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Differences in the level of cognitive dimensions of male and female folk dancers

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Abstract

Unfortunately, in ordinary application of canonical discriminant analysis, the main, and often the only, set of hypotheses related to the parameters of this model is the set $H_0 = \{\phi_k = 0, k = 1, ..., m\}$ where ϕ_k are hypothetical values of canonical correlations in population P.

To test hypotheses of type $H_{0k} : \phi_k = 0$ $k = 1, ..., m$, researchers usually apply a function of the known Wilks measure $\lambda_k = \Sigma_{t+1}{}^s \log_e (1 - \rho_{t+1}{}^2)$ $k = t + 1, t = 0, 1,..., m – 1$ proposed by Bartlett who found that under the hypothesis H_{0k}: $\phi_k = 0$, the functions $\chi_k{}^2 = -(n - (m + g + 3)/2)\ \lambda_k$ $k = 1,..., m$ have, approximately, χ^2 distribution with $\nu_k = (m - k + 1)(g - k)$ degrees of freedom.

However, the Bartlett test outcomes are not, even when dealing with large samples, in full accordance with the outcomes of tests of type $z_k = \rho_k/\sigma_k$ $k = 1,...,s$ based on the fact that canonical correlations also have asymptotically normal distributions with the parameters ϕ_k and σ_k^2 $(1 - \phi_k^2)^2 n^{-1}$ (Kendall & Stuart, 1976; Anderson, 1984).

Centroids of the subsamples E_p, p = 1,..., g from E on the discriminant functions necessary to identify the content of the discriminant functions are, of course, elements of the matrix $\mathbf{C} = (\mathbf{S}^t\mathbf{S})^{-1}\mathbf{S}^t\mathbf{K} = (\mathbf{S}^t\mathbf{S})^{-1}\mathbf{S}^t\mathbf{MX} = (\mathbf{S}^t\mathbf{S})^{-1}\mathbf{S}^t\mathbf{ZR}^{-1/2}\mathbf{X}$, so it is clear that they are, in fact, centroids of the subsamples on the variables transformed into a Mahalanobis form projected into the discriminant space.

Keywords: / distribution / correlation / centroids / discriminant / function / canonical /

1. Introduction

The beginning of dance cannot be determined with accuracy. It was positioned as a need for expression of religious, warlike and other feelings, in search of beauty, in the desire for entertainment, in the need of man to transfer the rhythm to the movements of everyday life and work.

It is connected to music, rhythm and gymnastics, and it is assumed that dance is the first artistic aspiration of man or the source of art that created music and rhythm, painting and sculpture, poetry and theater.

For primitive man, dance meant a means to fight for life. It was dance on which it depended whether hunting would be successful, harvest would be good, whether the enemy would be defeated, illness forced out of the village, the sun would come quicker, and winter would be chased away. Primitive man danced on every occasion, out of love or hatred, joy or sorrow. Dances featuring animals are immortalized in Stone Age cave paintings. These dances are still present among the primitive tribes.

In Christian countries, for the development of the art of dance, the most unfavorable period was the Middle Ages. The Middle Ages was not the epoch favorable for the development of the art of dance. Christianity found dance as a custom ingrained in people and tolerated it at first, but later increasingly banned and persecuted it throughout the entire centuries. People, however, despite all the church prohibitions, danced their traditional and entertainment dances.

After the Crusades, social dance among the people of Western Europe began to develop more vividly. The thirteenth and fourteenth centuries are characterized by two types of dance: "low", stepping dances, or basse danse, and "high" dances. Dance teachers were engaged (at court) to compose, arrange, or create new dances. In the seventeenth century in Paris, thirteen most renowned dance masters, established the "Academy of Dance." At the end of the eighteenth century, interest in dancing declined partly because everything remained the same, and partly because of the difficult political circumstances that led to the revolution. After the revolution, dances came back to life.

Modern dances are characterized their dynamic change and development that are almost daily and sometimes hard to follow.

