**Principal Component Analysis with Linear and Quadratic Discriminant Analysis for Identification of Cancer Samples**

* Introduction:

The paper by Camilo L. M. Morais and Kássio M. G. Lima discusses the application of Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA) and Quadratic Discriminant Analysis (QDA) for identifying cancer samples based on Mass Spectrometry (MS) data. The study aims to investigate the effectiveness of these methods in identifying cancer samples based on MS data.

* Methods:

The study used data from 77 cancer and 77 non-cancer samples. PCA was performed to reduce the dimensionality of the data. LDA and QDA were then applied to the reduced data to classify the samples into cancer or non-cancer groups. The performance of the methods was evaluated based on sensitivity, specificity, accuracy, and area under the Receiver Operating Characteristic (ROC) curve.

* Results:

The study found that PCA was able to reduce the dimensionality of the data from 2944 to 21 principal components, while still retaining over 95% of the variance in the data. LDA and QDA were then applied to the reduced data and achieved sensitivity and specificity values of 0.94 and 0.97 for LDA and 0.94 and 0.98 for QDA, respectively. The accuracy of LDA and QDA was 0.95 and 0.96, respectively. The area under the ROC curve for LDA and QDA was 0.98 and 0.99, respectively.

* Discussion:

The study concludes that PCA, LDA, and QDA can be effective methods for identifying cancer samples based on MS data. The results show that both LDA and QDA can achieve high levels of sensitivity, specificity, and accuracy in identifying cancer samples. The study also highlights the importance of dimensionality reduction techniques such as PCA in analyzing high-dimensional MS data.

* Conclusion:

The study by Camilo L. M. Morais and Kássio M. G. Lima demonstrates the potential of PCA, LDA, and QDA in identifying cancer samples based on MS data. The results show that these methods can achieve high levels of accuracy, sensitivity, and specificity in identifying cancer samples. The study highlights the importance of dimensionality reduction techniques such as PCA in analysing high-dimensional MS data. Overall, the study provides useful insights for researchers working on cancer identification using MS data.