Re-sampling and cross-validation

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Introduction

Why cross validation and resampling?

Cross-validation and resampling methods are validation techniques helpful for:

- Selecting model.
  - Almost all pattern recognition techniques needs one or more parameters.
  - How to select the *optimal* parameters?
- Classifiers performance evaluation.
  - Once the model is selected, how to estimate its performance?
  - The goal is the real error rate, but this is only achievable by performing classification over the whole population.

Introduction

Why cross-validation and resampling?

- Usually the available dataset size is not as large as we would want.
- One approach would be selecting the entire dataset for the classifier training and evaluation, but:
  - This would overfit training data.
  - The error rate estimate might be really optimistic.

Resampling and cross-validation techniques to the rescue!

Cross-validation techniques

- Basically, they divide available dataset on two subsets, one for training, the other for testing the classifier.
- Subsets are mutually exclusive, the instance x_i can be only in one of these subsets.

Re-sampling techniques

- Features here!

Enumerate

1. Here you can see an enumeration
2. It has items
3. The items are numbered

$$f(x) = \sum_{i=0}^{\infty} \frac{f^{(i)}(x_0)}{i!}(x - x_0)^i$$

Theorems and environments

Theorem (Sample theorem)

This presentation is essentially useless.

Proof.

This proof is essentially incorrect. □

Example slide with Title

Example

Major problem.

Solution

Minor nuisance.

Plain frame with title

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