

## Author's reply

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I would like to thank Gleb Beliakov for drawing attention to the algorithm by Schumaker and the way Butland defines the slopes. The complexity of this interpolation algorithm is less than the one by McAllister and Roulier and obtains identical results. Moreover, using McAllister and Roulier slopes for initial and end points that the interpolant satisfies all requirements for WOWA operators. Therefore, the method is relevant and appropriate for computing the WOWA operator.

However, note that the approaches by McAllister–Roulier [1] and Torra [2] are different for initial and end points. [1] defines  $m_1 = 2s_2 - m_2$  if  $s_2(2s_2 - m_2) > 0$  and  $m_1 = 0$  otherwise; and  $m_n = 2s_n - m_{n-1}$  if  $s_n(2s_n - m_{n-1}) > 0$ . Instead, [2] defines  $m_1 = 0$  if  $(m_2 = 0 \text{ and } s_2 = 0)$  and  $(s_2)^2/m_2$  otherwise; and  $m_n = 0$  if  $m_n = (s_n)^2/m_{n-1}$  otherwise. Note that similar interpolants are obtained when  $m_2 = s_2$  (because only in this case,  $2s_2 - m_2 = (s_2)^2/m_2$ ) and when  $m_n = s_n$  (similarly, because only in this case,  $2s_n - m_{n-1} = (s_n)^2/m_{n-1}$ ). Otherwise, different interpolants are obtained. An example of such a situation is given in Fig. 1. There, the set of weights  $w = (0.35, 0.05, 0.20, 0.05, 0.35)$ . This corresponds to interpolating the points:  $\{(0, 0), (0.2, 0.35), (0.4, 0.4), (0.6, 0.6), (0.8, 0.85), (1.0, 1.0)\}$

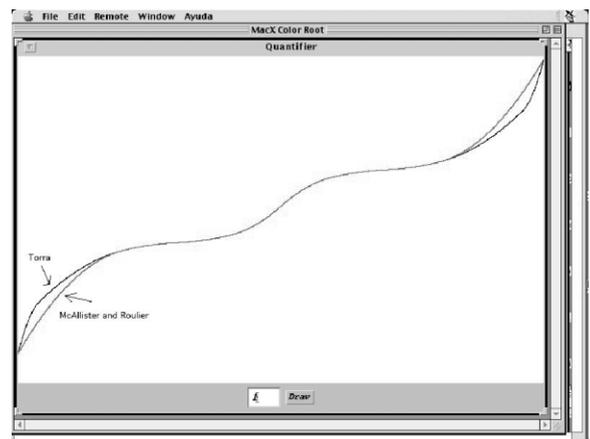


Fig. 1. Interpolants for the points:  $\{(0, 0), (0.2, 0.35), (0.4, 0.4), (0.6, 0.6), (0.8, 0.85), (1.0, 1.0)\}$ .

## References

- [1] D.F. McAllister, J.A. Roulier, An algorithm for computing a shape-preserving oscillatory quadratic spline, *ACM Trans. Math. Software* 7 (1981) 331–347.
- [2] V. Torra, The WOWA operator and the interpolation function  $W^*$ : Chen and Otto's interpolation revisited, *Fuzzy Sets and Systems* 113 (2000) 389–396.

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