

## CORRECTION NOTES

### CORRECTION TO “OPTIMUM CLASSIFICATION RULES FOR CLASSIFICATION INTO TWO MULTIVARIATE NORMAL POPULATIONS”

BY S. DAS GUPTA

There are a few slips in the statement of Lemma 3.2 and its proof in my paper [*Ann. Math. Statist.* **36** (1965) 1174–1184] pointed out to me by Dr. M. S. Shrivastava. The corrected and slightly modified form of Lemma 3.2 is stated below along with necessary changes in its proof. The main results of the paper are not affected by this change.

**LEMMA.** Let  $\mathbf{u}$  and  $\mathbf{v}$  be two  $p \times 1$  random vectors with mean vectors  $\delta \neq \mathbf{0}$  and  $\mathbf{0}$ , respectively, and having the identity matrix  $I_p$  as the common covariance matrix. Then, for any  $p \times p$  positive definite matrix  $\mathbf{B}$ ,

$$\Pr [\mathbf{u}'\mathbf{B}\mathbf{u} < \mathbf{v}'\mathbf{B}\mathbf{v}] \leq \frac{8 \operatorname{tr}(\mathbf{B})}{\delta'\mathbf{B}\delta} \leq \frac{8 \operatorname{tr}(\mathbf{B})}{(\delta'\delta)Ch_m(\mathbf{B})} \leq \frac{8pCh_M(\mathbf{B})}{(\delta'\delta)Ch_m(\mathbf{B})}$$

where  $Ch_M(B)$  and  $Ch_m(B)$  are the maximum and the minimum characteristic roots of  $B$ .

**PROOF.** It follows from the Cauchy–Schwarz inequality that

$$[(\mathbf{u} - \delta)'\mathbf{B}(\mathbf{u} - \delta) < \frac{1}{4}\delta'\mathbf{B}\delta] \Rightarrow \mathbf{u}'\mathbf{B}\mathbf{u} \geq \frac{1}{4}\delta'\mathbf{B}\delta$$

Thus

$$(\mathbf{u} - \delta)'\mathbf{B}(\mathbf{u} - \delta) < \frac{1}{4}\delta'\mathbf{B}\delta, \quad \mathbf{v}'\mathbf{B}\mathbf{v} < \frac{1}{4}\delta'\mathbf{B}\delta \Rightarrow \mathbf{u}'\mathbf{B}\mathbf{u} \geq \mathbf{v}'\mathbf{B}\mathbf{v}.$$

Hence

$$\begin{aligned} \Pr [\mathbf{u}'\mathbf{B}\mathbf{u} < \mathbf{v}'\mathbf{B}\mathbf{v}] &\leq \Pr [(\mathbf{u} - \delta)'\mathbf{B}(\mathbf{u} - \delta) \geq \frac{1}{4}\delta'\mathbf{B}\delta] + \Pr [\mathbf{v}'\mathbf{B}\mathbf{v} \geq \frac{1}{4}\delta'\mathbf{B}\delta] \\ &\leq 8 \operatorname{tr}(\mathbf{B}) / \delta'\mathbf{B}\delta \end{aligned}$$

from Chebyshev's inequality. The other inequalities follow trivially.

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### CORRECTION TO

### “CYLINDRICALLY ROTATABLE DESIGNS OF TYPES 1, 2 AND 3”

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I am grateful to Dr. G. C. Derringer for pointing out that the example given on page 170, *Ann. Math. Statist.* **38** 167–176, is singular. A new example of a second order cylindrically rotatable design of type 1 in four dimensions is the following.