Search terms:

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Machine learning for image based species identification

And citations within those

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[file:///home/hduser/Downloads/2021\_Book\_TheScienceOfCitizenScience.pdf](../../../../Downloads/2021_Book_TheScienceOfCitizenScience.pdf) (chapter 10)

https://www.mdpi.com/2071-1050/13/18/10287

Developing a citizen science web portal for manual and automated ecological image detection (get from cct)

[Deep learning-based appearance features extraction for automated carp species identification - ScienceDirect](https://www.sciencedirect.com/science/article/abs/pii/S0144860919302195)

Camera traps not suitable in this environment

*Seratella ignita in nymph stage*

*Testing Git*

Rajabizadeh and Rezghi (2021) applied both traditional machine learning and deep learning (neural network) techniques to the classification of images of six Iranian snake species. Having found that feature extraction – specifically LDA – significantly improves the performance of traditional classifiers, the SVM classifier was found to give an accuracy of 84%. Of the traditional machine learning algorithms SVM (rbf kernel) performed best out of those tested, namely KNN, Logistic regression, and SVM. The authors note that the most appropriate dimension reduction algorithm to use depends on the dataset and the task, rather than the classifier, so a trial-and-error approach to determining the appropriate approach will be adopted. An accuracy of 93% was achieved using a CNN classifier, and the authors found that it was the colour pattern and shape (the dorsal patterns) that the model used to discriminate between species. The authors determined this by visualising the images after processing by the various hidden layers.

While CNN algorithms tend to perform better than traditional machine learning methods (e.g. Rajabizadeh and Rezghi (2021)) for image-based species classification, the opposite has been reported, notably in the identification of birds by Islam et al. (2019).

Rajabizadeh and Rezghi (2021) note that training a deep CNN algorithm requires a large dataset, but that images of the snakes in question - with at least 50% of the snake’s body visible in the image - were not readily available. They used a final dataset of 594 images in total.

Some researchers have cropped images to focus on particular taxonomic features (James, 2017), but this approach would not be applicable to big data – for a big data processing algorithm the images gathered would need to be processed independent of any human input. The image gathering and processing approach needs to be simple and repeatable.

The CNN algorithm used by Rajabizadeh and Rezghi (2021) was MobileNetV2 (which can even be used on mobile devices), with 5,147,206 parameters over 150 epochs with an SGD optimizer and a learning rate equal to 0.000 and momentum of 0.9. Images fed to the model were initially resized to 24 x 224 pixels. Their model was pre-trained using images from ImageNet to attain the initial weights. However there are no datasets in ImageNet for the species being examined here so this was not replicated.

James, A. (2017) ‘Snake classification from images’, *PeerJ Preprints* [Preprint]. doi:10.7287/peerj.preprints.2867v1.

Rajabizadeh, M. and Rezghi, M. (2021). A comparative study on image-based snake identification using machine learning. *Scientific Reports*, [online] 11(1), p.19142. doi:https://doi.org/10.1038/s41598-021-96031-1.

Islam, Shazzadul, et al. “Bird Species Classification from an Image Using VGG-16 Network.” *Proceedings of the 2019 7th International Conference on Computer and Communications Management*, 27 July 2019, <https://doi.org/10.1145/3348445.3348480>.