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Automatic arrival time picking compared to manual picking (2)

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Various types of seismic studies, including EEW systems, require automated programs for the accurate picking of P and S wave arrival times. The study on automatic picking was started in the late 1970 decade; however, even now, the accuracy is low and not suitable for detailed studies. We developed a new method of automatic picking, which is similar with the software used in computer chess games. The method defines an initial model of evaluation equation, which can select actual P and S wave arrival times among candidates by using values that show the characteristics of waveforms in time periods between candidates and about 100 unknown coefficients. By using a large number of waveform data together with manually picked P and S wave data, the unknown coefficients are determined such that the square of arrival time differences between manually picking and by the evaluation equation is minimized. It takes only 0.1 sec in the calculation of the evaluation equation for 10,000 events; very short computing times makes possible to determine many coefficients to decrease time difference. The method was applied to about 80,000 waveform data and results show that our new method can determine correct arrival times with an accuracy nearly same or slightly better than that of manual pickings. The method was also applied to the waveform data for AE observation in a South African mine.

Keywords: Automatic picking, P and S wave arrival times, Evaluation function, AE, real-time waveform data, Hypocenter location