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Author: S. Bozza J. Broséus P. Esseiva F. Taroni

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## Bayesian classification criterion for forensic multivariate data

S. Bozza<sup>1</sup>, J. Broséus<sup>1</sup>, P. Esseiva<sup>1</sup>, F. Taroni<sup>1</sup>

<sup>a</sup>*Ca' Foscari University of Venice, Department of Economics, Venice, Italy*

<sup>b</sup>*University of Lausanne, School of Criminal Justice, Lausanne, Switzerland*

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### Abstract

This study presents a classification criteria for two-class Cannabis seedlings. As the cultivation of drug type Cannabis is forbidden in Switzerland, law enforcement authorities regularly ask laboratories to determine cannabis plant's chemotype from seized material in order to ascertain that the plantation is legal or not. In this study, the classification analysis is based on data obtained from the relative proportion of three major leaf compounds measured by gas-chromatography interfaced with mass spectrometry (GC-MS). The aim is to discriminate between drug type (illegal) and fibre type (legal) Cannabis at an early stage of the growth.

A Bayesian procedure is proposed: a Bayes factor is computed and classification is performed on the basis of the decision maker specifications (i.e. prior probability distributions on Cannabis type and consequences of classification measured by losses). Classification rates are computed with two statistical models and results are compared. Sensitivity analysis is then performed to analyze the robustness of classification criteria.

*Keywords:* Bayes' factor, classification, decision theory, loss function, drugs

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\*Corresponding author

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