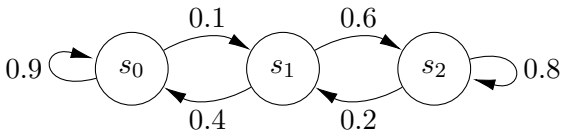
Technische Universität München
Institut für Informatik I07
Theoretical Computer Science

Quantitative Verification 6

Ex 1: Matrix Representation

Write down the matrix representation of the following Markov Chain. Suppose the initial distribution is $\pi_0 = [1, 0, 0]$, i.e. the process starts in s_0. What is the transient distribution after three time steps?

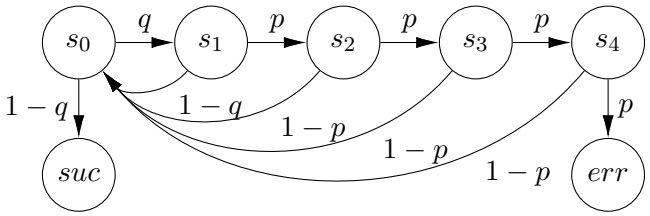


Ex 2: Modelling

Imagine jobs arriving at a server with an unbounded queue. The server works on a job at the head of the queue and, when finished, moves on to the next job. The server never drops a job, but just allows them to queue up. At every time step, with probability $p = \frac{1}{50}$ one job arrives, and independently, with probability $q = \frac{1}{30}$ one job departs, i.e. is finished by the server. Note that during a time step, we might have both an arrival and a transmission, or neither. Draw the Markov Chain modelling this server (assuming that you are interested in studying the number of jobs in the system).

Ex 3: PRISM

A simplified version of the IPv4 Zeroconf protocol is outlined below. Model the protocol in `PRISM` and compute the transient probabilities for the first few steps.



1. Randomly pick an address among the K (65024) addresses.
2. With m hosts in the network, collision probability is $q = \frac{M}{K}$
3. Send 4 ARP requests.
4. In case of collision, the probability of no answer to the ARP request is p (due to the lossy channel).