GENERATIVE ADVERSARIAL NETWORKS

A SEMINAR REPORT

submitted by

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DECLARATION

I undersigned hereby declare that the seminar report "Generative Adversarial Networks", submitted for partial fulfilment of the requirements for the award of degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bona fide work done by me under supervision of Dr. Ajeesh Ramanujan. This submission represents my ideas in my own words and where ideas or words of others have been included, I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

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Certificate

This is to certify that this report entitled Generative Adversarial Networks is a bona fide record of the seminar presented by ***Santhisenan A, Roll No. TVE15CS050*** *under my guidance towards the partial fulfilment of the requirements for the award of Bachelor of Technology in Computer Science and Engineering of Kerala Technological University.*

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ABSTRACT

Generative adversarial nets or GANs can be thought of as a game theoretic approach to deep learning. Every GAN will have two major components, a generator G, and a discriminator D. They are like two adversaries, playing against each other in a game. G tries to generate images that look real from noise, and D tries to identify fake images generated by G. G and D are in a constant battle throughout the training process. G tries to fool D by making realistic fake images and D tries not to get fooled by G. It is important to have good generator, otherwise generator can never fool the discriminator and model may not converge. It is equally important to have a good discriminator, as otherwise images generated by the GAN will be of no use. One of the most important challenges to GAN is that if any one system fails, the whole system fails. A variety of GANs like WGAN, CGAN, InfoGAN, SRGAN etc. has been developed for various applications. GANs is an area in which very active research is being done.

Keywords: Generative algorithms, Discriminator, Generator

Contents

Chapter 1

INTRODUCTION

In Artificial Intelligence (AI), we can describe machine learning (ML) as one of AI's smaller subsets. Machine learning uses statistical techniques to computer systems ability to progressively improve its performance on a specific task with data without being explicitly programmed.[4] Unsupervised learning algorithms are a subset of machine learning algorithms which tries to describe the structure of unlabelled data.

Use of generative models[1] is an approach to unsupervised learning. The goal of a generative model is to generate data similar to the ones in the dataset. Generative Adversarial Network (GAN) is a type of Generative Model. Other types of generative models include Variational Autoencoders (VAEs) and autoregressive models like PixelRNN. GANs have been successfully applied to solve problems in various domains like generating images, videos and audio, text to image synthesis etc.

GANs were originally introduced by Ian Goodfellow and his collaborators in University of Montreal in 2014[2]. Yann LeCun, Director of AI Research at Facebook and Professor at NYU called adversarial training as "the most interesting idea in the last 10 years in ML"[3].

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