503/E$_1$

A statistical technique to detect forged notes

W D Lakmal and D R Weerasekera
Department of Statistics, University of Colombo, P. O. Box 1490, Colombo

Technologically the production process of currency notes has become more advanced, and so have the means by which forgers produce counterfeit currency notes. This is increasingly becoming one of the major problems for law enforcement agencies. This paper focuses on discovering a means to identify forged currency notes and also on identifying possible real–world linkages among the groups from which the forged notes were obtained.

The data considered for this study was obtained from 52 forged currency notes available at the CID, and from randomly selected 52 legal (original) currency notes. These forged notes consist of notes from 3 different forgery production processes. It was decided to obtain 12 measurements from each note, which represents the characteristics used by the experienced investigators to identify forged notes. These measurements were obtained using a scanned Bitmap image of the currency note.

Results of the Multivariate Analysis of Variance showed that the two groups (Forged, Original) are significantly different with respect to the 12 measurements. Then "Bonferroni" confidence intervals were used to identify similar production processes. It showed that the two groups of the forgery productions are approximately similar.

A decision rule for classifying a given currency note as forged or original was built using linear discriminant analysis. This procedure was extended to build another decision rule for classifying them according to the different production processes as well. A neural network was also used for the purpose of classifying original and forged notes. For both statistical and neural network methods, simulation studies were also carried out to find out the goodness of the two methods, The resulting misclassifications from this study for statistical method were 7% and 15% for forged notes and original notes, while respective percentages for neural network method was 20% and 9%. Thus, the statistical method was judged to be relatively better.