Summary of TMA4300

What did we do?

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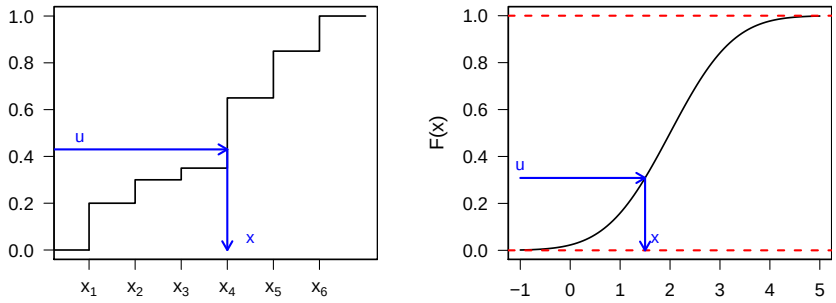
What did we do?

We had three blocks:

- Simulation
- Markov chain Monte Carlo and INLA
- Classification, Bootstrap and EM-algorithm

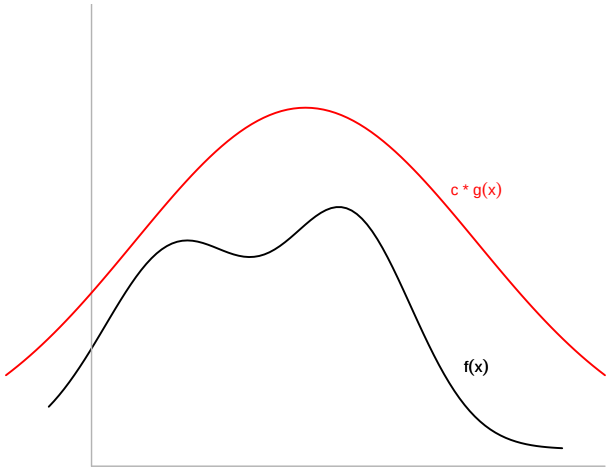
Block 1



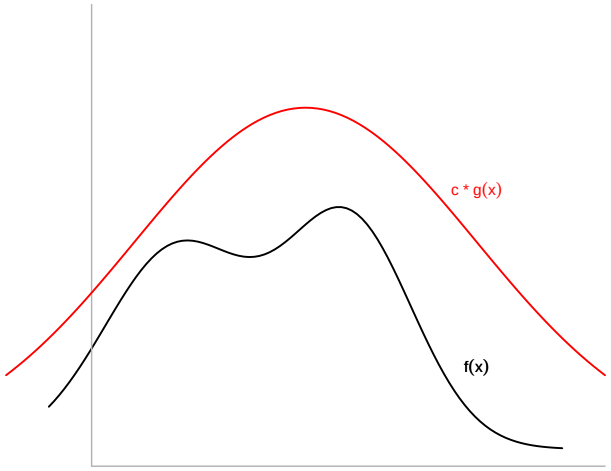
What else ...?

- Bivariate techniques, e.g. the Box-Muller algorithm
- Ratio-of-uniforms method
- Methods based on mixtures

Do you remember this figure?



Do you remember this figure?



Refinements: Make the envelope adaptive (different approaches)

Why do we want samples?

Often we would like to approximate a statistic that is difficult to compute directly.

Keywords:

- Monte Carlo integration
- Importance sampling

Bayesian inference

Basics:

- Posterior $\propto$ Likelihood $\times$ Prior
- Bayesian hierarchical models
- Full-conditional distributions

Block 2: Two big topics

Markov chain Monte Carlo:

- What is the idea? Can we generate any Markov chain?

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- What kind of different MCMC techniques have we seen?

Block 2: Two big topics

Markov chain Monte Carlo:

- What is the idea? Can we generate any Markov chain?
- Why do we not use an approach from block 1?
- What kind of different MCMC techniques have we seen?
- Is the algorithm working at all?

