

AI system identifies elephant trumpeting calls to improve safety for villagers

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In an [article](#) published in the *International Journal of Engineering Systems Modelling and Simulation* researchers demonstrate how a trained algorithm can identify the trumpeting calls of elephants, distinguishing

them from human and other animal sounds in the environment.

The work could improve safety for villagers and help farmers protect their crops and homesteads from [wild elephants](#) in India.

T. Thomas Leonid of the KCG College of Technology and R. Jayaparvathy of the SSN College of Engineering in Chennai, India, explain how conflicts between people and elephants are becoming increasingly common, especially in areas where human activity has encroached on natural elephant habitats. This is particularly true where agriculture meets forested land. These conflicts are not just an environmental concern, they pose a threat to human life and livelihoods.

In India, wild elephants are responsible for more human fatalities than large predators. Their presence also leads to the destruction of crops and infrastructure, which creates a heavy financial burden on rural communities.

Of course, the elephants are not to blame, they are wild animals, doing their best to survive. The root causes lie in [habitat destruction](#) due to human activities such as mining, dam construction, and increasing encroachment into forests for resources like firewood and water.

As such, finding effective solutions to mitigate human–elephant encounters is becoming increasingly urgent. The team suggests that a way to reduce the number of tragic and costly outcomes would be to put in place an early-warning system. Such a system would recognize elephant behavior from their vocalizations and allow farmers and others to avoid the elephants or perhaps even safely divert an incoming herd before it becomes a serious and damaging hazard.

The researchers compared several machine learning models to determine which one best detects and classifies elephant sounds. The models tested

included Support Vector Machines (SVM), K-nearest Neighbors (KNN), Naive Bayes, and Convolutional Neural Networks (CNN). They trained each of these algorithms on a dataset of 450 animal sound samples from five different species.

One of the key steps in the process is feature extraction, which involves identifying distinctive characteristics within the [audio signals](#), such as frequency, amplitude, and the temporal structure of the sounds. These features are then used to train the machine-learning models to recognize elephant calls.

The most accurate was the Convolutional Neural Network (CNN), a [deep learning model](#) that automatically learns complex features from raw data. CNNs are particularly well-suited for this type of task due to their ability to recognize intricate patterns in sound data.

The CNN had a high accuracy of 84%, far better than the models. This might be improved, but is sufficiently accurate to have the potential for a reliable, automated system to detect elephants on the march that might be heading towards homes and farms.

More information: T. Thomas Leonid et al, Elephant sound classification using machine learning algorithms for mitigation strategy, *International Journal of Engineering Systems Modelling and Simulation* (2024). [DOI: 10.1504/IJESMS.2024.140803](https://doi.org/10.1504/IJESMS.2024.140803)

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