# Computer lab 2: Controlling Convergence and Sequential Monte Carlo

## Learning objectives

The main objective of this computer lab is to make the student familiar with sequential Monte Carlo analysis and tools for assessing properties of sequences.

After completing the lab the student shall be able to:

1. Implement and evaluate basic sequential Monte Carlo (SMC) algorithms for in R.
2. Calculate effective sample size and use it for rejuvenation in sequential sampling importance resampling algorithms.

## Recommended reading

Chapter 4 in Robert and Casella (2009)

Chapter 6 in Givens and Hoeting (2013)

## Assignment 1: Sequential Monte Carlo of a high dimensional distribution

a.) This assignment is based on Example 6.6 (p. 174-175) in Givens and Hoeting (2013). Read through the text carefully and take a look at the associated code. Your first task is to add comments to the code using the information in the text (especially the algorithm description).

b.) Run the code until the last section that starts with #NOW TRY TO… Provide a plot of the effective sample size over iterations and explain the results.

c.) Calculate means and 95% confidence intervals of the sampled values **X** for each of *p* (over the iterations) and produce a plot of these results (that includes both means and confidence intervals). In addition, produce a density of all **X** values (merged over *p*) and discuss how it relates to the information given in the text.

d.) Produce density plots of the weights over iterations. Discuss the results.

e.) Run the last part of the code and discuss if the results correspond well with the information given in the text.

## To hand in

A written report (Word, pdf, html) where you summarize your main findings in the assignments. Submit your report via Moodle before the deadline.