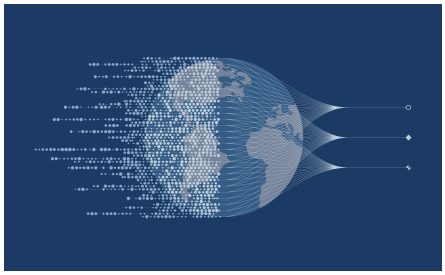

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Seismic Signal Classification through Novel Similarity-Based Techniques

Seismic signal classification plays a critical role in monitoring and understanding seismic activity by attributing each detected event to its source, such as earthquakes, quarry blasts, volcanic events, or nuclear explosions. Traditional methods, such as cross-correlation-based approaches, offer the advantage of not requiring large databases or explicit feature extraction. However, these widely used similarity-based methods often face significant challenges when dealing with complex, noisy real-world signals and exhibit high computational demands. This research presents a comparative study of other innovative and more efficient similarity-based classifiers. The proposed methods prioritize robustness against variability and noise, achieving enhanced accuracy, adaptability across diverse datasets, and significant reductions in computational complexity. Extensive experimental validation highlights their superior performance in improving seismic event classification, providing a reliable tool for automated event source identification. This study contributes to advancing seismic data analysis and supports efforts to ensure compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

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