

# A case study in the application of machine learning methods in non-life insurance

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## 1 Motivation

## 2 Abstract

Xie (2015)

## 3 Software, languages and libraries

### 3.1 SAS - Statistical Analysis Software

### 3.2 Python

#### 3.2.1 Libraries

### 3.3 R

#### 3.3.1 Packages

## 4 Models

### 4.1 General machine learning heuristics

#### 4.1.1 Bias-variance tradeoff

#### 4.1.2 Hyper parameter tuning

#### 4.1.3 Regularization and “the bet on sparsity”

#### 4.1.4 Model validation

##### 4.1.4.1 Cross-validation

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##### 4.1.4.4 Bootstrapping

### 4.2 Neural networks

#### 4.2.1 Vanilla-NN (NN basics)

##### 4.2.1.1 Activation functions

##### 4.2.1.2 Gradient descent for neural networks

#### 4.2.2 Regularization

##### 4.2.2.1 Norm regularization

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#### 4.2.2.3 Early stopping

### 4.3 Regularized general linear models

#### 4.3.1 LASSO regression

#### 4.3.2 Ridge regression

#### 4.3.3 Elastic net regression

### 4.4 Boosting

#### 4.4.1 Regularization

### 4.5 Meta ensemble methods

#### 4.5.1 Stacking

## 5 Data

Description of data and insurance data in general

### 5.1 Exploratory data analysis

## 6 Predictive analysis

### 6.1 Performance measures

### 6.2 Neural network

## 7 Conclusions

## 8 Bibliography

## 9 Appendices

## References

Xie, Y. (2015). *Dynamic Documents with R and knitr*. Chapman and Hall/CRC, Boca Raton, Florida, 2nd edition. ISBN 978-1498716963.