

Part I

Appendix: Parameter functions

There exist a number of pre-defined functions that can be used to set up the weights, delays, and kernel values for a topological connection.

Name	Parameters	Function
gaussian	c, p_center, mean, sigma	$c + p_center * e^{-(distance - mean)^2 / (2 * sigma^2)}$
gaussian2D	c, p_center, mean_x, sigma_x, mean_y, sigma_y, rho	$c + p_center * e^{-\left(\frac{(x - mean_x)^2}{sigma_x^2} + \frac{(y - mean_y)^2}{sigma_y^2} - \frac{2 * (x - mean_x) * (y - mean_y) * rho}{sigma_x * sigma_y}\right) / (2 * (1 - rho^2))}$
linear	a, c	$a * distance + c$
exponential	c, a, tau	$c + a * e^{-distance / tau}$
uniform	min, max	Random number in the range $[min, max]$

Table 1: Parameter functions.

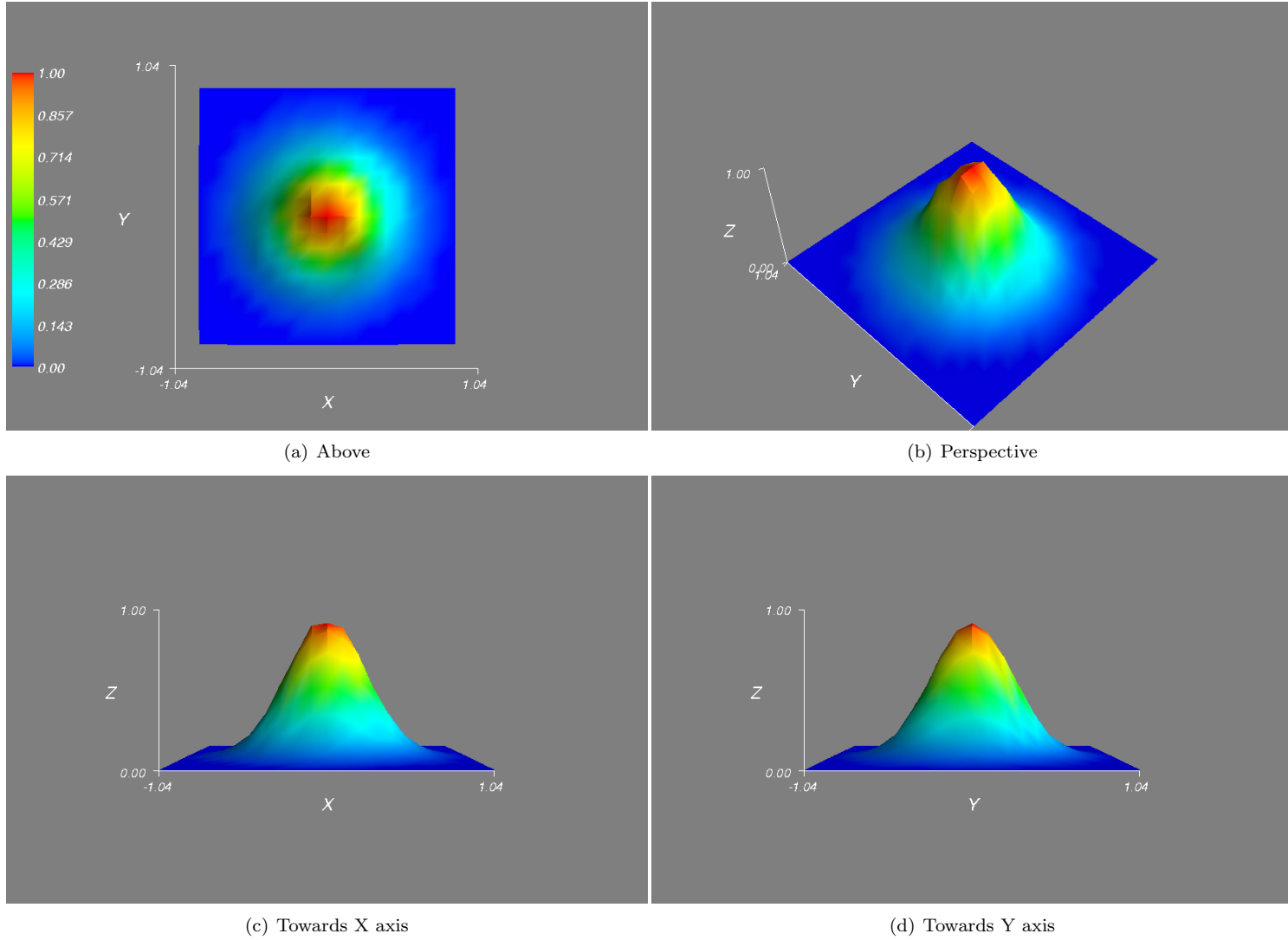


Figure 1: Gaussian connection profile with sigma equal to 0.3 (otherwise default values). The z-axis shows the relative distribution of the connections. The x- and y-axis shows the distances between the pre- and post-synaptic nodes involved in the different connections.

