

Semi-Automated Camera Trap Image Processing for the Detection of Ungulate Fence Crossing Events

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Remote camera images of animals generate important data for biological questions, but processing these images traditionally requires extensive human labour. Our project is part of a larger study comparing large ungulate crossings of wildlife friendly and traditional fences. We use computer programs we created to pre-process camera trap images and remove irrelevant images. Our program analyzed approximately one million images from motion-activated field cameras involving ungulate interactions with both types of fences. The semi-automatic program classifies images by dividing images into three horizontal regions, where movement over time between the two outer regions indicates a crossing. We detect movement in a region via background subtraction, image thresholding, and fragment histogram analysis. Our program reduced the number of images for human consideration to one third of the input set with a success rate of proper identification of ungulate crossing between 60% and 92%, which is suitable in larger study context. During our project we encountered some unexpected sources of error, such as animals licking the camera. We also examined techniques that ultimately proved unhelpful, such as nighttime eye tracking. Reflection on the program's efficacy includes recommendations for improvements to future studies utilizing a camera trap set-up.