

Wanida Lerspipatthananon 2014: Estimating Probability Statistics in Transition Matrices of Large Scales Markov Chain. Doctor of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Associate Professor Peerayuth Charnsethikul, Ph.D. 106 pages.

The aim of this research is to propose the estimation methods or optimization techniques used for estimating probability statistics in transition matrix of large scale Markov Chain. The proposed techniques eliminate the restriction of the 'quadprog' function of MATLAB which can be using the Restricted Least Squared (RLS) method. The numerical experiments were tested with the simulated data following the Markov Chain properties.

The results of study shows that using the RLS method to estimate probability statistics in transition matrix of large scale Markov Chain with 'quadprog' function has more average time of estimation when the number of states n is large number. This research proposes two directions. The direction one is still using the RLS method and solving the problem by Approximated Decomposition (AD) technique. It has Sum of Square Error (SSE) and average time of estimation less than the 'quadprog' function does. Another one is estimating probability statistics in transition matrix by the Restricted Least Absolute Deviation (RLAD) that can be reformulated as a Linear Programming Problem (LPP). In this study, the 'linprog' function of MATLAB and Column Generation (CG) technique are used to solve the LPP. If the number of periods for data collection S is less than 10, the estimation by RLAD method and directly solved by 'linprog' function will have the SSE and average time of estimation less than the RLS method solved by 'quadprog' function for every n studied. When the transition matrix of Markov Chain is too large to directly solved by 'linprog' function, the CG technique is very useful.

Student's signature

Thesis Advisor's signature