

Nyala Visual Biometrics using Machine Learning

School of Computer Science and Applied
Mathematics



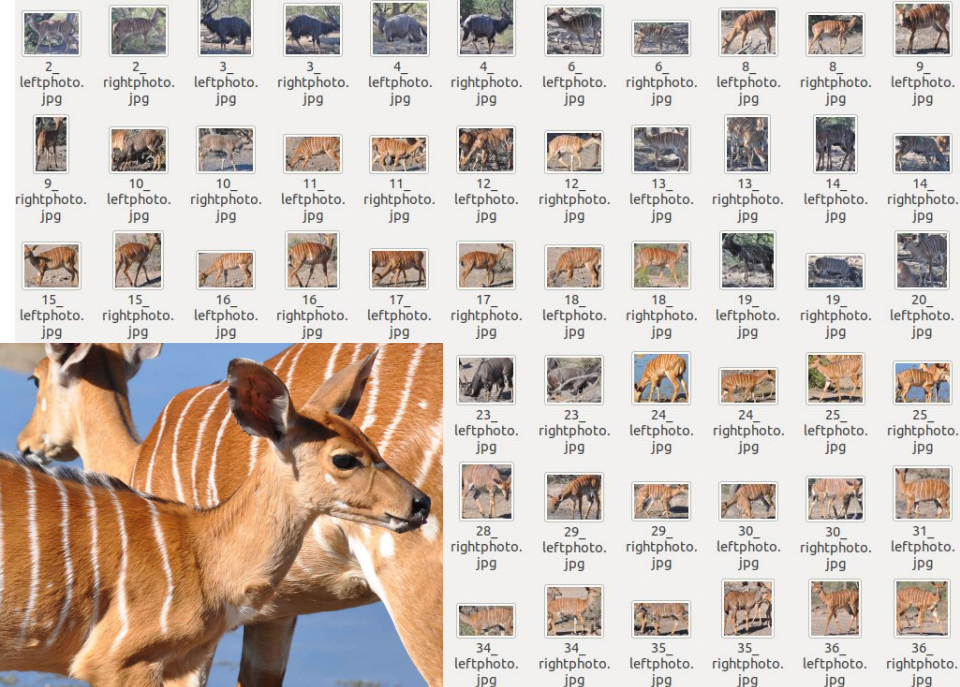
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Problem Statement

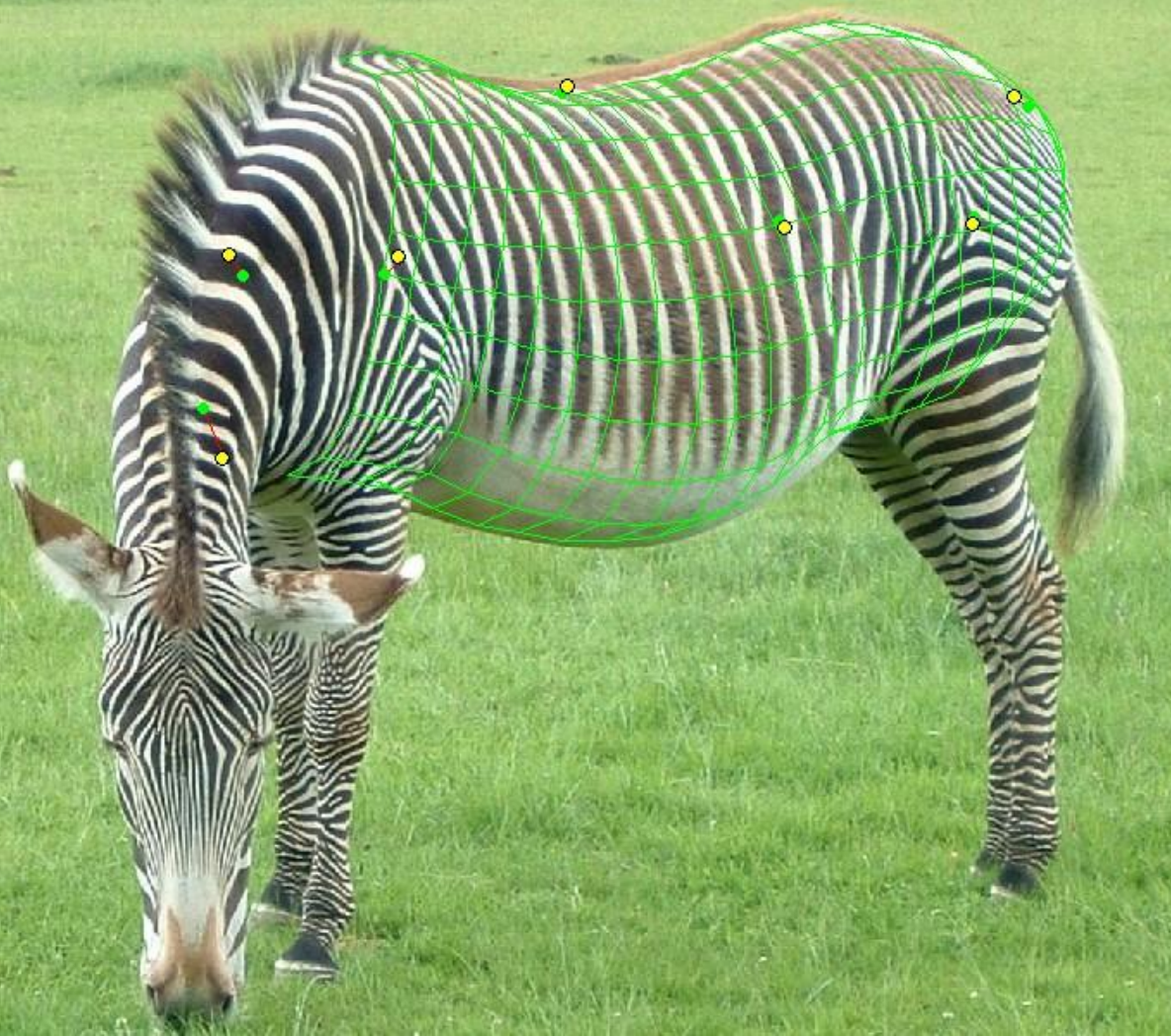
Can we develop a fingerprint for Nyala.



