

# CLASSIFICATION METHODS FOR SUPPORT VECTOR MACHINES

JULIA ANDRONOWITZ

B.S., Mathematics

May 2023

## **Abstract**

The purpose of this thesis is to give an introduction to the concept of Support Vector Machines in Machine Learning. We will first outline the idea of classification, including the maximal margin classifier and support vector classifier. Examples of each will be given using programming languages such as R and Python. Then, we will move onto support vector machines and the use of kernels with example data. Finally, we will implement the techniques previously described in a real dataset.

University of Connecticut  
Department of Mathematics  
Advisor: Dr. Jeremy Teitlebaum

## INTRODUCTION

- overview of type of data used in classification problems
- gene expression and cancer prediction in ?

## HYPERPLANES

- separating line in  $\mathbb{R}^2$
- planes and higher dimensional spaces

## MAXIMAL MARGIN CLASSIFIER

- linearly separably data
- use of hyperplanes

## SUPPORT VECTOR CLASSIFIER

- soft margin classifier
- introduction of costs/penalties

## SUPPORT VECTOR MACHINES

- non-linear decision boundaries
- use of kernels
- multi-class data

## EXAMPLE

- penguin/iris dataset: well-known example
- possible example with real implications

# ANALYSIS OF R AND PYTHON SVM MODULES AND DOCUMENTATION

- supporting documentation for each
- ease of use
- notes on function parameters

## References