

# Introduction to Machine Learning

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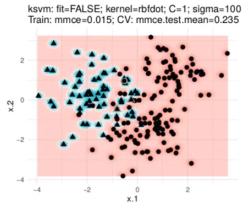
May 16, 2019

The course is organized as a digital lecture, which should be as self-contained and enable self-study as much as possible:

- Slides with lecture videos
- Interactive tutorials
- Complemented by a week-long inverted-classroom block course

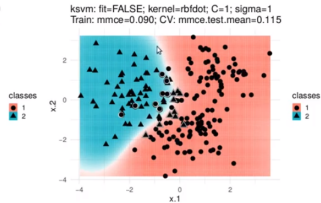
## OVERFITTING

Overfitting learner

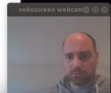


Better training set performance  
(seen examples)

Non-overfitting learner



Better test set performance  
(unseen examples)



# Concept - Interactive Tutorials (Quiz)

## Introduction to Machine Learning - Day 2

Introduction to Classification

Logistic Regression

Approaches to Classification

The Two Cultures of Statistical

Start Over

### ✓ Exercises

(7) Quiz

#### ✓ Which statements are true?

- ☒ Classification is a supervised learning task. ✓
- ☐ The decision boundary is independent of the used model.
- ☒ Binary classification uses two discriminant functions.
- ☐ Linear classifiers can just learn linear decision boundaries.
- ☐ For the discriminant approach we must have a loss function for minimization. ✓
- ☒ The generative and discriminant approach are basically the same.
- ☐ The generative approach is a probabilistic approach. ✓

Incorrect.

#### ✓ Which statements are false?

- ☒ The discriminant approach assumes a data generating process in which the features have different distributions conditional on the class of the target variable.
- ✓
- ☒ The generative approach attempts to minimize a loss function. ✓
- ☒ Linear discriminant analysis is a discriminant approach, while quadratic discriminant analysis is not. ✓
- ☐ The discriminant approach tries to model the discriminant score function directly.
- ☐ Logistic regression is a discriminant approach

Correct!

Next Topic

# Concept - Interactive Tutorials (Examples)

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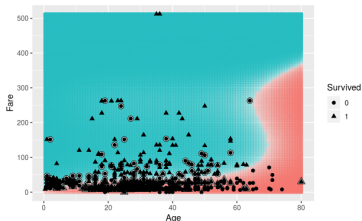
(P) Training a logistic regression with non-linear decision boundaries

The next demonstration shows how to include the features **Age** and **Fare** as polynomials and the effect on the decision boundary. As mentioned in the video, it is possible to transform a linear classifier into a non-linear classifier by just mapping features into a higher dimensional feature space (feature map):

Code [Start Over](#)

[Run Code](#)

```
1 library(ggplot2)
2
3 # Change degree and threshold here:
4 degree = 3
5 threshold = 0.5
6
```



[Previous Topic](#)

[Next Topic](#)

Check it out for yourself:

`compstat-lmu.github.io/lecture_i2ml`

## Technologies:

- Videos: very basic free screen-capture programs  
(Kazaam, vokoscreen)
- Tutorials/Website: (no HTML/CSS skills required)  
Rmarkdown + shiny + learnr + testwhat
- Webhosting:
  - Videos: YouTube (free)
  - Website: Github (free)
  - Coding Exercise: shinyapps.io (free for limited traffic)