# Can Machine learning be used to predict bipolar states with different types of input data?

Joakim I. Frogner


Thesis submitted for the degree of
Master in Programming and Networks
60 credits

Department of Informatics
Faculty of mathematics and natural sciences

UNIVERSITY OF OSLO

Spring 2018

# Can Machine learning be used to predict bipolar states with different types of input data?

Joakim I. Frogner

Can Machine learning be used to predict bipolar states with different types of input data?

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

Printed: Reprosentralen, University of Oslo

# Abstract

# Contents

# List of Figures

# List of Tables

# Preface

# Part I

# Introduction

# Chapter 1

# Introduction

## 1.1 Motivation

Statistics
- Data shows that 5,890,000 adults are diagnosed with bipolar disorder in the USA (2,65% of the adult population) [find better source].

Ways to use the results of this study?

## 1.2 Thesis overview

[Fill in later]

# Chapter 2

# Background

## 2.1 Bipolar disorder

Bipolar disorder is the disorder where you experience extreme mood swings. One day you can feel amazing and everything is fine, but the next day you feel like you don't belong anywhere in this universe. Mood swings in general is not something that you should be concerned about. It is however the extreme cases where your mind turns 180 degrees from day to day that is the main symptom of bipolar disorder. There is not really a specific type of people that get this; they can be of any age and any gender, but most people that suffer from it find out (by having an experience or episode) around age 25 [2].

When talking about bipolar disorder, we often separate between the states *normal*, *mania* and *depression*. The last two are the states we usually talk about, since a normal state isn't that interesting. These two states are very different, but they have some similarities, for example sleeping problems.

When a bipolar person is in a manic state, he/she may do things that they never would have intended doing, like spending a lot of money on items they really don't need, or abusing drugs/alcohol. They may also feel really excited or powerful [1].

A bipolar patient is in a depressive state when he or she is in a bad mood swing. They can stop doing everything they usually like to do, and lie down in bed all day with no motivation to do anything useful. They may feel useless and that they don't belong here, or being guilty of something they may or may not have done. In some cases, a depression may even end up with suicidality, where the person either just thinks of death, or actually attempt suicide (actually 20% of people diagnosed with bipolarity commit suicide [2]).

The frequency of these symptoms can vary. One year they can have these mood swings every day for several weeks at the time, and the next they get them less frequent, like once every month.

We also separate between bipolar disorder type I and II, with the main difference being that the manic episodes are way more aggressive in type I [3].

Statistics say that bipolarity is genetically inheritable, with 23% chance of getting a child with bipolar disorder if one parent is bipolar, and 66% if both parents are [2].

## 2.2 Machine learning

Some description about machine learning in general...

## 2.3 Machine learning strategies

### 2.3.1 Supervised learning

### 2.3.2 Unsupervised learning

### 2.3.3 Semi-supervised learning

## 2.4 Machine learning approaches

### 2.4.1 Decision tree learning

### 2.4.2 Reinforcement learning

### 2.4.3 Neural networks

- General idea
- Deep learning

## 2.5 How can machine learning help

How I can solve the problem described in the beginning of this chapter...

## 2.6 Related work

List related work and discuss...

## 2.7 Challenges

Describe some challenges...

## 2.8 Ethical concerns

Describe some ethical concerns...

# Part II

# The project

# Chapter 3

# Planning the project

# Part III

# Conclusion

# Chapter 4

# Results

# Bibliography


[1] *Bipolar overview*. Accessed: 14.03.2018. URL: https://familydoctor.org/condition/bipolar-disorder/.

[2] *Bipolar statistics*. Accessed: 14.03.2018. URL: https://www.statisticbrain.com/bipolar-disorder-statistics/.

[3] *Bipolar types*. Accessed: 14.03.2018. URL: https://www.healthline.com/health/bipolar-disorder/bipolar-1-vs-bipolar-2#bipolar-vs-bipolar-.