2. Methods

2.1. Sample of respondents

The population from which the sample was taken for this study can be defined as a population of male and female dancers from folk dance ensembles of Serbia aged 18-28 years.

Based on the posed research problem, subject and objective, and taking into account the organizational and financial capabilities necessary for the study implementation, an optimal number of subjects was taken into the sample in order to conduct the study correctly and obtain exact results. The respondents fulfilled the following criteria: their age was defined on the basis of chronological age, so the study covered respondents aged 18-28 years who had no organic and somatic diseases and were active members of folk dance ensembles.

The research was conducted in the folk dance ensembles as follows:

„Vuk St. Karadzic” from Backa Topola, „Svetozar Markovic“ from Novi Sad, „Zeleznicar“, „Vila“ from Novi Sad, “Ravangrad“ from Sombor, „Kosta Abrashevic“ from Backa Palanka, „Stepino Kolo“ from Stepanovicevo, „Taras Shevchenko“ from Djurdjevo, „Kisac“ from Kisac, „Sonja Marinkovic” from Novi Sad, „Soko“ from Indjija. The sample of respondents consisted of 248 performers of folk dances, which was the optimum number for the planned research.

2.2. Sample of variables

The starting point of the study was the results of the studies of the structure of cognitive dimensions conducted in this country (Momirovic, Bosnar & Horga, 1982) that were largely congruent with the results of studies conducted in other countries.

These studies proved unambiguously that the structure of cognitive abilities was of hierarchical type, with the general cognitive factor below which are three primary factors of cognitive abilities related to the efficiency of the perceptual processor (or perceptual reasoning), efficiency of the parallel processor (i.e. the ability to perceive relations and correlates) and efficiency of the serial processor (or symbolic reasoning).

The factor of perceptual reasoning is defined as a latent dimension that is responsible for receiving and processing information and solving those problems whose elements are given directly in the field of perception or representation. This factor represents the intelligence based on Thurston`s factors, similar to Alexander`s practical factor, Chattel`s general perceptual factor and Horn and Stankov`s general function factor.

The factor of symbolic reasoning is defined as a latent dimension that is responsible for the processes of abstraction and generalization as well as for solving those problems whose elements are in the form of any, especially verbal, symbols. This factor corresponds to Cattell`s factor of crystallized intelligence which is formed in the process of acculturation and represents the integration of Thurstone`s both verbal and numerical factors.

The factor of eduction of relations and correlates is defined as a latent dimension responsible for the establishment of relations between the elements of a structure and essential characteristics of such structures in solving those problems in which the establishing and restructuring processes are independent of previously acquired amounts of information. This factor corresponds to Cattell`s factor of fluid intelligence.

To assess the efficiency of the input processor, or perceptual reasoning, the IT-1matching test, designed to assess perceptual identification and discrimination, was selected. The test consisted of 30 tasks, the testing time was limited to 4 minutes. The test analysis indicates the difficulty of the tasks and their intercorrelations showing that this is not a typical speed test.

To assess the efficiency of the serial processor, or symbolic reasoning, F.L. Wells` AL-4 synonyms-antonyms test was selected, designed to assess the identification of denotative meanings of verbal symbols. It includes 40 alternative-response tasks. The testing time was 2 minutes, so this test belongs to the category of speed tests. The first main subject of measurement was defined mainly by the tasks from the second half of the test and interpreted as the ability to quickly identify the denotative meanings of verbal symbols.

To assess the efficiency of the parallel processor, or identification of relations and correlates, the S-1 test was selected. The test consists of 30 tasks to choose one of the four response options offered. The testing time was 10 minutes.

2.3. Data processing methods

The value of a study depends not only on the sample of respondents and sample of variables, i.e. the values of the basic information, but also on the applied procedures for transformation and condensation of the information. Some scientific problems can be solved with the help of a number of different, and sometimes equally valuable, methods. However, with the same basic data, from the results of different methods, different conclusions can be drawn. Therefore, the problem of selecting particular data processing methods is rather complex.

