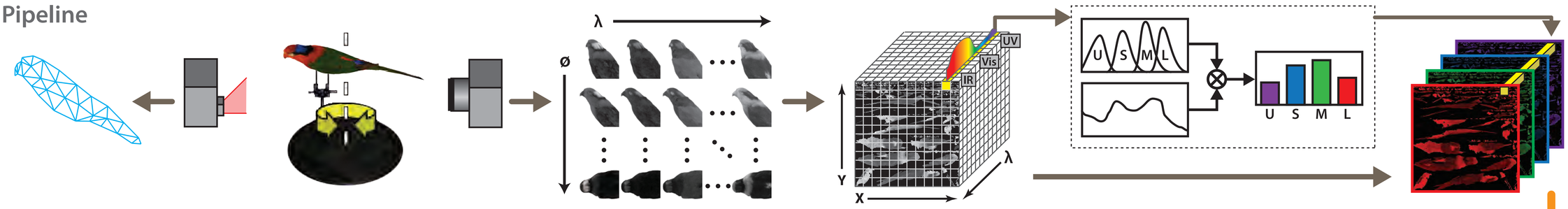
0122

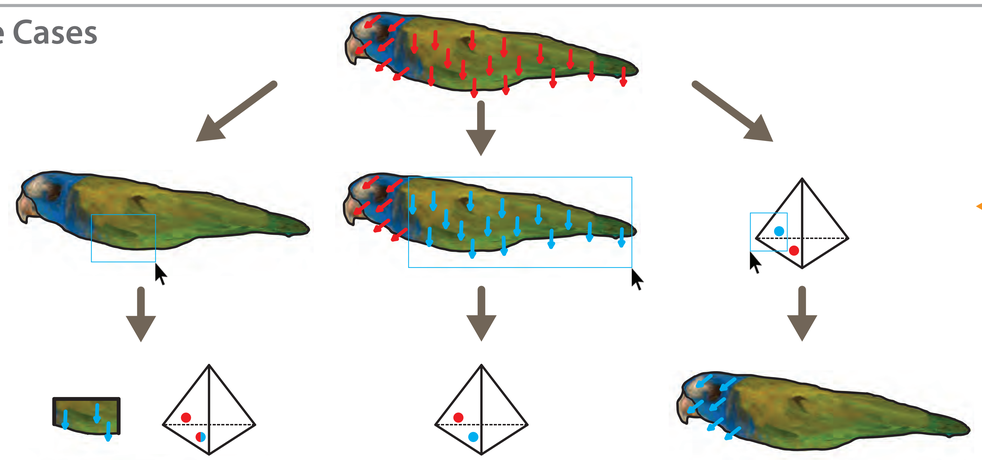
Visualization of Color as Birds See It

Jan Beneš[1,2], Todd A. Harvey[1], Edgar Velázquez-Armendáriz[3], Richard O. Prum[1,4]
[1]Yale University, [2]Charles University in Prague, [3]Cornell University, [4]Yale Peabody Museum.
Email: benes@cgg.mff.cuni.cz or todd.harvey@yale.edu

