



Quality Aware Generative Adversarial Networks

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Generative Adversarial Networks (GANs) have become a very popular tool for implicitly learning high-dimensional probability distributions. Several improvements have been made to the original GAN formulation to address some of its shortcomings like mode collapse, convergence issues, entanglement, poor visual quality etc. While a significant effort has been directed towards improving the visual quality of images generated by GANs, it is rather surprising that objective image quality metrics have neither been employed as cost functions nor as regularizers in GAN objective functions. In our work, we show how a distance metric that is a variant of the Structural SIMilarity (SSIM) index (a popular full-reference image quality assessment algorithm), and a novel quality-aware discriminator gradient penalty function

that is inspired by the Natural Image Quality Evaluator (NIQE, a popular no-reference image quality assessment algorithm) can each be used as excellent regularizers for GAN objective functions. Specifically, we were able to demonstrate state-of-the-art performance using the Wasserstein GAN gradient penalty (WGAN-GP) framework over CIFAR-10, STL10 and CelebA datasets. We call our proposed framework Quality Aware Generative Adversarial Networks (QAGANs). This work was carried out by PhD Scholar Ms. Kancharla Parimala. For more information (including the related publication and code), please visit our lab LFOVIA website at <https://www.iith.ac.in/~lfovia/publications.html>



3D Printing: Connecting the Virtual to Real

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Artificial intelligence is often linked to the ability of a machine to solve a given problem by itself, without human intervention, based on data and past experiences. In this regard, 3D Printing serves as a critical link in the physical translation of a virtual perception. 3D Printing is a process for making a physical object from a three-dimensional digital model, typically by laying down many successive thin layers of material. It brings a digital object (its CAD representation) into its physical form by adding layer by layer of materials. When AI is combined with 3D printing, it can lead to not just automated production but automated

manufacturing process planning adaptable for a different set of shapes and geometries; imagine just having to give the CAD model and the machine figuring out the process steps, tool paths, online motoring and final part fabrication. Today with the help of 3D Printing, one can make parts, appliances and tools in a wide variety of materials right from your home or workplace. Using a computer, simply create, modify or download a digital 3D model of an object. Click “print,” just as you would for a document, and watch your physical 3D object take shape.

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