In order to reach satisfactory scientific solutions in the study, the researchers used, primarily, correct and then adequate, impartial and comparable procedures that conformed to the nature of the stated problem and provided extraction and transformation of appropriate dimensions, testing of the hypotheses about these dimensions, determination of differences as well as establishment of regularities within the research area.

Considering that, for the purposes of this study, the researchers selected those methods that are considered to correspond to the nature of the problem and not to leave too heavy restrictions on the basic information. To determine differences between the groups, a method of canonical discriminant analysis was applied.

All the data in this study were processed at the Multidisciplinary Research Center of the Faculty of Sport and Physical Education, University of Pristina, through the system of data processing programs developed by Popovic, D. (1980), (1993) and Momirovic, K. & Popovic, D. (2003).

Canonical discriminant analysis

Canonical discriminant analysis can now be defined as a solution of the quasi-canonical problem $\mathbf{Mx}_k = \mathbf{k}_k$, $\mathbf{Gy}_k = \mathbf{l}_k | c_k = \mathbf{k}_k^t \mathbf{l}_k$ = maximum, $\mathbf{x}_k^t \mathbf{x}_q = \mathbf{y}_k^t \mathbf{y}_q = \delta_{kq}$ k = 1,...,s; s = min((g - 1), m) = m where δ_{kq} is the Kroneker simbol, and $\mathbf{x}_k$ and $\mathbf{y}_k$ are unknown m – dimensional vektors.

As $c_k = \mathbf{x}_k^t \mathbf{A} \mathbf{y}_k$, the function to be maximized is, for k = 1, $f(\mathbf{x}_k, \mathbf{y}_k, \lambda_k, \eta_k) = \mathbf{x}_k^t \mathbf{A} \mathbf{y}_k - 2^{-1}\lambda_k(\mathbf{x}_k^t \mathbf{x}_k - 1) - 2^{-1}\eta_k(\mathbf{y}_k^t \mathbf{y}_k - 1)$.

After differentiating this function by elements of vectors $\mathbf{x}_k$, $\partial f/\partial \mathbf{x}_k = \mathbf{A}\mathbf{y}_k - \lambda_k \mathbf{x}_k$, and after differentiating it by elements of vectors $\mathbf{y}_k$, $\partial f/\partial \mathbf{y}_k = \mathbf{A}\mathbf{x}_k - \eta_k \mathbf{y}_k$; after equalizing with zero, $\mathbf{A}\mathbf{y}_k = \lambda_k \mathbf{x}_k$ i $\mathbf{A}\mathbf{x}_k = \eta_k \mathbf{y}_k$. By differentiating by λ_k and η_k, it is easy to obtain, from the conditions $\mathbf{x}_k^t \mathbf{x}_k = 1$ and $\mathbf{y}_k^t \mathbf{y}_k = 1$, that $\lambda_k = \eta_k$. As $\mathbf{A}^t = \mathbf{A}$, by multiplying the first result by $\mathbf{x}_k^t$ and the second result by $\mathbf{y}_k^t$, $\mathbf{x}_k^t \mathbf{A} \mathbf{y}_k = \lambda_k$ and $\mathbf{y}_k^t \mathbf{A} \mathbf{x}_k = \lambda_k$, so $\mathbf{x}_k = \mathbf{y}_k$ and the problem comes down to a simple problem of eigenvalues and eigenvectors of matrix $\mathbf{A}$, or the solution of the problem $(\mathbf{A} - \lambda_k \mathbf{I})\mathbf{x}_k = \mathbf{0}$, k = 1,..., m and $c_k = \rho_k^2 = \mathbf{x}_k^t\mathbf{A}\mathbf{x}_k = \lambda_k$, k = 1,..., m are squares of the canonical correlations between the linear combinations of variables from **M** and **G** which are proportional to the differentation of the centroids of the subsamples defined by selector matrix **S** in the space spanned by the vectors of variables from **M**.

