MarkovFPT.wls (Mathematica 12)

Example 1

The script is presented with values for the transition matrix “a0” and initial state (within braces {} in “p0”) corresponding to Example 1 (Figs. 2 and 3 of the article):

a0 = {{1, 0, 0, 0}, {0.2, 0.1, 0.2, 0.5}, {0, 0.4, 0.4, 0.2}, {0.4, 0.3, 0, 0.3}};

p0 = DiscreteMarkovProcess[{0, 1/3, 1/3, 1/3}, a0];

To obtain the simulations corresponding to Examples 2 and 3 (Figs. 4 and 5 of the article) you must change the values of the transition matrix and initial state vector according to the data provided in section 3 of the article:

Example 2

a0 = {{1, 0, 0, 0, 0, 0, 0}, {0.1, 0, 0.3, 0.6, 0, 0, 0}, {0, 0.1, 0.5, 0.4, 0, 0, 0}, {0, 0.4, 0.6, 0, 0, 0, 0}, {0.5, 0, 0, 0, 0.4, 0.1, 0}, {0, 0, 0, 0, 0.2, 0, 0.8}, {0, 0, 0, 0, 0.5, 0.3, 0.2}};

For FPT distribution corresponding to Fig 4 (below left), set initial state vector

p0 = DiscreteMarkovProcess[{0, 0, 0, 0, 1/3, 1/3, 1/3}, a0];

For FPT distribution corresponding to Fig 4 (below right), set initial state vector

p0 = DiscreteMarkovProcess[{0, 1/3, 1/3, 1/3, 0, 0, 0}, a0];

Example 3

a0 = {{1, 0, 0, 0, 0, 0, 0}, {0.1, 0, 0.3, 0.6, 0, 0, 0}, {0, 0.1, 0.5, 0.4, 0, 0, 0}, {0, 0.4, 0, 0, 0, 0, 0.6}, {0.5, 0, 0, 0, 0.4, 0.1, 0}, {0, 0, 0, 0, 0.2, 0, 0.8}, {0, 0, 0, 0, 0.5, 0.3, 0.2}};

For FPT distribution corresponding to Fig 5, set initial state vector

p0 = DiscreteMarkovProcess[{0, 1/3, 1/3, 1/3, 0, 0, 0}, a0];