INDIANA UNIVERSITY BLOOMINGTON

Improved Conditional Adversarial Network

by

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in the

Faculty of ...
Department of Computer Science

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Declaration of Authorship

I, Mridul Birla, declare that this thesis titled, 'Improved Conditional Adversarial Network' and the work presented in it are my own. I confirm that:

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- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed: _____

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"We did it, we bashed them, wee Potter's the one,
and Voldy's gone moldy, so now let's have fun!"

- Peeves

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Abstract

Faculty of ...
Department of Computer Science

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any complex computer vision problems have now become approachable with the advancements in the areas of deep learning. Generative neural network frameworks have been one of the most recent developments in this field. These networks have shown promising results of generating real world synthetic images such as of bedrooms, cats, human faces etc. These frameworks are being applied to various computer vision applications and once such challenging problem is generating images. In this work, we scrutinize various generative frameworks such as Deep Convolution Generative Adversarial Network(DCGAN), Stacked Generative Adversarial Network(SGAN), InfoGAN. We then, train the combined network, over the CHAR-RNN-CNN network encoded caption/label combined with image. To evaluate the performance of the network, we test the newly generated images over the InceptionNet to see classification accuracy of these images.

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Contents

Declaration of Authorship i

Abstract iii

Acknowledgements iv

List of Figures vii

List of Tables viii

Abbreviations ix

Physical Constants x

Symbols xi

1 Introduction 1
- 1.1 A Section . . . 1
  - 1.1.1 A Subsection . . . 2
- 1.2 Another Section . . . 2

2 Related Work 3
- 2.1 Generative Models . . . 3

3 Generative Adversarial Network 4
- 3.1 Introduction . . . 4
- 3.2 Generative Model . . . 4
- 3.3 The GAN Concept . . . 5
  - 3.3.1 Mathematical Definition . . . 6
  - 3.3.2 Real World Example . . . 6

A An Appendix **7**

Bibliography **9**

List of Figures

3.1 The panther 5
3.2 GAN overview 6

List of Tables

Abbreviations

LAH **L**ist **A**bbreviations **H**ere

OWL **O**rdinary **W**izarding **L**evel

Physical Constants

Speed of Light $c = 2.997\ 924\ 58 \times 10^8\ \mathrm{ms}^{-\mathrm{S}}$ (exact)

Symbols

a	distance	m
P	power	W (Js^{-1})
ω	angular frequency	$rads^{-1}$

For/Dedicated to/To my...

Chapter 1

Introduction

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1.1 A Section

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1.1.1 A Subsection

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1.2 Another Section

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LaTeX is great!

Chapter 2

Related Work

In this chapter, we look at the previous work done in the field of generative models. Here first we look at diffeerent generative model. As our work is focused on genrative adversarial neural network, we look at the various models under the umbrella of it.

2.1 Generative Models

There has been lot of research going on in area of generative models.One of the most proven models belongs to Restricted boltzzman machine and Deep Belief Net[cite].

Chapter 3

Generative Adversarial Network

3.1 Introduction

The basic building block of this work is generative adversarial network. With the recent advancements in generative adversarial networks, it has become one the most studied generative model. A lot of variations and different architecture have been developed after the first paper was published.[cite][cite][cite]. In this chapter we explain GAN from the very basics. After reviewing this work, we discuss deep convolution generative adversarial network(DCGAN) which has pioneered the stabilization of the adversarial training.

3.2 Generative Model

Generative adversarial networks works on the principle of maximum likelihood. It means when given a dataset, the model tries to provide probability distribution of the sample data parameterized by θ. As this work is focused on computer vision,so the key relationship between images and statistics is that we can interpret images as samples from a high-dimensional probability distribution.

It is very import to differentiate between explicit and implicit density model. So is tree differentiating model based on maximum likelihood principal.

