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| Authors/Year | Objective | Methodology & Features | Key Findings | Limitations & Gaps |
| ResearchGate Review (2025) | Compare ML/DL efficacy for AD diagnosis from EEG signals. | Systematic review of various ML (SVM, k-NN) and DL (CNN, LSTM) methods. Examined power spectral density, wavelet transforms. | DL models (CNN, LSTM) are highly promising, showing higher efficiency in feature extraction and temporal pattern modeling. Found accuracies of up to 99%. | High accuracy claims are often on small datasets and may not generalize well. Acknowledge signal reliability issues and environmental interference. |
| Scinito/MDPI Review (2025) | Explore trends in ML/DL use for EEG-based AD diagnosis. | Systematic review focusing on electrode configurations (19, 16, 32 electrodes), data acquisition, and participant numbers. | Identified a growing trend toward DL methods. Showed that most studies use a low to medium density of electrodes (19 being the most common). | Lack of standardization in data acquisition, preprocessing, and electrode placement makes it difficult to compare results across studies. |
| PMC Review (2024) | Systematically review the use of resting-state EEG for AD diagnosis. | Literature review analyzing studies using features like rhythm synchrony, power spectrum, and connectivity from resting-state EEG. | EEG is sensitive to the earliest functional changes in the brain, often preceding structural changes seen in MRI or PET scans. | Inconsistency in study protocols and a need for a unified approach to facilitate knowledge transfer among research groups. |
| MDPI Paper (2024) | Propose a novel method for early diagnosis using EEG signal processing. | Used a novel Finite Impulse Response (FIR) filter method to extract features from time domain EEG signals. Classifiers (MLP, SVM, k-NN) were used. | Achieved high accuracy for binary classifications (97% for HC vs. AD). Showed the potential for development on embedded devices for low-cost, real-time diagnosis. | The dataset used was relatively small (105 subjects). The model's generalizability needs to be tested on larger, more diverse datasets. |
| Mayo Clinic Research (2024) | Develop a data-driven approach to identify neurodegenerative patterns in EEG. | Used a data-driven AI method that does not require prior selection of EEG channels or frequency bands, avoiding bias. Analyzed over 12,000 EEG recordings. | Successfully identified distinct brain activity patterns for AD and Lewy body dementia. The approach improves the clinical utility of routine EEG recordings. | Acknowledges the need for continued development to fully realize the clinical potential. This method is still under research validation. |