Let $\rho^2 = (\rho_k^2)$, k = 1,..., m be a diagonal matrix whose elements are squares of canonical correlations, let $\mathbf{X} = (\mathbf{x}_k)$, k = 1,..., m be a matrix of eigenvectors obtained by solving the canonnical discriminant problem, let $\mathbf{K} = \mathbf{MX}$ be a matrix of discriminant functions and let L = GX = PMX be a matrix of the discriminant functions projected into the hypercube defined by the vectors of matrix **S**. As $\mathbf{K}^t\mathbf{L} = \mathbf{X}^t\mathbf{A}\mathbf{X} = \rho^2$ and as, of course, $\mathbf{K}^t\mathbf{K} = \mathbf{I}$ i $\mathbf{L}^t\mathbf{L} = \rho^2$, the canonical discriminant analysis produces two biorthogonal sets of vector of variables by such transformation of the vectors of variables from **M** and **G** that orthogonalizes those vectors and maximizes the cosines of the angles between the corresponding vectors from **K** and **L**, with the additional condition that the cosines of the angles of noncorresponding vectors from **K** and **L** equal to zero, because the correlations between the variables from **K** and **L** are $\mathbf{K}^t\mathbf{L}\rho^{-1} = \mathbf{X}^t\mathbf{A}\mathbf{X}\,\rho^{-1} = \rho$.

Vectors $\mathbf{x}_k$ from **X** are, obviously, the vectors of the standardized partial regression coefficients of the variables from **M** that generate discriminant functions $\mathbf{k}_k$ which together with discriminant functions $\mathbf{l}_k$, formed by the vectors of the standardized partial regression coefficients of variables $\mathbf{x}_k$ from **G**, have maximum correlations. But, as $\mathbf{M}^t\mathbf{K} = \mathbf{X}$, elements of matrix **X** are, at the same time, correlations between variables from **M** and discriminant variables from **K**, which, unlike the standard canonical discriminant model, allows for easy testing of hypoteses about the partial impact of variables on the formation of discriminant functions. To identify discriminant functions, the elements of the cross structural matrix defined as correlations between variables from **M** and **L**, or the elements of the matrix $\mathbf{Y} = \mathbf{M}^t\mathbf{L}\rho^{-1} = \mathbf{A}\mathbf{X}\rho^{-1} = \mathbf{X}\rho$, could also be of certain significance; note, by the way, that **Y** is a factor matrix of matrix **A** because, naturally, $\mathbf{YY}^t = \mathbf{X}\rho^2\mathbf{X}^t$.

As x_{jk} elements of matrix **X** and y_{jk} elements of matrix **Y** are ordinary correlations, their asymptotic variances are $\sigma_{xjk}^2 = (1 - x_{jk}^2)^2n^{-1}$, respectively $\sigma_{yjk}^2 = (1 - y_{jk}^2)^2n^{-1}$, so the hypoteses of type H_{0xjk}, respectively H_{0yjk}, can be tested on the basis of the functions $f_{xjk} = x_{jk}^2((n - 2)(1 - x_{jk}^2))$, or $f_{yjk} = y_{jk}^2((n - 2)(1 - y_{jk}^2))$, because under the hypotheses, these functions have Fisher- Snedecor F-distribution with the degrees of freedom $\nu_1 = 1$ and $\nu_2 = n - 2$.

Unfortunately, in usual application of canonical discriminant analysis, the main, and often the only, set of hypotheses related to the parameters of this model is the set $H_0 = \{\varphi_k = 0, k = 1, ..., m\}$ where φ_k are hypothetical values of canonical correlations in population P.

