

Improving Infrasound Station Data Availability with State-of-Health Encoded Feature Clustering

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Ensuring IMS station data availability is critically important to the mission of the Comprehensive Nuclear Test-Ban-Treaty Preparatory Commission Organization. Monitoring a wide range of state-of-health (SOH) metrics in the power system of an array can help maximize station uptime. The Wilson Alaska Technical Center of the University of Alaska Fairbanks is continuously working on techniques to improve station performance monitoring. In this research, we present a technique that leverages our growing data set of SOH metrics and machine learning. Using an autoencoder, we compress daily SOH time series segments into lower dimensional encoded features, which we then cluster into groups representing physical states of the system. Additionally with this technique, we set thresholds on the autoencoder's ability to reconstruct the original data, so that segments that are not reconstructed well represent data abnormalities. We use this technique operationally at the 152GB infrasound array, where technicians are notified daily of the current state of a component of the power system. Improving this technique to incorporate multiple metrics at once can further improve monitoring and ideally limit station downtime.

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