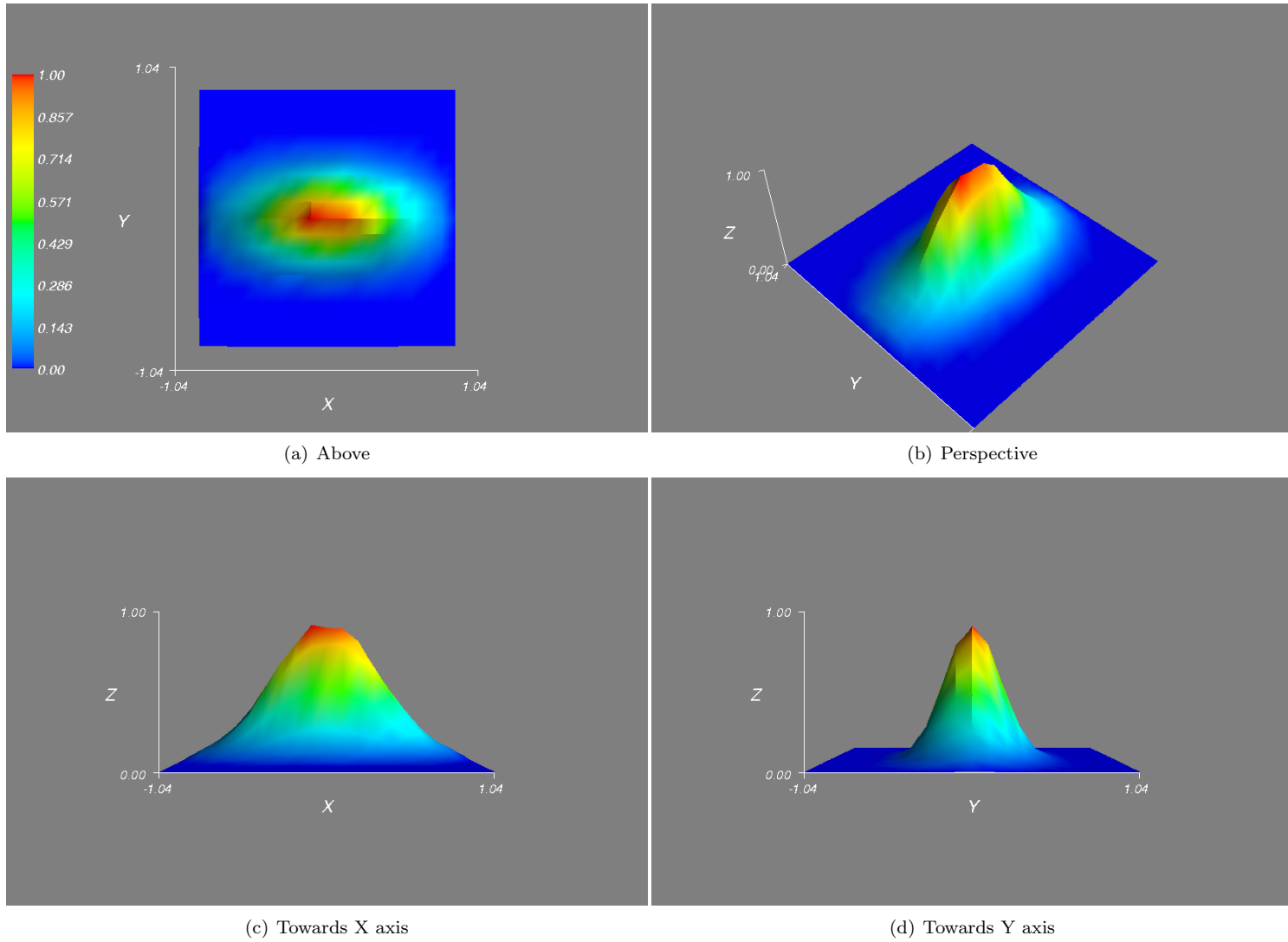
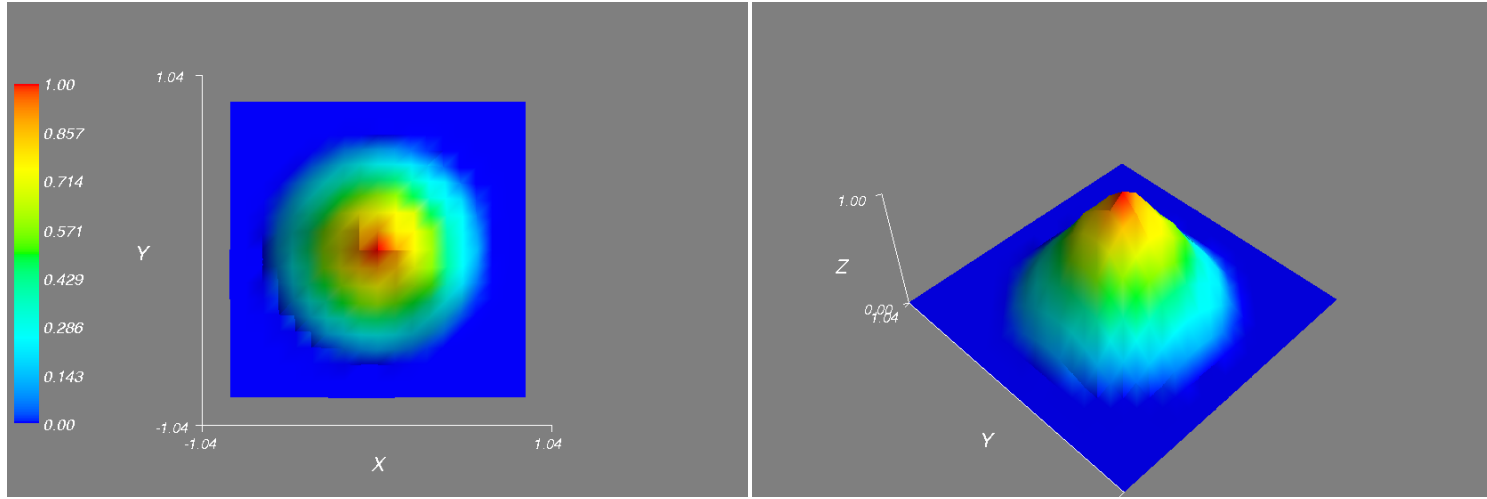