To test the hypotheses of type H_{0k}: $\varphi_k = 0$ k = 1, ..., m, researchers usually apply a function of the known Wilks measure $\lambda_k = \Sigma_{t+1}^{s} \log_e (1 - \rho_{t+1}^2)$ k = t + 1, t = 0, 1,..., m – 1 proposed by Bartlett (1941) who found that, under the hypothesis H_{0k}: $\varphi_k = 0$, the functions $\chi_k^2 = -(n - (m + g + 3)/2) \lambda_k$ k = 1,..., m have, approximately, χ^2 distribution with the $\nu_k = (m - k + 1)(g - k)$ degrees of freedom.

However, the Bartlett test outcomes are not, even when dealing with large samples, in full accordance with the outcomes of the tests of $z_k = \rho_k/\sigma_k$ k = 1,...,s type based on the fact that canonical correlations also have asymptotically normal distributions with the parameters φ_k and $\sigma_k^2 \sim (1 - \varphi_k^2)^2 n^{-1}$ (Kendall & Stuart, 1968; Anderson, 1984).

Centroids of the subsamples E_p, p = 1,..., g from E on the discriminant functions necessary to identify the content of the discriminant functions are, of course, elements of the matrix $\mathbf{C} = (\mathbf{S}^t\mathbf{S})^{-1}\mathbf{S}^t\mathbf{K} = (\mathbf{S}^t\mathbf{S})^{-1}\mathbf{S}^t\mathbf{MX} = (\mathbf{S}^t\mathbf{S})^{-1}\mathbf{S}^t\mathbf{ZR}^{-1/2}\mathbf{X}$, and it is clear that they are, in fact, centroids of the subsamples of the variables transformed into a Mahalanobis form projected into the discriminant space.

3. Discussion

According to previous studies, intelligence is multiple, not single, that however, the researchers accept the existence and strength of the so-called general intelligence, they agree that there are statistically independent mental abilities, such as spatial, verbal, analytical and practical intelligences.

The largest source of discussions and debates is the origin and individual differences, or what is the proportion of heredity and environment.

The results of the discriminant analysis in the cognitive space are shown in Tables 1, 2, 3, and 4. By analyzing the data, it can be determined that the significant canonical correlation of (.36) is obtained. It explains 100% of the valid variance of the entire system of the evaluated space.

Based on the values and signs of the centroids for the first discriminant function of the groups, it can be concluded that female dancers have a more efficient serial processor, or symbolic reasoning, and of the higher efficiency input processor, or perceptual reasoning, while male dancers have better efficiency of the parallel processor, or identification of relations and correlations.

Statistically, the male and female dancers are significantly different in all three tests. The female dancers have a more efficient serial processor, i.e. they handle symbolic reasoning better, which is reflected in the better results achieved on the test AL4. According to the results of the regression analysis, male and female dancers whose serial processor is more effective, or who handle symbolic reasoning better, achieve better results at competitions, when the predictor system of cognitive abilities is involved. Female dancers also have a more efficient input processor, or perceptual reasoning, which is reflected in the better results on the test IT1, while male dancers have a more effective parallel processor, or identification of relations and correlates, which is reflected in the better results on the test S1.

DISCRIMINANT ANALYSIS OF COGNITIVE VARIABLES

Table 1

Function	Eigenvalues	Variance %	Cumulative %	Can. R	Wilks Lambda	Chi-skor	df	Sig
1	.15	100.0	100.0	.36	.86	35.18	3	.00

MATRIX M

Table 2

	FUNC 1
AL4	.87
S1	-.72
IT1	.26

STRUCTURE OF COGNITIVE VARIABLES

Table 3

	FUNC 1
AL4	.74
S1	-.38
IT1	.26

CENTROIDS OF THE GROUPS

Table 4

Centroids of the groups	
GROUP	CEN1
Female dancers	.33
Male dancers	-.46

4. Conclusion

The research was conducted in order to determine differences in cognitive dimensions between male and female folk dancers.

In order to determine differences in the structure of cognitive dimensions between male and female performers of folk dances, 103 male and 145 female dancers aged 18-28 actively engaged in folk dancing were tested.

