

FYS-STK4155 - Applied data analysis and machine learning

Project 1

Even M. Nordhagen

September 12, 2018

- Github repository containing programs and results:
<https://github.com/evenmn/FYS-STK4155>

Abstract

Do not forget to be specific

Contents

1	Introduction	3
2	Theory	3
2.1	First order regression	3
2.1.1	Ordinary Least Square (OLS)	3
2.1.2	Ridge regression	3
2.1.3	Lasso regression	3
2.2	Higher order regression	3
2.3	Terrain	3
2.4	Higher order	3
2.5	Error analysis	3
3	Methods	4
3.1	Resampling techniques	4
4	Code	4
4.1	Code structure	4
4.2	Implementation	4
4.3	Optimalization	4
5	Results	4
6	Discussion	4
7	Conclusion	4
A	Appendix A	4

1 Introduction

Should write some motivating words about how much regression is used in different fields etc..

2 Theory

2.1 First order regression

A few general words about regression

2.1.1 Ordinary Least Square (OLS)

2.1.2 Ridge regression

2.1.3 Lasso regression

2.2 Higher order regression

2.3 Terrain

Mention the Franke Function

$$f(x, y) = \frac{3}{4} \exp \left(-\frac{(9x-2)^2}{4} - \frac{(9y-2)^2}{4} \right) + \frac{3}{4} \exp \left(-\frac{(9x+1)^2}{49} - \frac{(9y+1)^2}{10} \right) \\ + \frac{1}{2} \exp \left(-\frac{(9x-7)^2}{4} - \frac{(9y-3)^2}{4} \right) - \frac{1}{5} \exp \left(-(9x-4)^2 - (9y-7)^2 \right).$$

2.4 Higher order

Although we stick to 2D regression in this project, I add this section for completeness.

2.5 Error analysis

Cost function (loss function)

Different methods to estimate error:

- Absolute error
- Relative error

- Mean square error (MSE)
- R^2 score function

3 Methods

3.1 Resampling techniques

4 Code

4.1 Code structure

4.2 Implementation

4.3 Optimization

5 Results

6 Discussion

7 Conclusion

A Appendix A