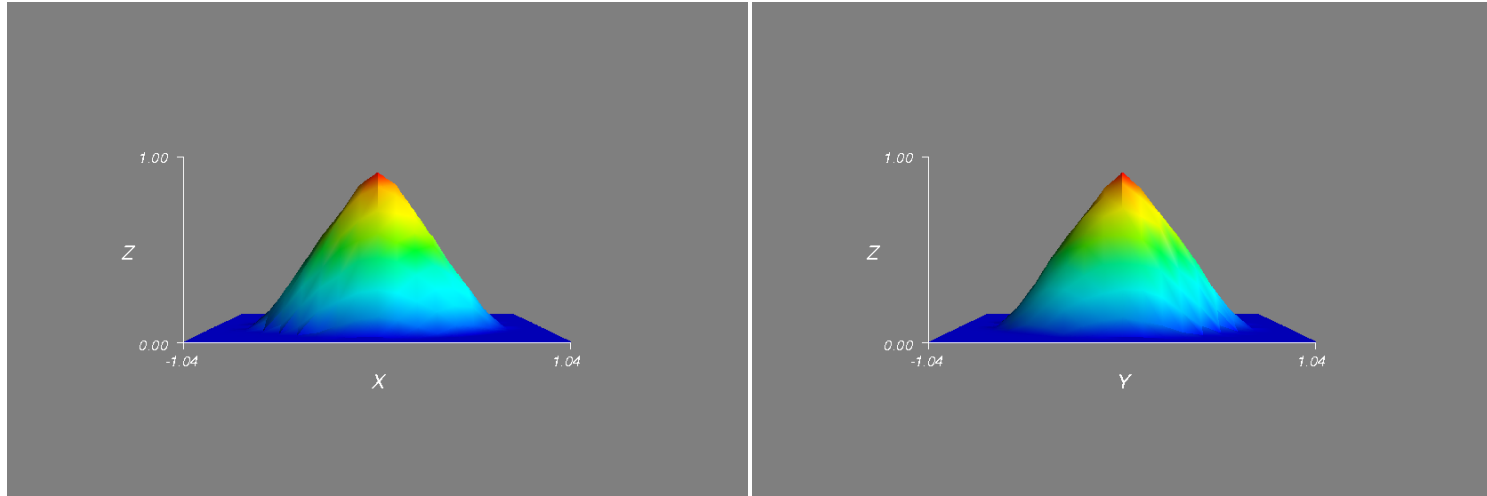