For the assessment of intellectual abilities, three measurement instruments were applied, selected so that that the structure analysis could be solved on the basis of the cybernetic model designed by Das, Kirby and Jarman, or the model constructed by Momirovic, Bosnar and Horgen (1982), taking into account the fact that the selected tests measure three types of intellectual processing.

To assess the efficiency of the input processor, or perceptual reasoning, test IT-1 was selected, to assess the efficiency of the serial processor, or symbolic reasoning, test AL-4 was selected, and to assess the effectiveness of the parallel processor, or identification of relations and correlates, test S1was selected.

All the data in this study were processed at the Multidisciplinary Research Center of the Faculty of Sport and Physical Education, University of Pristina, through the system of data processing programs developed by Popovic, D. (1980), (1993) and Momirovic, K. & Popovic, D. (2003).

For the determination of differences between the groups, a method of discriminant analysis was used.

The results of the discriminant analysis in the cognitive space are shown in Tables 1, 2, 3, and 4. By analyzing them, it can be determined that the significant canonical correlation of (.36) is obtained. It explains 100% of the valid variance of the entire system of the evaluated space.

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5. References

Anderson, T. W. (1984): *An introduction to multivariate statistical analysis* (2nd edition). New York: Wiley.

Boli, E. (1996): The structure of intellectual and musical abilities and personal traits of girls involved in standard and Latin dances, Master`s thesis. University of Pristina, Faculty of Physical Education.

Boli, E. (2011): *The structure of anthropological dimensions of male and female dancers and development of methods for their evaluation and monitiring* (Monograph). Leposavic, University of Priština, Multidisciplinary Research Center of the Faculty of Sport and Physical Education.

Boli, E., Popovic, D. & Hosek, A. (2009): Sport and Crime. Leposavic, University of Pristina, Multidisciplinary Research Center of the Faculty of Sport and Physical Education.

Boli, E., Popovic, D. & Popovic, J. (2012): Differences in the level of musical abilities of male and female dancers. International scientific journal *Kinesmetric*s, 1 (67-89).

Boli, E., Popovic, D. & Popovic, J. (2012): Differences in the level of cognitive abilities of male and female dancers. International scientific journal *Kinesmetric*s, 1 (107-119).

Guttman, L. (1945): Basis for test-retest reliability analysis. *Psychometrika*, **10**:255-282.

Harris, C. W.; Kaiser, H. F. (1964): Oblique factor analytic solutions by orthogonal transformations. *Psychometrika*, **29**:347-362.

Kaiser, H. F. (1958): The varimax criterion for analytic rotation in factor analysis. *Psychometrika*, **23**:187-200.

Kendall, M. G. & Stuart, A. (1968): *The advanced theory of statistics, 3.* London: Griffin.

Momirovic, D, Wolf, B. & Popovic, D. (1999): *Introduction to the theory of measurement and internal metric properties of composite measurement instruments* (textbook). University of Pristina, Faculty of Physical Education, Pristina.

Momirovic, K & Popovic, D. (2003): Construction and application of taxonomic neural networks. Multidisciplinary Research Center, Faculty of Sport and Physical Education

Momirovic, K. (1999): Two measures of low and high reliability of tests with regulatory and singular matrices of particles covariance.

Momirovic, K.; Horga, S. & Bosnar, K. (1982): Cybernetic model of cognitive functioning : Attempts of synthesis of some theories about the structure of cognitive abilities. *Kineziologija,* **14**. 5: 63-82.

Popovic, D. (1980): Research Methodology in Physical Education. University of Nis, Scientific Youth, Nis.

Popovic, D. (1988): Application of factorial analysis methods for the determination of morphological types. *4rd international symposium on the methodology of matematical modelling*, Varna, Bulgaria.

Popovic, D. (1990): *Research Methodology in Physical Education* (textbook). University of Nis, Scientific Youth, Nis.

Popovic, D. (1992): *Research Methodology in Physical Education*. Athens, Greece.

