Abstract ID: 013

A CUSTOM PYTHON SCRIPT FOR AUTOMATED TRACKING OF LOCOMOTOR ACTIVITY IN AMPHIBIAN LARVAE

H. T. D. Rajapaksha[a], B. M. Dissanayake[b], W. A. G. K. Wickramasinghe[c], and N. U. K. Pathirana[a*]

[a]*Department of Zoology, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka.*
[b]*REWE International AG, Wiener Neudorf, Austria.*
[c]*Department of Physical Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka.*

[*]*nuwandi.pathirana@sci.pdn.ac.lk*

Abstract

Automated behavioural tracking tools are increasingly valuable for reducing observer bias, improving reproducibility, and enabling high-throughput data collection in animal behaviour research. Recent developments in open-source and customizable tracking platforms have enhanced accessibility and analytical efficiency across species, while modern programming tools like R and Python enable affordable and precise behavioural quantification, particularly valuable for research in resource-limited settings. Existing commercial and open-source packages provide useful frameworks, yet they are often constrained by limited flexibility, high costs, or inadequate adaptability to species-specific behaviours, particularly in non-model organisms such as amphibian larvae. To address this gap, we developed a custom Python-based tracking script capable of quantifying locomotor activity from standard video recordings The tool automates the detection and tracking of individual larvae, extracting continuous X–Y positional data and generating visual outputs such as trajectory plots and heat maps to represent spatial activity patterns. Output files are produced in Excel-compatible format, allowing seamless integration with statistical workflows. Behavioral trials were conducted to evaluate both short-term repeatability and developmental consistency of locomotor traits in tadpoles, demonstrating the script's ability to capture fine-scale variation in activity levels over time. Preliminary validation against manual scoring confirmed high accuracy and reliability, highlighting its potential as a robust alternative to observer-based measurements. Importantly, the script's open and adaptable structure allows researchers to modify tracking parameters according to study needs, extending its applicability beyond amphibians to other small aquatic organisms. This custom tool therefore offers a flexible, low-cost, and reproducible approach for behavioural ecologists and conservation biologists investigating movement and activity in larval stages. By facilitating detailed and standardized quantification of locomotion, it contributes to advancing questions in developmental biology, personality research, and ecological assessments of amphibian populations—areas of growing significance in light of global amphibian declines.

Keywords*: Automated Tracking, Behavioral Software, Locomotion Analysis, Movement Quantification, Open-Source Alternative, Python Script*