

# **Fuzzy clustering of Serum Protein Profiles in Cervical and Oral Cancer Diagnosis**

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## **Abstract**

The application of clustering algorithms for the classification of serum protein profiles of healthy volunteers and cancer patients (Cervical and Oral cancer), recorded using High Performance Liquid Chromatography combined with Laser Induced Fluorescence (HPLC-LIF) setup is studied. An ultra-sensitive HPLC-LIF system was designed and assembled in our laboratory to record the protein profiles of clinical samples. We have selected five clustering algorithms to investigate protein profiles patterns of three classes (healthy subjects, Cervical and Oral cancers) of serum samples. The clustering algorithms used were K- means, K- medoid, Fuzzy C-means, Gustafson-Kessel, and Gath-Geva respectively. The present work demonstrates that Fuzzified Sammon visualization improves the ability to discriminate the protein profiles of the three classes, in comparison with traditional PCA method. Our results suggest that Fuzzy clustering algorithm is the best methods among the common clustering methods, for protein profile classification. We have drawn contour maps in the data space to visualize the results (normal or malignant), which gave high rates of agreement (>98%) between the Fuzzy C- means and histopathology (Gold standard) results. The technique was evaluated by classifying blind samples using these algorithms.

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