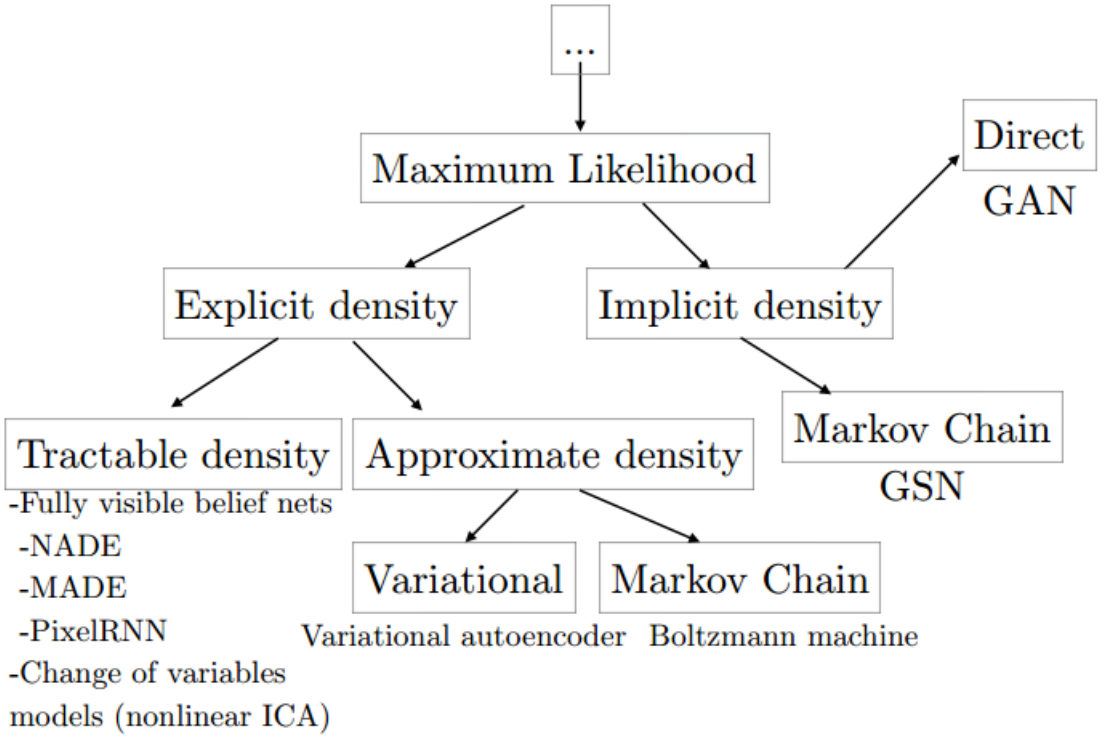

FIGURE 3.1: Taxonomy of Generative Model[2]

In explicit model which also known as prescribed probabilistic model, we explicitly define the distribution of random variable and specify the log likelihood function. In implicit model we don't need to define density function[1]. The model learn the function from the data and generate sample in a single step.

3.3 The GAN Concept

Generative Adversarial network works by inter playing two deep artificial neural networks, a generator(G) and a discriminator(D). Both of these network play a min max game, where generator tries to produce a fake image and discriminator tries to identify whether it is fake or real image as illustrated in Figure 3.1

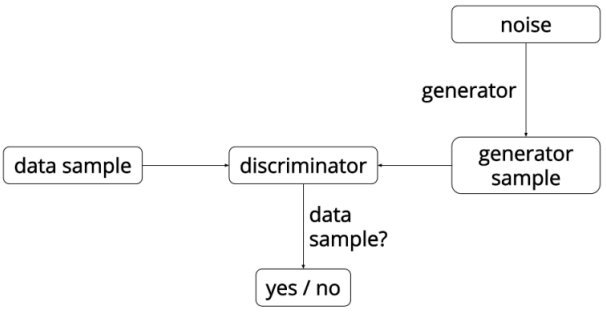

FIGURE 3.2: GAN overview[3]

3.3.1 Mathematical Definition

Mathematically, let x, θ_G and θ_D are be a data variable ,optimal hyper-parameters of the generator and discriminator model. Give a latent variable z drawn from a Gaussian distribution , the genrator transform this variable to a sample from the data. And the discriminator tries to estimate whether the x is from data space p_{data}.

$$F(\theta_G, \theta_D) = E_{x \sim p_{data}}[log(D(x; \theta_D))] + E_{z \sim N(0,I)} \log(1 - D(G(z; \theta_G); \theta_D))$$

3.3.2 Real World Example

To understand GAN better,lets take a real world analogy. Suppose G is a counterfeit artist who produces fake money and D is a undercover agent from FBI who acting as buyer. The task of D is to differentiate the money. So to master the skill G, produces a fake currency batch and sells them to the D . If D identifies the batch then G updates its skill based on feedback fro the G. In this way both goes back and forward, till G has learn the art of producing fake money.

Appendix A

An Appendix

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