Exposé - Deep Learning

Aerial Cactus Identification

Wei-Hung Hsu, Tim Schneider, Matthias Heinrich

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We implement an Convolutional Neural Network to learn a classifier that detects cacti based on an kaggle challenge[1].

1 Motivation

Object detection or object recognition is one of the most common problem across many different fields such as medical research or public safety. In the scope of this project we want to implement such a system. Under the pretext of entering the Kaggle competition, Aerial Cactus Identification, we want to study the fundamental practice of deep learning based approach. The goal of the competition is to assess the impact of climate change on flora and fauna. The system VIGIA, an autonomous surveillance of protected areas, was build for this exact purpose. An important part of such as system is to be able to identify certain vegetation within the protected areas. In the context of the competition we want to determine whether an image contains a columnar cactus of the neobuxbaumia tetetzo species or not. A past experiment with LeNet-5 showed an accuracy of 0.95.

2 Scope

2.1 Scope off our project

2.2 Not in scope off our project

3 Implementation

For implementation we plan to use Python 3.7 with keras[3] and sciPY[5], in particular numpy and pandas. If we have enough time left at the end of the project we might also try different libraries and compare if we can get better results that way.

4 Data

The dataset[2] consists of 17,500 aerial images out of which 13,136 contain an columnar cacti and 4,364 do not. Each image is 32x32 in size. The images have been resized by kaggle to be uniform in size. The dataset also contains an .csv file that annoates for each image if it contains an columnar cacti or not. The images are all from the Tehucan-Cuicatlan valley in the south of Mexico [4]. The images have been obtained using a drone from an flight altitude of 100 m. The images were manually labeled.

References

[1] Kaggle. Aerial cactus identification. URL `https://www.kaggle.com/c/aerial-cactus-identification`. Accessed: 2019-05-21.

[2] Kaggle. Aerial cactus identification data, 2019. URL `https://www.kaggle.com/c/aerial-cactus-identification/data`. Accessed: 2019-05-21.

[3] keras. Keras: The python deep learning library. URL `https://kears.io/`. Accessed: 2019-05-21.

[4] Efren Lopez-Jimenez, Juan Irving Vasquez-Gomez, Miguel Angel Sanchez-Acevedo, Juan Carlos Herrera-Lozada, and Abril Valeria Uriarte-Arcia. Columnar cactus recognition in aerial images using a deep learning approach. *Ecological Informatics*, 2019. ISSN 1574-9541. doi: https://doi.org/10.1016/j.ecoinf.2019.05.005. URL `http://www.sciencedirect.com/science/article/pii/S1574954119300895`.

[5] SciPY. Aerial cactus identification. URL `https://scipy.org/`. Accessed: 2019-05-21.