Figure 2: 2D gaussian connection profile with σ_x equal to 0.2 and σ_y equal to 0.4 (otherwise default values).



(a) Above

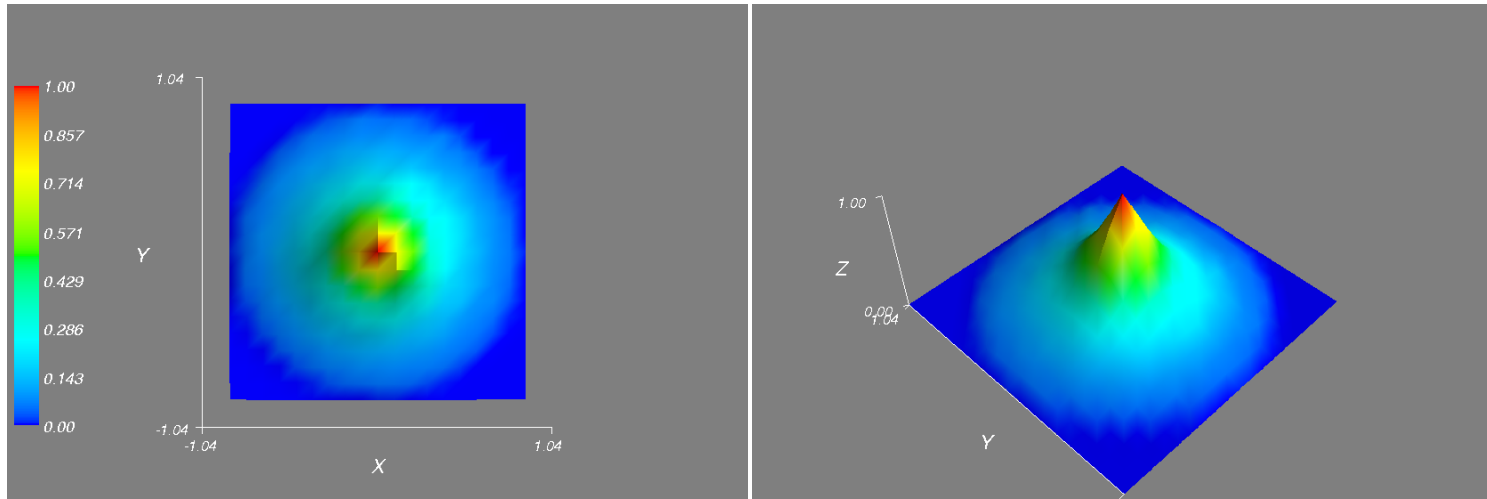
(b) Perspective



(c) Towards X axis

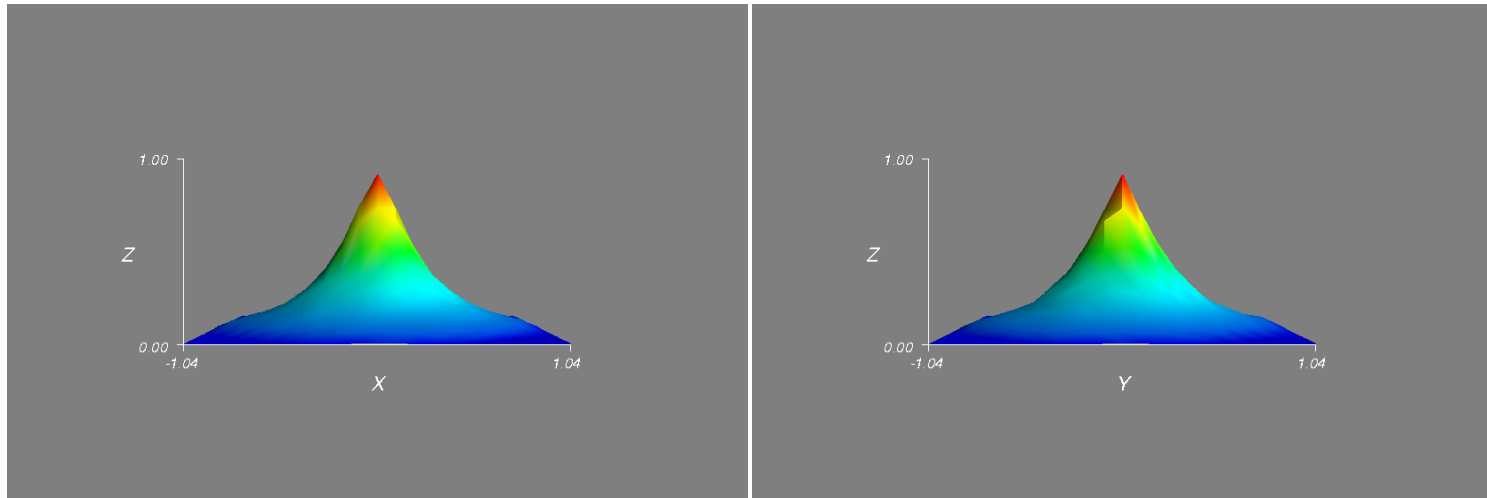
(d) Towards Y axis

Figure 3: Linear connection profile with $a = -1.3$ and $c = 1.0$ (otherwise default values).



(a) Above

(b) Perspective



(c) Towards X axis

(d) Towards Y axis

Figure 4: Exponential connection profile with tau equal to 0.3 (otherwise default values).

