

Some references on aggregation of Markov processes

R Buda *Computational Economics* 31 (2008) 397-408  
 Buckley Euro J OR 116 (1999) 545-564  
 Simon & Ando, *Econometrica* 29 (1961) 111-138  
 WJ Stewart *Intro to numerical soln of Markov chains* 1994  
 WJ Stewart (ed) *Numerical soln of Markov chains* (1991) e.g. Schweitzer pp 63-88  
 WJ Stewart (ed), *Computation with Markov chains* (1995) e.g. Hatan & Leutenegger  
 DJ Wales *J Chem Phys* 130 (2009) 204111  
*Letter Phys Chem* 25 (2006) 237-

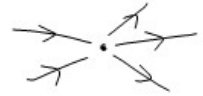
My proposed scheme

Suppose "Markov flow" on  $\Gamma$  graph



Suppose want to aggregate nodes  $a \in A \subset \Gamma$  to a super-node  $A$  and derive a Markov flow with corresponding properties

Say Markov flow means steady soln of some stoch semi-Markov process (semi means allow stationary waiting time distributions at each node but successive transitions & waiting time are independent



I'll do an aggregation scheme at expense of enlarging the class under study to allow

multiple edges  $s \rightarrow A$ ,  $A \rightarrow t$  and transition probability between edges not nodes.



So obtain a Markov flow on set of edges rather than nodes (called link-graph of  $\Gamma$ )

I claim that further aggregation of nodes produces nothing worse than flows on edges.

So define the aggregation scheme on flows on edges (first assign waiting times to edges e.g

the edge entering a node  $\xrightarrow{e}$  wait  $T_e$ ):

$$T'_e = T_e + P_{eA} (I - P_{AA})^{-1} T_A$$

for edges  $e$  entering  $A$ .

