Special software helps to save species

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The new software system searches through photos and video sequences, analyzes the apes' faces and links them to individuals. (© Dr. Tobias Deschner - MPI EVA (2009), Taď Nationalpark)

With the aim of better protecting endangered species, game wardens are studying the behavior of surviving great apes in the wild. This is often painstaking work because it is difficult to distinguish between different individuals. A new software system will make things easier by analyzing the animals' faces for individual identification.

The pictures from the video trap are highly encouraging. A strong young male gorilla appears several times – in a tree, moving through the forest, at a feeding place. This is a good sign for the park ranger. It indicates that the population in the protected zone is recovering. What he does not know, however, is whether it's the same gorilla each time or various young adults. Knowledge of how many individuals are living in a particular area is vital if these extinction-threatened species are to be more effectively protected. The park rangers therefore spare no effort to

obtain reliable figures about the population. They search the forests for feeding and gathering places, read tracks and try to match them to specific individuals. In addition, they spend hours analyzing pictures from video and photo traps – a painstaking and time-consuming job, which is also subjective and susceptible to error.

A new software system could soon make things easier for the park rangers by searching through the photos and videos for sequences in which the animals appear and assigning the images to individual gorillas. Scientists at the Fraunhofer Institutes for Integrated Circuits IIS and Digital Media Technology IDMT as well as at the Max Planck Institute for Evolutionary Anthropology are jointly developing the system in the SAISBECO project.

"The pictures are first filtered to find the ones on which the primates' faces can be seen," explains Alexander Loos from the IDMT in Ilmenau. This task is handled by a detection software program developed by research scientists at the IIS in Erlangen which detects faces on individual pictures as well as on video streams in real time. Loos and his colleagues are currently developing a module that will assign the faces to specific individuals. "Our software analyzes the primates' faces using special algorithms," states Loos. At the moment these face-recognition algorithms analyze the entire face. In a data pool of 24 chimpanzees at Leipzig Zoo the Max Planck research scientists achieved a recognition rate of 83 percent.

This good hit accuracy is due to the high quality of the photos. "The algorithms are strongly affected by external influences," explains Loos. "In poor light or if the faces are partially occluded the recognition rates quickly drop to below 60 percent." Because it is much more difficult to get good pictures in the wild, the Ilmenau-based research scientists intend to add further algorithms which will not analyze the entire face but specific biometric features – such as the eyes, nose and mouth.

The new software system also analyzes audio signals and assigns them to various noises made by the apes, for example chest drumming and threatening grunts like pant-hoots. This provides not only a basis for studying their social behavior but also enables specific individuals to be quickly identified, as the research scientists no longer have to listen to all of the recorded material. As a next step, the scientists intend to expand their data sets, because the software system learns as it performs the analysis, and the recognition rate improves as the number of pictures per individual in the data pool increases. A further module is also to be added to the system. This will automatically recognize what activity the ape is engaged in and provide valuable information in particular for studying their social behavior.

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