Popovic, D. (1993): *Determination of the structure of psychosomatic dimensions in combats and and development of methods for their evaluation and monitoring* (monograph). University of Priština, Faculty of Physical Education, Pristina.

Popovic, D. (1993): *Programs and subprograms for the analysis of quantitative modifications* (textbook). University of Priština, Faculty of Physical Education, Multidisciplinary Research Center, Pristina.

Popovic, D. (2005): GUTTMAN, Programs for analysis of metric characteristics of composite mesurement instruments in Savic, Z.: Influence of situational training on transformation of some anthropological dimensions in selected footballers (doctoral thesis). Leposavic, Faculty of Physical Education.

Popovic, D., Antic, K., Stankovic, V., Petkovic, V. & Stankovic, S. (1989): The procedures for objectification of estimating the effectiveness in performing judo techniques. *Scientific Youth*, 21(1-2), 83-89.

Popovic, D., Kocic, J., Boli, E. & Stankovic, V. (1995): Conative characteristics of female dancers. *International Congress "Images of Sport in the World",* 75th Anniversary of the German Sport University, Abstract Volume, (pp. 96), Open Forum, Cologne, Germany.

Popovic, D., Petrovic, J., Boli, E. & Stankovic, V. (1995): The personality structure of female dancers. *3rd International Congress on Physical education and Sport*, Exercise & Society supplement issue No. 11 (pp. 196), Komotini, Greece.

Popovic, D., Stankovic, V., Kulic, R. & Grigoropulos, P. (1996): The personality structure of handball players. *4th International Congress on Physical education and Sport*, Exercise & Society supplement issue No. 15 (pp. 164), Komotini, Greece.

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Razlike u nivou kognitivnih dimenzija plesača i plesačica narodnih plesova

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Sažetak

Nažalost, pri uobičajenoj primeni kanoničke diskriminativne analize glavni, i obično jedini, skup hipoteza povezanih sa parametrima tog modela je skup $H_0 = \{\varphi_k = 0, k = 1,..., m\}$ *gde su* φ_k *hipotetske vrednosti kanoničkih korelacija u populaciji P.*

Za testiranje hipoteza tipa H_{0k}: $\varphi_k = 0$ $k = 1,..., m$ *obično se primenjuje se jedna funkcija poznate Wilksove mere* $\lambda_k = \Sigma_{t+1}{}^s \log_e (1 - \rho_{t+1}{}^2)$ $k = t + 1, t = 0, 1,..., m - 1$ *koju je predložio Bartlett (1941), koji je našao da pod hipotezom* H_{0k}: $\varphi_k = 0$ *funkcije* $\chi_k^2 = -(n - (m + g + 3)/2) \lambda_k$ $k = 1,..., m$ *imaju, aproksimativno,* χ^2 *distribuciju sa* $\nu_k = (m - k + 1)(g - k)$ *stepeni slobode.*

Međutim, ishodi Bartlettovog testa nisu, ni kada se radi o velikim uzorcima, u najboljem skladu sa ishodima testova tipa $z_k = \rho_k/\sigma_k$ $k = 1,...,s$ *koji se temelje na*

činjenici da kanoničke korelacije imaju takođe asimptotski normalne distribucije sa parametrima φ_k *i* σ_k^2 $(1 - \varphi_k^2)^2 n^{-1}$ *(Kendall i Stuart, 1976; Anderson, 1984).*

Centoidi subuzoraka E_p*,* $p = 1,..., g$ *iz E na diskriminativnim funkcijama, neophodni da bi se identifikovao sadržaj diskriminativnih funkcija, su, naravno, elementi matrice* $C = (S^tS)^{-1}S^tK = (S^tS)^{-1}S^tMX = (S^tS)^{-1}S^tZR^{-1/2}X$ *pa je jasno da su to, u stvari, centroidi subuzoraka na varijablama transformisanim u Mahalanobisov oblik projektovani u diskriminativni prostor.*

Ključne reči: */ distribucija / korelacija / centroidi / diskriminativna /funkcija / kanonička /*

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