ABSTRAK

Analisis varian multivariat (MANOVA) satu arah digunakan untuk menguji ada atau tidaknya perbedaan yang nyata tentang pengaruh perlakuan terhadap p variabel respon (p>1), atau menguji kesamaan vektor rata-rata dari beberapa (k) populasi. Pada penulisan ini ditentukan mengenai analisis varian multivariat (MANOVA) satu arah untuk model tetap. Hipotesis tidak ada perbedaan vektor rata-rata perlakuan adalah $H_0 : \mu_1 = \mu_2 = ... = \mu_k$ atau ekuivalen dengan $H_0 : \tau_i = 0$, i = 1,2,...,k. Hipotesis dapat diuji dengan Wilks' Λ

$$\Lambda = \frac{|\mathbf{G}|}{|\mathbf{G}+\mathbf{H}|}$$

di mana, **G** adalah matrik error berukuran p×p berdistribusi $W_p(kn-k,\Sigma)$, dan **H** adalah matrik hipotesis berukuran p×p berdistribusi $W_p(k-1,\Sigma)$. H_0 ditolak jika $\Lambda \leq \Lambda_{\alpha;p;k-1;kn-k}$, nilai kritis dari Wilks' Λ. Matrik **G** dan **G** + **H** definit positif jika $(kn-k) \geq p$, oleh karena itu Λ terdefinisi hanya dalam kondisi $(kn-k) \geq p$.

Jika H_0 ditolak berarti ada perbedaan antar vektor rata-rata perlakuan. Dalam hal ini perbandingan antar kelompok vektor rata-rata diperlukan. Kontras multivariat dapat digunakan untuk perbandingan antar kelompok vektor rata-rata. Hipotesis untuk kontras multivariat adalah $H_0 : c_1\mu_1 + c_2\mu_2 + ... + c_k\mu_k = \mathbf{0}$, hipotesis dapat diuji dengan statistik Hotelling's T^2, di mana

$$T^2 = \frac{n}{\sum_{i=1}^{k} c_i^2}\left(\sum_{i=1}^{k} c_i \bar{\mathbf{y}}_{i.}\right)'\left(\frac{\mathbf{G}}{kn-k}\right)^{-1}\left(\sum_{i=1}^{k} c_i \bar{\mathbf{y}}_{i.}\right)$$

berdistribusi $T^2_{p;kn-k}$ H_0 ditolak jika $T^2 \geq T^2_{\alpha;p;kn-k}$, nilai kritis dari distribusi T^2.

ABSTRACT

Oneway multivariate analysis of variance (MANOVA) is used for testing there are no significantly differences about treatment effect with p respon variates, or testing the equality of mean vector of several populations. In this paper, is developed the oneway multivariate analysis of variance (MANOVA) for the fixed effect model. Hypothesis of no defferences in treatment means vector is $H_0 : \mu_1 = \mu_2 = ... = \mu_k$ or equivalently $H_0 : \tau_i = \mathbf{0}$, $i = 1,2,...,k$. The hypothesis can be tested with Wilks' Λ

$$\Lambda = \frac{|\mathbf{G}|}{|\mathbf{G}+\mathbf{H}|}$$

Where, **G** is the p×p error matrix distributed $W_p(kn\text{-}k,\Sigma)$, and **H** the p×p hypothesis matrix distributed $W_p(k\text{-}1,\Sigma)$. H_0 is rejected if $\Lambda \le \Lambda_{\alpha;p;k-1;kn-k}$, exact critical value for Wilks' Λ. The matrix **G** and **G** + **H** is positive definit if $(kn\text{-}k) \ge p$, hence Λ is defined only under condition $(kn\text{-}k) \ge p$.

If H_0 is rejected, thus there are differences between the treatment means vector. In this situation, further comparisons between goups of treatment means vector may be useful. Contrast multivariate can be used to compare between groups of treatment means vector. Hypothesis of contrasts is $H_0 : c_1\mu_1 + c_2\mu_2 + ... + c_k\mu_k = \mathbf{0}$, hypothesis can be tested with Hotelling's T^2, Where

$$T^2 = \frac{n}{\sum_{i=1}^{k} c_i^2}\left(\sum_{i=1}^{k} c_i \bar{\mathbf{y}}_{i.}\right)'\left(\frac{\mathbf{G}}{kn-k}\right)^{-1}\left(\sum_{i=1}^{k} c_i \bar{\mathbf{y}}_{i.}\right)$$

Which is distributed as $T^2_{p;kn-k}$, H_0 is rejected if $T^2 \ge T^2_{\alpha;p;kn-k}$, exact critical value of T^2 distribution.