Initial Research Using ODA in Markov Process Modelling

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This note compiles initial research exploring the use of ODA in Markov process modelling.

Used to study individual and group temporal (sequential) behavior in many areas[1], Markov analysis employs a t_i (rows) by t_{i+1} (columns) contingency table to tabulate the number of events occurring per row-column combination: a coach might record the team's win *vs.* loss record over successive games, or a supervisor may tabulate the on-time delivery record of a pizza delivery driver across successive days, for example (Table 1).

Table 1: Markov Transition Matrix Modelling State A *vs*. State B

		Time t_{i+1}	
		State A	State B
Time t_i	State A	$n_{A_{ti}A_{ti+1}}$	$n_{A_{ti}B_{ti+1}}$
	State B	$n_{B_{ti}A_{ti+1}}$	$n_{B_{ti}B_{ti+1}}$

When it is sufficiently-iterated a process is called a first order Markovian change process if its transition matrix reveals a steady state: this is assessed by comparing consecutive transition matrices using ODA.[2,3] If the process is not first order, ODA is used to evaluate the hypothesis that the process is second order.[4] ODA is also used to ascertain if stratifying the sample with respect to another variable produces different transition matrices.[5,6] And, for multicategorical designs with three or more States, the structure underlying transition matrix data is identified using ODA.[1,7]

References

[1]Yarnold PR, Soltysik RC (2005). *Optimal data analysis: A guidebook with software for Windows*. Washington, DC, APA Books.

[2]Yarnold PR (2017). Novometric analysis of transition matrices to ascertain Markovian order. *Optimal Data Analysis*, *6*, 5-8.

[3]Yarnold PR (2018). Using ODA to confirm a first order Markov steady state process. *Optimal Data Analysis*, *7*, 72-73.

[4]Yarnold PR (2018). Using ODA to determine if a Markov transition process is second order. *Optimal Data Analysis*, *7*, 74-75.

[5]Yarnold PR (2017). Novometric comparison of Markov transition matrices for heterogeneous populations. *Optimal Data Analysis*, *6*, 9-12.

[6]Yarnold PR (2018). Using ODA to ascertain if stratification yielded different transition matrices. *Optimal Data Analysis*, *7*, 76-77.

[7]Yarnold PR (2016). GenODA structural decomposition *vs*. log-linear model of one-step Markov transition data: Stability and change in male geographic mobility in 1944-1951 and 1951-1953. *Optimal Data Analysis*, *5*, 213-215.

Author Notes

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