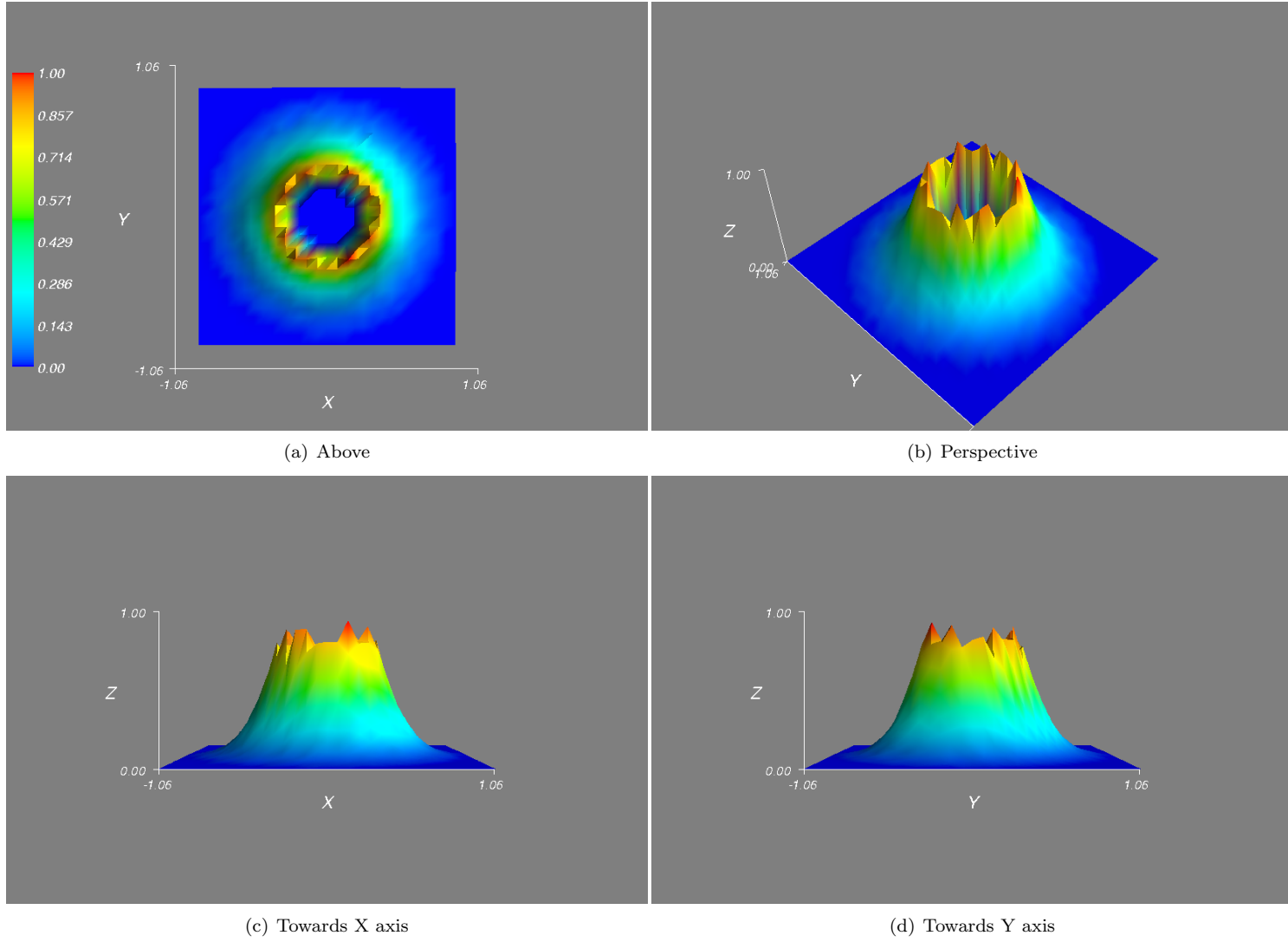


Figure 5: Gaussian connection profile with sigma equal to 0.3 (otherwise default values). A doughnut region with inner radius of 0.3 and outer radius of 1.0 is used. Z axis still shows relative distribution of connections.

