

Title: A Systematic Review of Graph Neural Network in Healthcare-Based Applications: Recent Advances, Trends, and Future Directions

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Abstract: Graph neural network (GNN) is a formidable deep learning framework that enables the analysis and modeling of intricate relationships present in data structured as graphs. In recent years, a burgeoning interest has arisen in exploiting the latent capabilities of GNN for healthcare-based applications, capitalizing on their aptitude for modeling complex relationships and unearthing profound insights from graph-structured data. However, to the best of our knowledge, no study has systemically reviewed the GNN studies conducted in the healthcare domain. This study has furnished an all-encompassing and erudite overview of the prevailing cutting-edge research on GNN in healthcare. Through analysis and assimilation of studies, current research trends, recurrent challenges, and promising future opportunities in GNN for healthcare applications have been identified. China emerged as the leading country to conduct GNN-based studies in the healthcare domain, followed by the USA, UK, and Turkey. Among various aspects of healthcare, disease prediction and drug discovery emerge as the most prominent areas of focus for GNN application, indicating the potential of GNN for advancing diagnostic and therapeutic approaches. This study proposed research questions regarding diverse aspects of GNN in the healthcare domain and addressed them through an in-depth analysis. This study can provide practitioners and researchers with profound insights into the current landscape of GNN applications in healthcare and can guide healthcare institutes, researchers, and governments by demonstrating the ways in which GNN can contribute to the development of effective and efficient healthcare systems.

Keywords: Graph neural networks , Medical services , Medical diagnostic imaging , Systematics , Market research , Diseases , Feature extraction

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