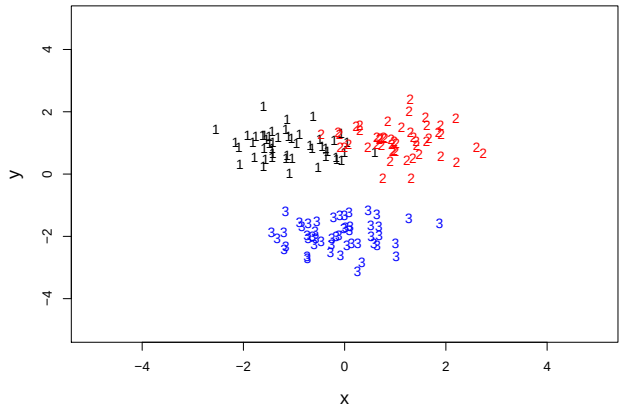
Some keywords

detailed balance condition, Metropolis-within-Gibbs, random-walk proposal, burn-in, convergence diagnostics, mixing, effective sample size, ...

Integrated nested Laplace approximations

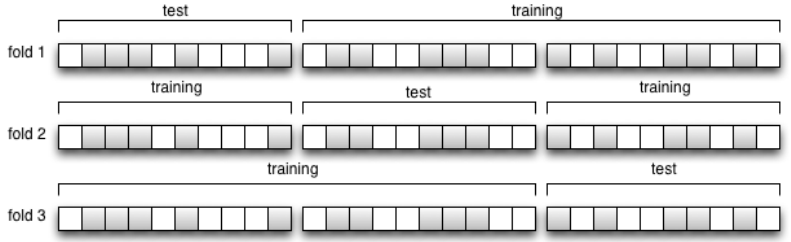
- What is the idea?
- For which models does it work?
- What are the main "ingredients"
- Potential advantages over MCMC

Block 3



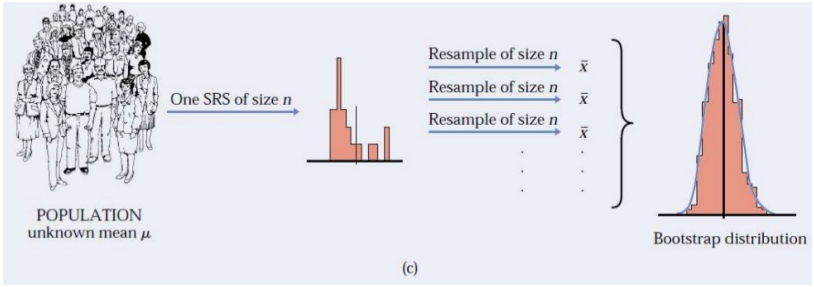
Keywords: LDA, QDA, KNN.

Which algorithm fits to this figure

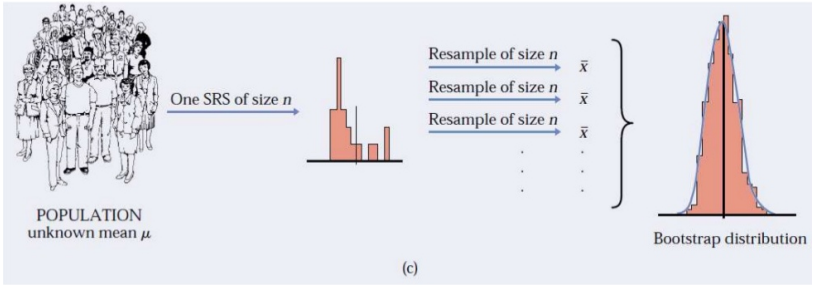


In which context might we use this algorithm?

Bootstrap



Bootstrap



- Non-parametric bootstrap
- Parametric bootstrap
- Bootstrapping regression

EM-algorithm

- Goal? Basic idea? What are the steps?
- Apply it to a simple example as inferring a missing datapoint

10	15	17
22	23	NA

The exam - 01.06.2016

Permitted aids:

- Calculator HP30S, CITIZEN SR-270X, CITIZEN SR-270X College, Casio fx-82ES PLUS with empty memory.

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- A dictionary in any language.
- One yellow, stamped A5 sheet with your own handwritten formulas and notes (on both sides).


GOOD
LUCK!