# Facial recognition software for non-invasive animal monitoring

(Technology Transfer)

| | |
|---|---|
| **Project leads** | **Univ.-Prof. Sonia Kleindorfer (sonia.kleindorfer@univie.ac.at)** |
| **Abstract** | Current methods to track animals mostly involve tagging or collaring, which can be highly invasive and stressful to the individuals. My team developed a novel and non-invasive facial recognition software that can be used to monitor animal movement using resighting from photographs or drone imagery. We intend to merge landscape ecology with mechanistic and behavioural research to deliver improved conservation planning in response to environmental threats. |
| **Keywords** | Facial recognition software, animal monitoring, non-invasive, citizen science |
| **Aims of the Third Mission activity** | To create an app for online identification of animals observed during monitoring via photograph. |
| **Cooperation partners outside the university sector** | public service providers including Department for Water and Environment and Integrated Monitoring Initiative IMI-SDG6, United Nations |
| **Cooperation partners from the scientific/research field** | • External partner: Dr. Diane Colombelii-Negrel, Flinders University<br>• Internal partner: Prof. Dr. Leonida Fusan |
| **Faculty** | Faculty of Life Sciences, core facility Konrad Lorenz Research Center for Behaviour and Cognition, Grunau im Almtal |
| **Timeframe** | 2018 - 2023 |
| **Funding** | Australian Research Council |
| **Research basis** | I supervised a Masters thesis and am co-supervising a postdoctoral researcher Dr. Damian Tohl who together with Dr. Jimmy Li, head of the Video and Image Processing group at Flinders University, developed the software. |

| | |
|---|---|
| **Social/economic relevance** | Even though wild animals can now be monitored by satellite from space or using drones in the field, we are surprisingly incapable of individually identifying wild animals using remote sensing. The application of facial recognition software in wild animals will revolutionise animal monitoring using satellite tracking. The outcomes of this project therefore have the potential to be used by large multi-national global space monitoring programs (e.g. ICARUS, Germany) and other on-ground global monitoring initiatives (e.g. Integrated Monitoring Initiative IMI-SDG6, United Nations). |
| **Integration into academic teaching/the curriculum** | Students contribute photographs of individually marked animals including greylag geese to the photo data base; 300188 UE Ethologischen Übungen Grünau. |
| **Impact** | In 2019, the International Cooperation for Animal Research Using Space (ICARUS) program was launched, which tracks animal presence and movement using photographs via satellite - but cannot yet identify individual animals from space because of the lack of software. Most satellite tracking still requires animals to be captured to fit tracking collars, and often recaptured to recover the data. This intensive approach limits the number of animals that can be tracked, particularly for hard to trap species, including feral cats. By pioneering this non-invasive approach, we expect to monitor a larger number of individuals from multiple species, while gathering lower-resolution movement data that is adequate for making inferences about movement in response to features of landscapes. The research outcomes can generate transferable insights in many species that can be monitored by drone or satellite. |
| **Transfer aspect of the activity** | We work closely with collaborators to further develop a software that can be used across a wide range of wild mammals (native and introduced), to further test the transferability of our software across species and taxa globally. |
| **Future orientation & sustainability** | The aim is to use the individual facial monitoring of wild animals to measure animal persistence from space at an individual level in threatened species (e.g. gorilla), to provide accurate estimates of population size without recounting the same individual twice, and contribute to implementing effective conservation monitoring tools for long-term biodiversity protection. |
| **Achievement of objectives** | We compute the accuracy of photo identification across taxa, and use 90% accuracy as a minimum criterion per species. |

| | |
|---|---|
| **Measures to sustain this activity over the long term/expand it** | We have developed automatic image pre-processing to standardise the analysis. Our pre-processing steps include rotation and scale correction, including image expansion, followed by detail extraction and enhancement. With large data bases of existing images, we plan to develop citizen science apps. |
| **Visibility** | Currently in development with publications planned for 2021 and onwards. |
| **Links/Publications** | / |