Guided Tour of the Young Diagram Simulator program

This document is intended to be a short guide to sampling random Young diagrams with the program from `http://home.imf.au.dk/beltoft`, meant for the reader of my phd progress report.

The Special Complementary Hook Walk

1. To sample the special complementary hook walk, set $q = 1$, set coordinates to 'standard', make sure, 'distribution', 'averages' and 'curve' are all unchecked, and set 'number of boxes' to 1.
2. Click 'Generate new diagram' in the 'q-Plancherel Distribution' section. This generates the diagram with 1 box.
3. Now click 'Grow existing diagram' to add boxes to the diagram one at a time. As the constructed diagrams have the transition probabilities from the Plancherel distribution, they appear as if attahed by the special complementary hook walk.
4. If 1 box at a time is too slow, increase the number in 'number of boxes'.
5. Reset using the 'reset' button.

The q-Hook Walk

1. To sample diagrams using the q-hook walk, just set q to any positive number of your liking and do as above. Note that switching $q \to q^{-1}$ corresponds to transposing the picture.

The Arcsine Law

1. Obviously, the arcsine law manifests itself only when the number of boxes grows large. Set $q = 1$, uncheck 'distribution' and 'averages', and check 'curve' to plot the curve Ω. Set the number of boxes to 1000, and generate diagrams from the Plancherel distribution. They will generally lie close to the curve. The coordinates 'Kerov' are the (x, y)-coordinates from the report. Try also growing diagrams with greater numbers of boxes.

The Exponential Distribution

1. Uncheck 'distribution', 'averages' and 'curve'. Choose 'french' coordinates to match the setup in the report.
2. To sample exponentially distributed diagrams, use the set of buttons in the 'bounded exponential distribution' section. Set m and n to 100 each (the default value).
3. Click 'set $q = e^{-\frac{1}{n}}$ (note that this means that $y = 1$) and click 'generate diagram' to sample diagrams.
4. Check 'distribution' to show a colour grading on the boxes corresponding to the frequency with which the boxes have occured among the diagrams sampled (see the 'statistics' section). To sample many diagrams at once, increase the number in 'generate __ diagrams'. Check 'curve' to print the curve $t_0(z)$ from the report, and check 'averages' to plot the average observed height of each column.
5. Try increasing m and n and taking different values for them (up to ~ 600). Remember to set q accordingly using the button.
6. Unbounded exponentially distributed diagrams can be sampled the same way. Note that q must be less than 1. Try first $q = 0.8$. This produces very small diagrams. Try increasing q to 0.9 and 0.99. Unfortunately, due to the immense size of the numbers involved, q cannot be larger than ~ 0.995. Check 'distribution', 'curve' and 'averages' to compare observed averages with the curve $t \mapsto -\log(1 - e^{-t})$.