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Conference Abstract

Supporting citizen scientists with automatic species identification using deep learning image recognition models

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Abstract

Volunteers, researchers and citizen scientists are important contributors to observation and monitoring databases. Their contributions thus become part of a global digital data pool, that forms the basis for important and powerful tools for conservation, research, education and policy. With the data contributed by citizen scientists also come concerns about data completeness and quality. For data generated by citizen scientists taxonomic bias effects, where certain species (groups) are underrepresented in observations, are even stronger than for professionally collected data. Identification tools that help citizen scientists to access more difficult, underrepresented groups, can help to close this gap.

We are exploring the possibilities of using artificial intelligence for automatic species identification as a tool to support the registration of field observations. Our aim is to offer nature enthusiasts the possibility of automatically identifying species, based on photos they have taken as part of an observation. Furthermore, by allowing them to register these identifications as part of the observation, we aim to enhance the completeness and quality of the observation database. We will demonstrate the use of automatic species recognition as part of the process of observation registration, using a recognition model that is based on deep learning techniques.

We investigated the automatic species recognition using deep learning models trained with observation data of the popular website Observation.org (https://observation.org/). At Observation.org data quality is ensured by a review process of all observations by experts. Using the pictures and corresponding validated metadata from their database, models were developed covering several species groups. These techniques were based on earlier work that culminated in ObsIdentify, an free offline mobile app for identifying species based on pictures taken in the field. The models are also made available as an API web service, which allows for identification by offering a photo through common HTTP-communication - essentially like uploading it through a webpage. This web service was implemented in the observation entry workflows of Observation.org. By providing an automatically generated taxonomic identification with each image, we expect to stimulate existing citizen scientists to generate a larger quantity of and more biodiverse observations. Additionally we hope to motivate new citizen scientists to start contributing.

Additionally, we investigated the use of image recognition for the identification of additional species in the photo other than the primary subject, for example the identification of the host plant in photos of insects. The Observation.org database contains many of such photos which are associated with a single species observation, while additional, other species are also present in the photo, but are unidentified. Combining object detection to detect individual species with species recognition models opens up the possibility of automatically identifying and counting these species, enhancing the quality of the observations. In the presentation we will present the initial results of this application of deep learning technology, and discuss the possibilities and challenges.

Keywords

automated image recognition, deep learning, AI, automatic species recognition

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