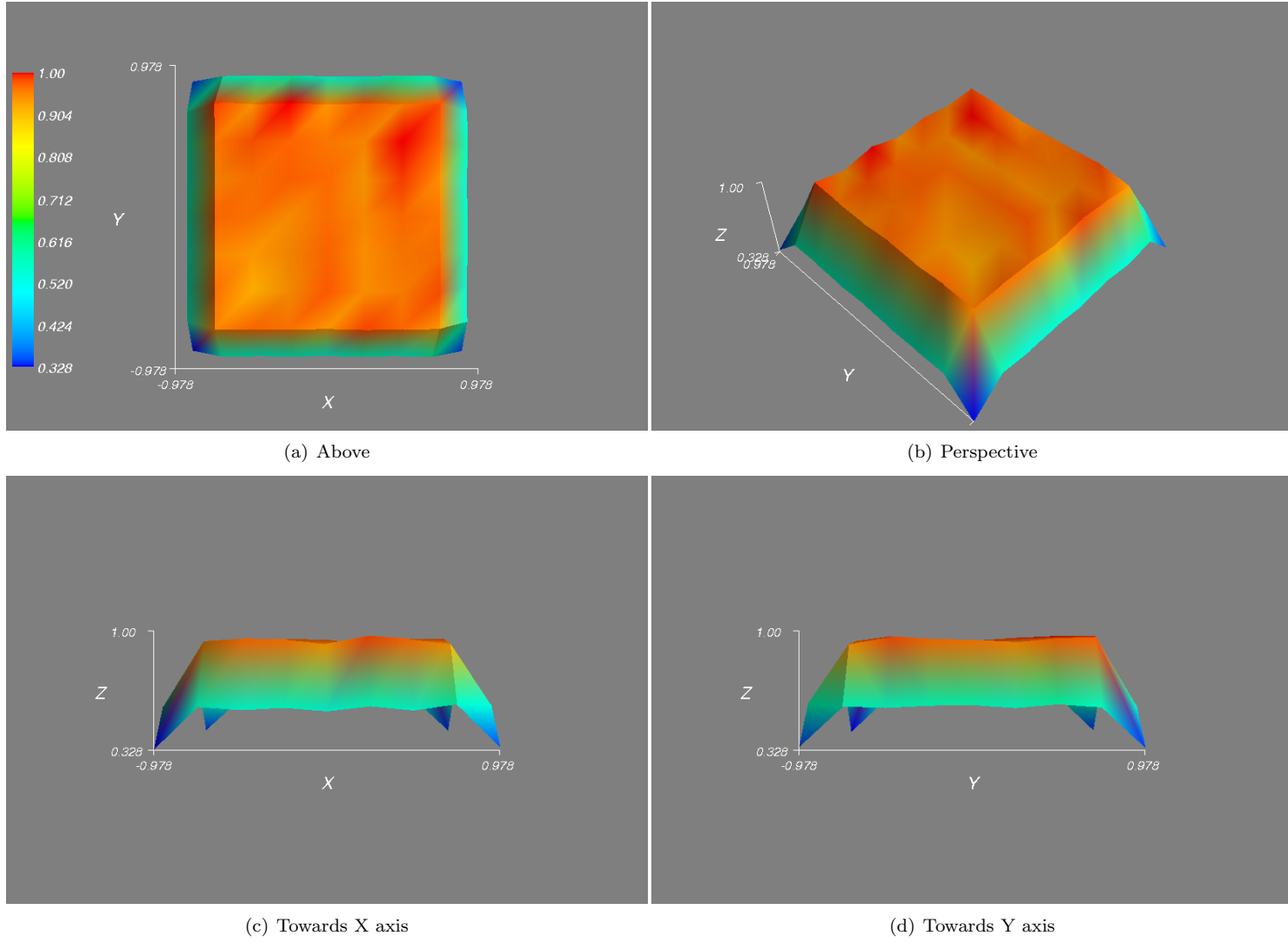


Figure 6: Flat connection profile. A rectangular region with lower left corner equal to $[-1, -1]$ and upper right corner equal to $[1, 1]$ is used.