

## Use of Generative Adversarial Networks (GANs) in Neuroimaging and Clinical Neuroscience Applications

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**Abstract :** GANs are a potent form of deep learning models that have found success in various fields. They are part of the larger group of generative techniques, which aim to produce authentic data using a probabilistic model that learns distributions from actual samples. In clinical settings, GANs have demonstrated improved abilities in capturing spatially intricate, nonlinear, and possibly subtle disease impacts in contrast to conventional generative techniques. This review critically evaluates the current research on how GANs are being used in imaging studies of different neurological conditions like Alzheimer's disease, brain tumors, aging of the brain, and multiple sclerosis. We offer a clear explanation of different GAN techniques for each use case in neuroimaging and delve into the key hurdles, unanswered queries, and potential advancements in utilizing GANs in this field. Our goal is to connect advanced deep learning techniques with neurology studies, showcasing how GANs can assist in clinical decision-making and enhance our comprehension of the structural and functional aspects of brain disorders.

**Keywords :** GAN, pathology, generative adversarial network, neuro imaging

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