Contribution ID: **10** Type: **Talk**

AcousNomaly: Learning to Detect Anomalies in Acoustic Telemetry Data using Machine learning and Deep Learning

Wednesday, 4 December 2024 15:30 (20 minutes)

Acoustic telemetry data plays a vital role in understanding the behaviour and movement of aquatic animals. However, these datasets, which can often consist of millions of individual data points, often contain anomalous detections that can pose challenges in data analysis and interpretation. Anomalies in acoustic telemetry data can occur due to various biological and environmental factors, and technological limitations. Anomalous movements are generally identified manually, which can be extremely time-consuming in large datasets. As such, this study focuses on automating the process of anomaly detection in telemetry datasets using machine learning (ML) and artificial intelligence (AI) models. Fifty dusky kob *(Argyrosomus japonicus)* were surgically fitted with unique coded acoustic transmitters in the Breede Estuary, South Africa, and their movements were monitored using an array of 16 acoustic receivers deployed throughout the estuary between 2016 and 2021, resulting in more than 3 million individual data points. The research approach combined the use of Neural Network (NN) models and autoencoders to construct an efficient anomaly detection system. The model is proficient at learning the normal movement patterns within
the data, effectively distinguishing between normal and anomalous behaviour, and exceeding 90% across all four evaluation metrics including accuracy, precision, recall, and F1. However, it may encounter challenges in accurately detecting anomalies where they deviate slowly from the expected movement patterns. Despite this limitation, the model demonstrates promising capabilities by pinpointing the precise locations of anomalous entries within the dataset. Further investigation, including refinement and optimization of the model's parameters and training process, especially with memory-based NN-AE, may enhance its ability to detect anomalies with greater accuracy and reliability.

Student or Postdoc?

Email address

Co-Authors

CHPC User

CHPC Research Programme

Workshop Duration

Primary authors: ATEMKENG, Marcellin (Rhodes University); ZAZA*, Siphendulwe (MSc Applied Mathematics student from Rhodes University); MURRAY, Taryn (Rhodes University)

Presenter: ZAZA*, Siphendulwe (MSc Applied Mathematics student from Rhodes University)

Session Classification: DIRISA

Track Classification: DIRISA