



**PHILIPPINE STATISTICAL ASSOCIATION, INC.**

2/F Philippine Social Science Center  
Commonwealth Avenue, Diliman, Quezon City  
Telephone (632) 920-6513 Telefax (632) 456-1928  
Email: [psa.sec@gmail.com](mailto:psa.sec@gmail.com); [psai.sec@gmail.com](mailto:psai.sec@gmail.com)  
PSA website : [www.philstat.org.ph](http://www.philstat.org.ph)

---

---

**THE PHILIPPINE STATISTICIAN**  
**2007, Volume 56, Nos. 3-4**

**Small Sample Statistical Properties of a Correlation Contrast  
Function Used in Kernel Independent Component Analysis**

---

Roberto N. Padua and Warren A. Luzano

**Abstract**

This study considers the finite-sample statistical properties of the empirical regularized maximum correlation estimator used in Kernel Independent Component Analysis through bootstrap. This study also determined the performance of Kernel ICA as evaluated by the normalized Amari error index. The correlation  $I$  calculated in a reproducing kernel Hilbert space. Results indicate that the variance of the computed correlation contrast function behaves as  $O(n\lambda)$ , i.e. the variance decreases at the rate  $n\lambda$  which means that the finite sample calculations seem to indicate that the F-correlation contrast function converges in mean square to a fixed value for large  $n$ . The normalized Amari error are generally of the order  $10^{-3}$ , thus the contrast function is able to separate signals with 99.9% accuracy.

**Keywords:** *Independent component analysis, kernel, canonical correlation, bootstrap*