

Fornberg's Recursive Algorithm: The Stencil Pyramid

$m = 0$

(1 node)

$$\delta_0^{(0,0)}$$

$m = 1$

(2 nodes)

$$\delta_1^{(0,1)}$$

$$\delta_1^{(1,1)}$$

$m = 2$

(3 nodes)

$$\delta_2^{(0,2)}$$

$$\delta_2^{(1,2)}$$

$$\delta_2^{(2,2)}$$

$m = 3$

(4 nodes)

$$\delta^{(0,3)}$$

$$\delta^{(1,3)}$$

$$\delta^{(2,3)}$$

$$\delta^{(3,3)}$$

$m = 4$

(5 nodes)

$$\delta^{(0,4)}$$

$$\delta^{(1,4)}$$

$$\delta^{(2,4)}$$

$$\delta^{(3,4)}$$

$$\delta^{(4,4)}$$

Each box represents a weight $\delta_j^{(k,m)}$ for node k in a stencil of $m+1$ nodes.
Arrows show dependencies: weights at level m depend on level $m-1$.