





















matrix A

matrix

Comments

· X^tX/n=I_



15 16 Comparison by artificial data Implementation of ICA Regard raw data X centered as factor loading Compare three methods: - Varimax-based ICA Execute factor rotation - Oblimin-based ICA Resultant factor loadings are factor scores - FastICA (Hyvärinen & Oja, 1997) estimated by ICA Mixing matrix A can also be obtained as a rotating Correlations between factors generated originally and those estimated RMSE of estimates of the factor loading matrix - When X has been sphered, rotate orthogonally - When X is not sphered, rotate obliquely factor rotation is performed with PROC FACTOR in SAS 8.2 - Kaiser's normalization must not be made The Japanese-German Joint Symposium on Classification 2005 The Japanese-German Joint Symposium on Classification 2005

Design		17
 dataset Five-dimensional factor score distributions 	es f having gamma), 3.0, 2.0	
 n=500 Factor loading matrix: A = 	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
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Estimated factor scores		Factor scores generated originally				
		fl	f2	f3	f4	f5
FastICA	CA fl 0.984 0.055 0.186	0.984	fl 0.984	0.186	0.054	-0.079
	f^2	-0.099	0.992	-0.050	0.068	0.057
	f3	-0.145	-0.022	0.981	0.004	-0.092
	f4	0.029	-0.090	0.019	0.995	-0.091
	f5	0.029	-0.060	0.001	0.055	0.987
Varimax	fl	0.984	0.055	0.186	0.054	-0.079
	f^2	-0.099	0.993	-0.050	0.067	0.055
	f3	-0.145	-0.022	0.981	0.004	-0.092
	f4	0.029	-0.089	0.019	0.995	-0.091
	f5	0.029	-0.058	0.001	0.056	0.987
Oblimin	fl	0.911	0.334	0.177	0.132	-0.057
	f^2	0.102	0.973	0.070	0.041	0.104
	f3	-0.156	0.126	0.954	0.126	-0.169
	f4	0.092	-0.158	0.118	0.978	0.090
	f5	0.042	0.003	0.009	0.211	0.961

Correlation between original and estimated factors

18









5. Summary

25

- 1. We showed the definition of ICA and outlined how to estimate ICA models
- 2. We pointed out that (basic) ICA is nothing but factor rotation procedure in traditional FA
- 3. LiNGAM project is running which aims at finding causal ordering with the help of ICA and Wald test
- 4. We finally note that
 - 1. Any data appearing in social science (and in natural science as well) are more or less nonnormal
 - 2. Regarding such data as normal has brought great benefits
 - 3. Use of nonnormality will expect some other benefits

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Thank you for your attention!

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