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

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Chapter 1

INTRODUCTION

1.1 Generative Adversarial Networks

Generative adversarial networks (GANs) are a class of artificial intelligence algorithms used in unsupervised machine learning, implemented by a system of two neural networks contesting with each other in a zero-sum game framework. They were introduced by Ian Goodfellow et al. in 2014[1]. This technique can generate photographs that look at least superficially authentic to human observers, having many realistic characteristics.[2]

1.2 Generative vs Discriminative algorithms

To understand GANs, you should know how generative algorithms work, and for that, contrasting them with discriminative algorithms is instructive. Discriminative algorithms try to classify input data; that is, given the features of a data instance, they predict a label or category to which that data belongs.

Discriminative algorithms map features to labels. They are concerned solely with that correlation. One way to think about generative algorithms is that they do the opposite. Instead of predicting a label given certain features, they attempt to predict features given a certain label.

1.3 How GANs work

One neural network, called the generator, generates new data instances, while the other, the discriminator, evaluates them for authenticity; i.e. the discriminator decides whether each instance of data it reviews belongs to the actual training dataset or not.[3]

Steps taken by a GAN are:

- The generator takes some random noise and returns an image
- This generated image is fed to the discriminator along with a stream of images taken the actual dataset
- The discriminator taken in both real and fake images and returns the probability of the fake image being real.

Bibliography

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[3] *https://deeplearning4j.org/generative-adversarial-network*