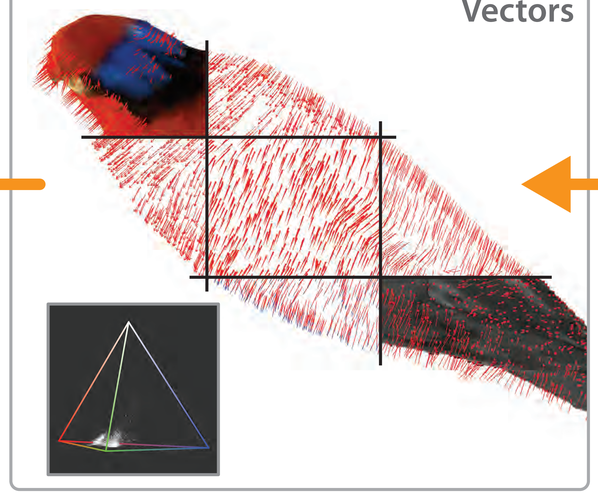
Pipeline



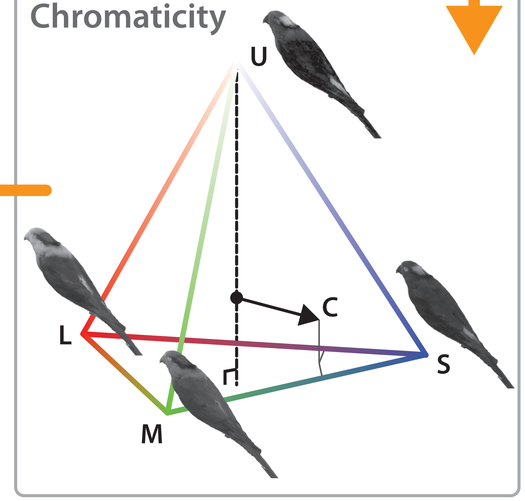
Use Cases



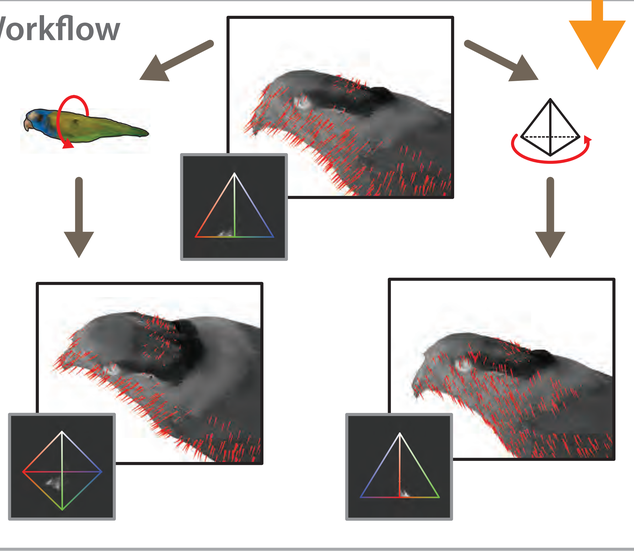
Vectors



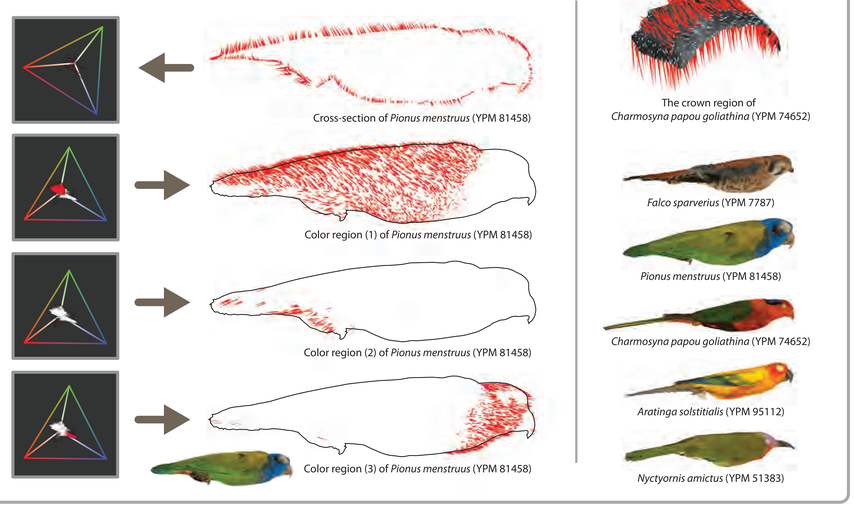
Chromaticity



Workflow



Results



Summary

Our tool gives biologists a new way to quantify and analyze spatial variation in coloration of objects as seen by tetrachromats (L/M/S/U cones), especially birds. We achieve this by visualizing color using vectors. This gives rise to a novel visualization method where the origins of the color vectors are positioned on the object's surface with some vectors pointing inside and others pointing outside. The application workflow was designed based on requirements of the involved biologists. Monochromatic output is used to prevent perceptual bias.

Acknowledgments

National Science Foundation grant 0852844. The specimens used in creating 3D models are housed at the Yale Peabody Museum (YPM). We thank Kristof Zyskowski of the Yale Peabody Museum for assisting with bird selections and Rômulo Carleial of the Universidade Federal de Minas Gerais for assisting with measurements. Our pipeline uses Patrick Min's MESHCONV 3D model converter.

References

1. GOLDSMITH, T. H. 1990. Optimization, constraint, and history in the evolution of eyes. The Quarterly review of biology 65, 3 (Sept.).
2. KIM, M. H., HARVEY, T. A., KITTLE, D. S., RUSHMEIER, H., DORSEY, J., PRUM, R. O., AND BRADY, D. J. 2012. 3D imaging spectroscopy for measuring hyperspectral patterns on solid objects. ACM Transactions on Graphics (TOG) 31, 4 (July).
3. STODDARD, M. C., AND PRUM, R. O. 2011. How colorful are birds? Evolution of the avian plumage color gamut. Behavioral Ecology 22, 5 (Aug.), 1042–1052.2.