

# Learning

*Subtitle*

Mathias Kirkerød



Thesis submitted for the degree of  
Master in Informatics: Language and Communication  
60 credits

Department of Informatics  
Faculty of mathematics and natural sciences

UNIVERSITY OF OSLO

Spring 2018



# Learning

*Subtitle*

Mathias Kirkerød

© 2018 Mathias Kirkerød

Learning

<http://www.duo.uio.no/>

Printed: Reprosentralen, University of Oslo

# Abstract

# Contents

<b>I</b>	<b>Introduction</b>	<b>1</b>
<b>1</b>	<b>Introduction</b>	<b>2</b>
1.1	Background and Motivation . . . . .	2
1.2	Goal / Problem . . . . .	2
1.3	Scope and Limitations . . . . .	2
1.4	Outline . . . . .	2
<b>2</b>	<b>Background</b>	<b>4</b>
2.1	Cancer . . . . .	4
2.1.1	regular colonoscopy/ Gastroscopy . . . . .	4
2.1.2	Pillcam . . . . .	4
2.2	Machine Learning . . . . .	4
2.2.1	Tasks (other better word goes here) . . . . .	4
2.2.2	The rate of success . . . . .	4
2.3	supervised vs unsupervised . . . . .	5
2.4	Unsupervised . . . . .	5
2.4.1	Approaches to unsupervised learning . . . . .	5
2.4.2	Deep Unsupervised learning . . . . .	5
2.4.3	more . . . . .	5
2.5	Related work . . . . .	5
<b>II</b>	<b>The project</b>	<b>6</b>
<b>3</b>	<b>Planning the project</b>	<b>7</b>
<b>III</b>	<b>Conclusion</b>	<b>8</b>
<b>4</b>	<b>Results</b>	<b>9</b>

# List of Figures

# List of Tables



# Preface

# **Part I**

## **Introduction**

# Chapter 1

## Introduction

### 1.1 Background and Motivation

Cancer is, today, the second leading cause of death in the world, only behind cardiovascular diseases. The western (or modern) world has been in a battle against cancer, and despite a lot of new cures/innovations it is still one of the deadliest killers in the world. You can get cancer in every major organ, but some are more common than others. For instance cancer in the gastrointestinal tract (GI) is one of the more common places to get cancer.

Something about cancer and current treatments \* Increasing cancer rate \* 2 main options (colonoscopy MRI) \* the 3rd option \* CAD ACD (computer aided diagnosis, Automated computer diagnosis) \* Simulas contribution \* Simulas EIR \* Now that we got a lot of tests, why not unsupervised

### 1.2 Goal / Problem

\* We know that we can get some results using a neural network \* Can this be done unsupervised? \* Can it be done in a fashion that is better than S-ML

### 1.3 Scope and Limitations

\* Something about earlier research already got far, so the scope is mainly unsupervised deep learning. \* (and how to generalise it?)

### 1.4 Outline

The rest of the thesis is structured as follows:

## **Chapter 2 - Background**

talk about cancer \*talk about machine learning. **Chapter 3 - Me doing stuff**

**Chapter 4 - Me got and presented result**

**Chapter 5 - Me saying result was good A+**

# Chapter 2

## Background

### 2.1 Cancer

#### 2.1.1 regular colonoscopy/ Gastroscopy

#### 2.1.2 Pillcam

### 2.2 Machine Learning

Testing a cite:

*A computer program is said to learn from experience  $E$  with respect to some class of tasks  $T$  and performance measure  $P$ , if its performance at tasks in  $T$ , as measured by  $P$ , improves with the experience  $E$ . Mitchell 1997*

#### 2.2.1 Tasks (other better word goes here)

- Classification
- regression
- transcription/translation
- de-noising /finding missing inputs

#### 2.2.2 The rate of success

What is a good result, how to measure?

FP,TN,FN,TP

## 2.3 supervised vs unsupervised

What it means to be S/US.

Something about the kind of experience allowed during the learning process.

## 2.4 Unsupervised

noe med å dele i grupper? Experience the dataset containing many features, and finds useful properties of the structures. ***Unsupervised learning algorithms*** experience a dataset containing many features, then learn useful properties of the structure of this dataset. In the context of deep learning, we usually want to learn the entire probability distribution that generated a dataset, whether explicitly, as in density estimation, or implicitly, for tasks like synthesis or denoising. Some other unsupervised learning algorithms perform other roles, like clustering, which consists of dividing the dataset into clusters of similar examples. Goodfellow, Bengio, and Courville 2016

### 2.4.1 Approaches to unsupervised learning

look at the subsection 2.2.1 to see what applies to the unsupervised.

### 2.4.2 Deep Unsupervised learning

### 2.4.3 more

## 2.5 Related work

# **Part II**

## **The project**

## **Chapter 3**

### **Planning the project**



# **Part III**

## **Conclusion**

# **Chapter 4**

## **Results**

# Bibliography

Goodfellow, Ian, Yoshua Bengio, and Aaron Courville (2016). *Deep Learning*. <http://www.deeplearningbook.org>. MIT Press.

Mitchell, Tom M (1997). *Machine learning*. eng. New York.