

Machine learning reveals facial regions critical for species recognition in guenons

Sandra Winters, William L. Allen, and James P. Higham
New York University, New York NY, 10003

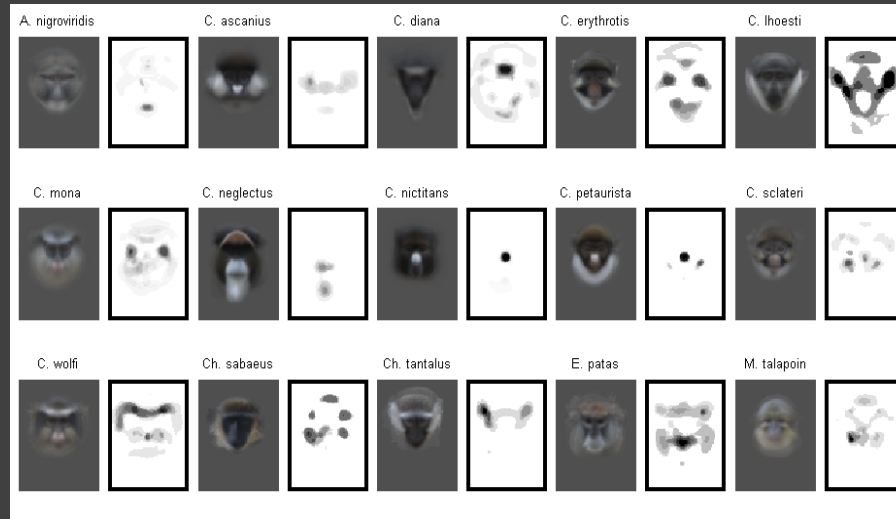
Background

Selection should favor the evolution of species recognition signals.

Guenons live in groups of multiple species and have evolved distinctive faces for species recognition.



Which facial cues do they use?



Likelihood of correct classification based on occlusion of different face regions. White areas – unimportant. Dark areas – important.

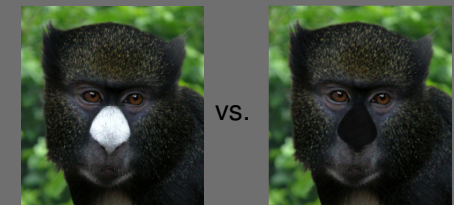
Results & Conclusions

Guenon species correctly classified 91.6% of the time (range 33.3% to 100%) – guenon face patterns contain information on species membership.

Regions necessary for classification vary by species (Figure 1).

Future Directions

Test computational results experimentally with live guenons.



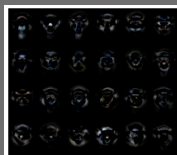
Collect videos of guenon interactions to assess head movement accentuation of face regions.

Conduct field research to determine the influence of microhabitats.

Methods

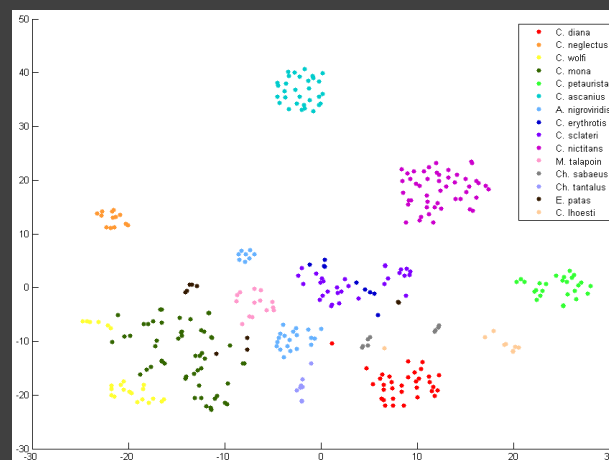
599 images of 133 individuals from 15 guenon species.

'Fisherface' face recognition algorithm used to extract features.



24 Fisherfaces used in the analysis

Regions of faces systematically blocked and re-classified to identify regions required for correct classification.



Guenons separate by species in face space

Visualization of images in feature space, down-projected using t-SNE.