Markov Models Practical

Exercise 1. Add state costs

So far, we have assumed that there are no costs associated with the health states. Add in a fixed cost of £100 per year associated with the smoking state by:

a. Updating the state costs array to replace the zeroes with a £100 per year state cost for the smoking state. Specify that the no smoking state is associated with zero costs.
b. Rerun the simulation and analyse the results using BCEA. What impact does adding a cost associated with the smoking state have on results?
c. Describe the change in the cost-effectiveness plane and explain why.

Exercise 2. Add the 'Death' state

In reality, models will have more than two states. One state that has not been represented here is the death state which people can move in to at each cycle.

Go through the code and add in an extra state to represent death by:

a. Changing the number of states from 2 to 3 and naming the death state
b. Adjusting the transition matrices for both SoC with website and SoC to account for the fact that people can move between three states rather than two. The use of the Dirichlet distribution allows you to easily add a third possible transition but remember that the probabilities must sum to 1. Assume that there are 2 deaths in every 100 patients in the smoking state and 1 death in the non-smoking state. Remember that death is an absorbing state that people cannot move back from.
c. Check that you have set up your transition matrix correctly using the code transition_matrices["SoC with website", 1, ,]
d. Assign a QALY of 0 and a cost of 0 to the death state
e. Rerun the simulation including the death state, assuming that no one starts in the death state
f. Analyse the results using BCEA. What impact does adding the death state have on the results?