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# Dawning of a new era in gravitational wave data analysis: Unveiling cosmic mysteries via artificial intelligence —A systematic review

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Gravitational wave data analysis (GWDA) faces significant challenges due to high-dimensional parameter spaces and non-Gaussian, non-stationary artifacts in the interferometer background, which traditional methods have made significant progress in addressing but continue to face limitations. Artificial intelligence (AI), particularly deep learning (DL) algorithms, offers potential advantages, including computational efficiency, scalability, and adaptability, which may complement traditional approaches in tackling these challenges more effectively. In this review, we explore AI-driven approaches to GWDA, covering every stage of the pipeline and presenting first explorations in waveform modeling and parameter estimation. This work represents the most comprehensive review to date, integrating the latest AI advancements with practical GWDA applications. Our meta-analysis reveals insights and trends, highlighting the transformative potential of AI in revolutionizing gravitational wave research and paving the way for future discoveries.

## Collaboration you are representing

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