
Factor analysis and categorial principal component analysis: comparative analysis and practical application for processing of questionnaire survey results

© E.E. Fomina

Tver State Technical University, Tver, 170026, Russia

The questionnaire survey is one of the main tools of studying the state of public opinion in the work of the sociologist. The primary result of the survey is usually a database that requires further in-depth analysis and search for relationships among variables being studied. To solve this problem a factor analysis and categorial principal component analysis can be applied. It allows making obtained results meaningful. Despite the fact that using these methods one problem is solved, they include different algorithms for determining integral characteristics, so the problem of selecting the appropriate method is relevant. The article compares factor analysis and categorial principal component analysis both from a theoretical position and from the point of view of practical application. An example of processing of questionnaire survey results is considered, and methodological recommendations are offered.

Keywords: factor analysis, CatPCA algorithm, principal component analysis, questionnaire survey

REFERENCES

- [1] Shcherbak A.P. Beseda, intervuyirovanie i anketirovanie [Conversation, interviewing and questioning] In: *Kharakteristika metodov issledovaniya* [Characteristics of research methods]. Rybinsk, Rybinskiy filial Yaroslavsogo Gosudarstvennogo Pedagogicheskogo Universiteta im. K.D. Ushinskogo Publ., 2007. Available at: <http://cito-web.yspu.org/link1/metod/met93/node4.html> (accessed September 01, 2016).
 - [2] Bessokirnaya G.P. *Sotsiologiya: metodologiya, metody, matematicheskoe modelirovanie* — *Sociology: Methodology, Methods, Mathematical Modeling*, 2000, no. 12, pp. 142–153.
 - [3] Bureeva N.N. *Mnogomernyy statisticheskiy analiz s ispolzovaniem paketa prikladnykh program "STATISTICA"* [Multivariate statistical analysis using the "STATISTICA" software package]. Nizhniy Novgorod, Lobachevsky Nizhegorodskiy Gosudarstvennyy Universitet Publ., 2007, 112 p.
 - [4] Obshchaya psikhologiya [General Psychology]. In: Petrovsky A.V., red. *Entsiklopedicheskiy slovar. V 6 tomakh. Tom 1* [Petrovsky A.V., ed. Encyclopedic dictionary. In 6 vols. Vol. 1]. Moscow, PER SE Publ., 2005, 251 p.
 - [5] *Obshchiy algoritm i teoreticheskie problemy faktornogo analiza* [General algorithm and theoretical problems of the factor analysis]. Available at: <http://www.studfiles.ru/preview/1938850/page:3/> (accessed March 01, 2017).
 - [6] Fomina E.E. *Sotsiosfera* — *Sociosphere*, 2016, no. 3, pp. 122–127.
 - [7] Tolstova Yu.N. *Izmereniya v sotsiologii* [Measurement in Sociology]. Moscow, KDU Publ., 2007, 288 p.
 - [8] *CatPCA Algorithms*. Available at: https://www.ibm.com/support/knowledgecenter/zh/SSLVMB_21.0.0/com.ibm.spss.statistics.help/alg_catpca.htm (accessed April 03, 2017).
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[9] *Sravnitelnyy analiz metodov kategorialnogo faktornogo analiza* [Comparative analysis of methods of categorical factor analysis]. Available at: <https://www.hse.ru/data/2013/06/07/1283920122/%D0%92%D0%9A%D0%A0%20%D0%A8%D0%98%D0%A8%D0%9A%D0%9E.doc> (accessed March 20, 2017).

Fomina E.E., Cand. Sc. (Eng.), Associate Professor, Department of Informatics and Applied Mathematics, Tver State University. Research interests: mathematical modeling in medicine and sociology. e-mail: f-elena2008@yandex.ru