you don't want the waveforms to be saved with your image, you can turn them off with the “Display” setting under “Sound”.

Help

This is the manual that you are currently reading!

Credits

DrawJong could not have been made without the people listed here.

Types of Attractors

De Jong

The De Jong Attractor can be modeled by solving two equations:

$$x_n = sin(a*y_{n-1}) - cos(b*x_{n-1})$$
$$y_n = sin(c*x_{n-1}) - cos(d*y_{n-1})$$

a, b, c, and d are known as the coefficients of the equation. These can be changed under DrawJong's “Coeffs” menu. Due to the relatively noisy waveforms generated by this equation, it is recommended that you use smaller table sizes and lower frequencies for the oscillators.

Clifford

The Clifford Attractor is very similar to the De Jong Attractor. It can be modeled by solving two equations:

$$x_n = sin(a*y_{n-1}) + c*cos(a*x_{n-1})$$
$$y_n = sin(b*x_{n-1}) + d*cos(b*y_{n-1})$$

Duffing

The Duffing Attractor can be rendered by using the following equations:

$$dx / dt = y$$
$$dy / dt = x - x^3 - a*y + b*cos(w*t)$$

Out of all five equations included with DrawJong, this is the only one with the potential to go to infinity (The Lorenz and Rossler systems usually have this potential, but their maximum ranges have been limited to prevent this). I have taken precautions to make sure that the program doesn't generate sound bursts at these points, but please be careful when using headphones.

There are no recommended settings for the Duffing system. Interesting sounds can be found with any frequency and FM setting.

Lorenz

The Lorenz Attractor can be rendered by using the following equations:

$$dx / dt = a(y - x)$$
$$dy / dt = x(b - z) - y$$
$$dz / dt = x*y - c*z$$

As you can see, the Lorenz Attractor is evaluated in three dimensions, unlike the previous three attractors. The Z-axis is not currently used for any sound features. This attractor has a very interesting history. If you want to read more about it, you should look at the Wikipedia page (http://en.wikipedia.org/wiki/Lorenz_attractor).

It is recommended that you use higher frequencies and larger table sizes to get the most dramatic sounds out of this system. Lower frequencies work as well, but are only recommended if you have good headphones or a set of speakers to connect your device to.

Rossler

The Rossler Attractor can be rendered by using the following equations:

$$dx / dt = - y - z$$
$$dy / dt = x + a*y$$
$$dz / dt = b + z (x - c)$$

The recommended settings are the same as the Lorenz Attractor.

OSC Reference

This section is for advanced users who are already familiar with how to setup an OSC template. For premade templates, go to the Software section at http://mhetrick.github.com

SEND ALL MESSAGES ON PORT 9999.

DrawJong responds to two different types of bundling using the following addresses:

Coefficients

"/coeff f f f f" (where each f is a floating point number from -5.0 to 5.0.)
or
"/coeff/1 f". Use /1, /2, /3, and /4 to pick the coefficient that you are sending to. If you are using TouchOSC or a Lemur, using a multislider object and setting its address to "/coeff" will work for this formatting.

Background Color

"/bgcolor f f f" (Each f is from 0.0 to 1.0 in the order Red, Green, Blue)
or
"/bgcolor/1 f". /1 is Red, /2 is Blue, /3 is Green.

Particle Color

"/partcolor f f f f" (From 0.0 to 1.0. Red, Green, Blue, Alpha)
or
"/partcolor/1 f" /1 is Red, /2 is Blue, /3 is Green, /4 is Alpha.

X Frequency

"/freqx f f" (Each f is a floating point number with a minimum value of 0.0. The first controls Coarse frequency, and the second controls fine. Neither control is bounded to an upper frequency, so you can use this for frequencies outside of the range of the normal controls. Use this for some serious aliasing.)
or "/freqx/1 f" where /1 is coarse and /2 is fine.
For **Y frequency**, replace /freqx with /freqy

Gain

"/gain f f" (Each f is from 0.0 to 1.0) First f is X Gain, second is Y Gain
or
"/gain/1 f" Where /1 is X Gain, /2 is Y Gain

FM Synthesis

"/fmamount f" Affects the modulation amplitude. "f" must be a minimum of 0.0.
"/fmmode i" selects which mode of FM synthesis to use, where "i" is either 0 (none), 1(X->Y), or 2(Y->X).

Table Size

"/tablesizex i" Controls the size of the X Oscillator's table, where "i" is an integer from 0-6.
"/tablesizey i" Controls the size of the Y Oscillator's table.

Visual Modes

"/animation i" Turns on animation, where "i" is an integer 0 or 1.
"/line mode i" Turns on line mode, where "i" is an integer 0 or 1.

Points

"/points i" Controls the number of points, where "i" is an integer 0 to 100,000.

Version History

2.0
-Added Clifford, Duffing, Lorenz, and Rossler attractors.
-Fixed bugs with OSC support.
-Fixed bugs on iPhone/iPod menus.
-Efficiency tweaks.

1.3
-Added full OSC support through oscpack by Ross Bencina.

1.2
-Added full touch-screen gesture controls.
-Added option to color waveforms.

1.1
-Universal Binary: Now works on iPhone and iPod Touch.
-Includes a new animated mode.
-X Volume is now equal to Y Volume.
-Fixed a few performance errors, especially with fewer numbers of points.

1.0
-Initial Release