

EQUIVALENCE OF FISHER DISCRIMINANT ANALYSIS AND LEAST SQUARE

Chro

*Research Scholar, Department of Statistics, Kurdistan Institution for Strategic Studies and Scientific Research,
Kurdistan Region, Iraq*

ABSTRACT

Linear Discriminant Analysis (LDA) is a well-known method for dimensionality reduction and classification. LDA in the binary-class case has been shown to be equivalent to linear regression with the class label as the output. This implies that LDA for binary class classification can be formulated as a least square problem. However many real-world applications involves multi-class classification, where a least square formulation for LDA is desirable. Previous studies have shown certain relationship between multivariate linear regression and LDA. Many of these studies show that multivariate linear regression with a specific class indicator matrix as the output can be applied as a pre-processing step for LDA. However, directly casting LDA as a least squares problems remains open for the multi-class case.

In this paper used Fisher Linear Discriminant in an original space and finding the coefficients, compare these coefficients with the coefficients of least square method, to show that these methods are equivalent in directions, this equivalent happen when the statistics of Rayleigh Coefficient is maximized.

By using the Iris dataset was introduced by R. A. Fisher as an example for discriminant analysis, that the data report four characteristics (sepal width, sepal length, pedal width and pedal length) of three species of Iris flower with the class label as output. We took just two species to explain the equivalent between LDA and LS.

KEYWORDS: *Fisher Linear Discriminant, Least Square, Rayleigh Coefficient*

Article History

Received: 14 Oct 2021 | Revised: 20 Oct 2021 | Accepted: 26 Oct 2021
