Generative Adversarial Network (GAN) for Nuclei Detection on Breast Cancer Histopathology Images

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*Abstract*—We extended the work of August Odena of a Semi supervised Learning approach with GAN, combined it with the implementation of a DCGAN and adapt the model to work with the same dataset used in the SSAE paper, the latest is currently the best approach to perform nuclei detection over Breast Cancer Histopathology Images dataset. Our goal was to take advantage of the G of this model to add work as a supplier of training data and see if D by itself could outperform the SSAE architecture. The inspiration of this idea was borrowed from the paper “A Survey on Deep Learning in Medical Image Analysis”.

Keywords— Feature representation learning; automated nuclei detection; Semi-supervised approach; Generative Adversarial Network; breast cancer histopathology;

# Introduction

Other Nuclei detection approaches

How the SSAE is train and predict (high-level)

GAN uses and quality results.

GAN semi-supervised approaches (overview)

DC GAN architecture and results

S GAN architecture and results.

How does an SDC-GAN is trained (High-Level)

How it predicts (high-level)

The rest of the paper is organized as follows:…

# Previous Related Work

## GAN

Overview. Intuition. Architecture. Loss.

## DCGAN

Semi-supervised learning.

## Other Semi-Supervised approaches and techniques.

Semi-supervised learning.

# SDCGAN

Intro:

## SGAN

Algorithm.

Output.

## SDCGAN

High-level feature learning.

Difference with SSAE.

Loss.

D for nuclei detection.

# Experimental Setup

Same as SSAE.

Dataset.

Parameter setting.

Generation of training sets.

Ground truth generation.

Training the SDC-GAN (MNIST and TMI)

SDC-GAN versus SSAE.

# Experimental Results

Qualitative results.

Quantitative results.

Sensitivity Analysis.

Computational Consideration.

# Conclusion and future work

Conclusion.

We are excited to explore the following related ideas:

##### Acknowledgment

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