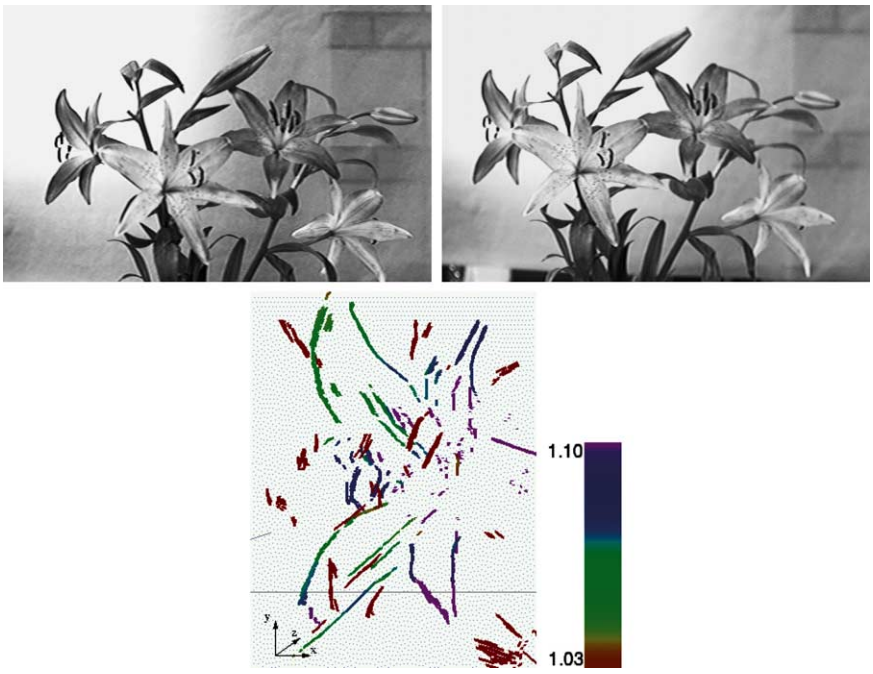

Fig. 23. Example of a depth map computation using the stereo compatibility structures in the columnar machine. The edge depth map is color coded (see bar on the right) and for clarity we show a magnified detail.

binocular ones. Interestingly, some evidence showing such interactions already exist in the literature [31].

8. Conclusions

We have argued for a differential geometric approach to vision, and have shown how this can be supported by the columnar architecture of visual cortex. Our computational model comprises non-linear local orientation measurements and the refinement of these measurements using context, provided by curvature, through a cooperative network. We have demonstrated how the local orientation measurements could be computed by intra-columnar neural circuitry, via shunting inhibition. The observed physiology of inter-columnar connections suggests a more complex model for contour integration than co-aligned facilitation; we hypothesize that the connections implement curvature, which follows from the computational considerations of our model. Finally, we have shown how the differential geometric framework naturally extends to handle the analysis of texture, shading, and stereo correspondence, all using the same basic columnar architecture. We hope that these developments will provide a basis for future neurophysiological experiments.

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