Identify 237 unique animals from 1068 labeled images.



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Individual Zebra Identification - An investigation into image pre-processing, stripe extraction and pattern matching techniques (2002)

by Hans Krijger , Supervised Prof , Shaun Bangay , Dr. Greg Foster



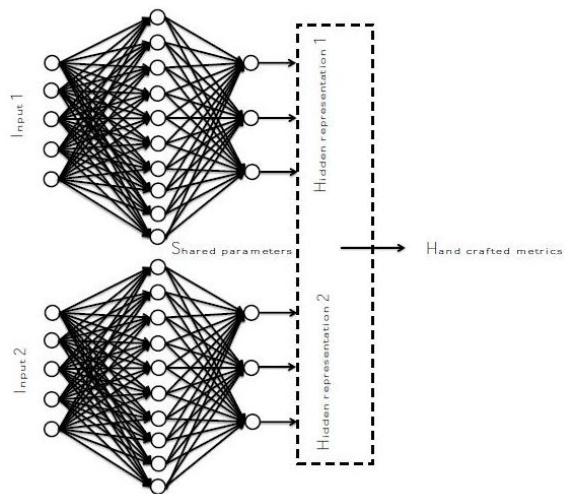
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Similarity and Metric Learning

“Similarity learning is an area of supervised machine learning [...]. It is closely related to regression and classification, but the goal is to learn from examples X a [...] function that measures how similar [...] two objects are.” Wikipedia

“Metric learning is the task of learning a distance function D_W over examples X .”

Wikipedia

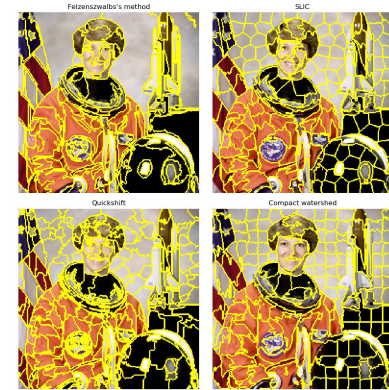
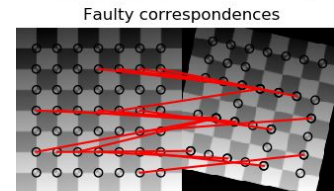
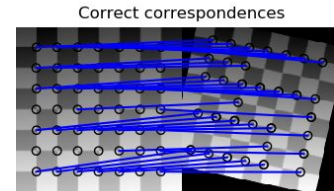
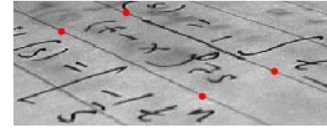


$$(1 - Y)\frac{1}{2}(D_W)^2 + (Y)\frac{1}{2}\{\max(0, m - D_W)\}^2$$



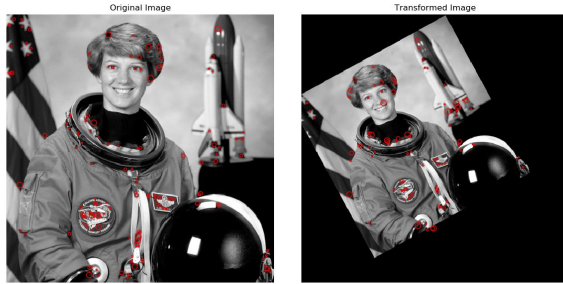
Classical Computer Vision

- Pre-Processing
- Segmentation
- Image rectification
- Feature extraction
- Matching using RANSAC

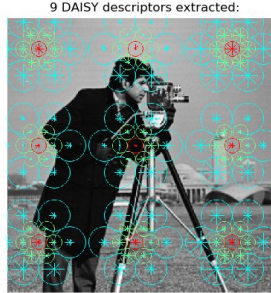


Feature Descriptors

CENSURE feature detector



Dense DAISY feature description

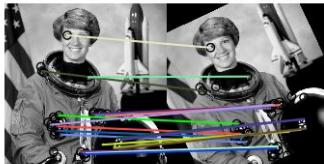


BRIEF binary descriptor

Original Image vs. Transformed Image

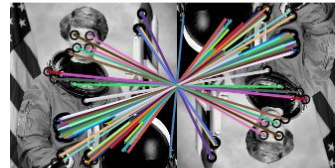


Original Image vs. Transformed Image



ORB feature detector and binary descriptor

Original Image vs. Transformed Image



Original Image vs. Transformed Image



Thank You

Any Quick Questions...



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References

http://scikit-image.org/docs/stable/auto_examples/xx_applications/plot_geometric.html#sphx-glr-auto-examples-xx-applications-plot-geometric-py

http://scikit-image.org/docs/stable/auto_examples/segmentation/plot_segmentations.html#sphx-glr-auto-examples-segmentation-plot-segmentations-py

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http://scikit-image.org/docs/stable/auto_examples/transform/plot_matching.html#sphx-glr-auto-examples-transform-plot-matching-py

http://scikit-image.org/docs/stable/user_guide/transforming_image_data.html

