



FAKULTÄT FÜR  
INFORMATIK

Lehrstuhl für Simulation

## Applied Discrete Modelling

### Assignment 5 “Machine Temperature”: HMMs

#### System Specification

A machine has two states. It can be either in *High Performance Mode* (HPM) or in *Low Performance Mode* (LPM). The probability to change from HPM to LPM in one step is 0.02. The one step transition probability from LPM to HPM is 0.1. At the beginning of the simulation the machine is in HPM.

The machine produces one part per time step, the probability to produce a working part in HPM is 0.95 in LPM only 0.8.

#### Implementation

Obtain or build a tool that is able to solve the Evaluation and Decoding problem for HMM. (e.g. MatLab, C, Excel...)

#### Tasks and Questions

Specify and draw the HMM representing the system.

Use your program to answer the following questions:

- What is the most likely sequence of parts conditions in the first three steps of our observation?
- What is the probability of producing three defective parts in a row (trace: *defective, defective, defective*) in the first three steps of our observation?
- What is the probability of the trace (*defective, defective, defective*) when starting in steady state?
- What is the most likely path that led to the production of three working parts in a row (trace: *working, working, working*) in the first three steps of our observation?
- What is the most likely path for the trace (*working, working, working*) when starting in steady state?