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**Date: 2021/03/24**

Investigating ways of Improving Diagnosis of Schizophrenia with SVM Machine Learning Model



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A dissertation submitted in partial fulfilment of requirements of Technological University Dublin for the degree of

M.Sc. in Computer Science

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# DECLARATION

I certify that this dissertation which I now submit for examination for the award of MSc in Computer Science, is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the test of my work.

This dissertation was prepared according to the regulations for postgraduate study of the Technological University Dublin and has not been submitted in whole or part for an award in any other Institute or University.

The work reported on in this dissertation conforms to the principles and requirements of the Institute’s guidelines for ethics in research.

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# ABSTRACT

Machine learning classifiers can be used with MRI and fMRI images in order to help clinicians avoid misdiagnosis. Young girls tend to not be diagnosed with ADHD because how unalike its manifestation is when compared to boys, having better tools for diagnosing disorders will greatly improve people’s quality of life.

There have been a few short comings in diagnosing of serious mental health disorders, there is no process to date that properly diagnoses D.I.D, despite it being acknowledged as a mental illness in the 1950s, research between then and now has been done but was later found to be fraudulent or difficult to reproduce.

Disassociation and schizophrenia are very disabling mental health disorders with huge time requirements to attain a diagnosis, assuming that a patient can avoid years of misdiagnosis due to showing less severe symptoms which are harder to spot with the naked eye.

This study has investigated the potential ways of improving the diagnosis of schizophrenia among other serious disorders through prototyping of models and suggesting potential avenues for future work.

Key Results

Conclusion

Keywords: Machine Learning, Mental Health, Diagnosis Prediction, Brain Disorder Classification, Schizophrenia

# ACKNOWLEDGEMENTS

Notes for later:

Thank supervisor etc

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# INTRODUCTION

## Background

Machine learning is gaining popularity in many industries, one industry that is having difficulty in adopting machine learning is diagnostics in healthcare that require explainable results, some of the most powerful tools available don’t produce explainable models. Having said that machine learning still has the capability to be used as a tool in the hands of trained clinicians and fill a much-needed area in psychiatric diagnosis.

A diagnosis for dissociative disorders and schizophrenia among other disorders rely on the interpretation of an assessment completed by a clinician, (HSE, 2021) this can be difficult when a patient does not express extreme symptoms such as hearing voices or delusions, the flattening of emotions in psychology is a condition in which a person is unable to express emotions the same way other people might. (Timothy J. Legg, 2017) Similar overlapping symptoms can cause a misdiagnosis and lead a patient astray for years before finally being diagnosed for instance with schizophrenia or a disassociation disorder.

Currently there is no established biomarker for diagnosing schizophrenia besides using the process of elimination.

One way to reduce misdiagnosis is with the use of machine learning classification in conjunction

with MRI and fMRI images. Once a biomarker for other illnesses such as depression or anxiety can be identified they can then be acknowledged and ‘omitted’ when searching for definitive biomarkers that help hone in on schizophrenia or disassociation disorders.

An obstacle that occurs when one begins collecting data to analyse, apart from privacy concerns and difficulty obtaining such data due to regulations, schizophrenia only afflicts ~1% of the population making it very scarce. (mentalhelp.net, 2021) When working with images one can rotate them to create more samples.

Relevance and importance

Questions and objectives

Overview of structure

## Research Project/problem

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## Research Objectives

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## Research Methodologies

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## Scope and Limitations

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# LITERATURE REVIEW

## Introduction

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## Conclusion

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**Footnote**

Introduction section

First paragraph of literature survey

Max cap 900 words

SVM can be replaced with any other model as I gain more insight into this topic, schizophrenia can be replaced with dissaciative disorders depending on data availability, the dataset I’m planning on using is pulled from schizophrenia MRI images.

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