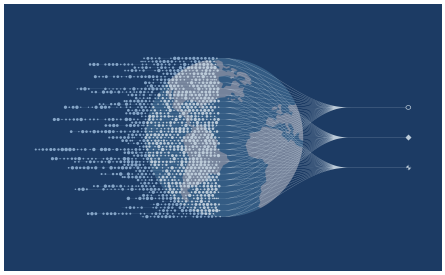

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Seismic Monitoring Capabilities of Bogazici University Kandilli Observatory and Earthquake Research Institute Through Integrated AI Modules

The Anatolian region, characterized by complex fault systems such as the North Anatolian Fault, East Anatolian Fault and the extensively deforming fault systems in the Aegean and Mediterranean regions, serves as a natural laboratory for earthquake studies. These fault systems create a highly dynamic and seismically active tectonic environment. The Kandilli Observatory and Earthquake Research Institute (KOERI), responsible for maintaining high-quality seismic monitoring to issue a tsunami alert message in this region, is implementing state of the art artificial intelligence modules to enhance its operational capabilities. The monitoring system will also be extended to incorporate Global Navigation Satellite System data for early warning capabilities. We present a comprehensive upgrade to the monitoring system through the integration of specialized neural network architectures designed for phase picking, phase association and location-magnitude estimation. These AI modules are engineered to work collaboratively, forming an automated workflow that significantly improves catalog completeness and accuracy. Initial performance metrics demonstrate substantial improvements in phase picking precision, event detection capabilities and location accuracy compared to traditional methods. This modernization of the Kandilli Observatory's monitoring system represents a significant step forward in providing high-quality seismic data for the scientific community, particularly in a region of profound importance for earthquake studies.

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