Non-Invasive Estimation of Blood Parameters from Composite Signal From Optode Array Using Near Infrared Spectroscopy Coupled With Independent Component Analysis

by

Gayatri Nair, Swathi Ramasahayam, Rahul Shrestha, Shubhajit Roy Chowdhury

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International Institute of Information Technology
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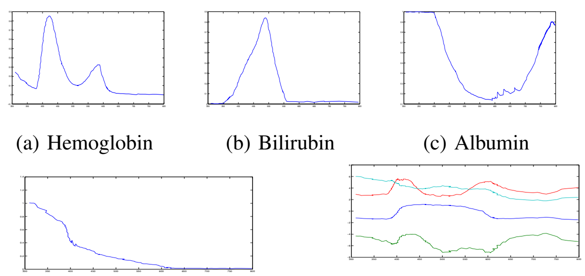
the red one clearly has 2 peaks at 400 and 600 nanometers , hence indicate Hemoglobin .The deep blue plot , also has a significant peak at around 500 nanometers hence is Bilirubin , while the green one has high absorbance at 350 nanometers and then has a trough at around 550 nm,therefore is Albumin .



(a) Hemoglobin (b) Bilirubin (c) Albumin

(d) Lipemia (e) Separated plots on performing ICA

Fig. 1: Lipemia,Albumin, Bilirubin and Hemoglobin Plotted in Matlab with 154 points .

III. ANALYSIS AND CONCLUSION

On analysis and comparison , we understand that certain compounds have strong absorptivity at some wavelength while weak absorptivity at some other wavelength .First order derivative of the plot(slope of the plot) and second order derivative (nature of the curve) helps in understanding and differentiating between two compounds having same absorptivity at a particular wavelength of infrared or near infrared sensors.Further work can be done on how to estimate the quantity of each compound in blood .On separating the compounds, we could estimate the quantity of each compound which would be a very good value addition . As of now , we can just identify the compounds , not estimate the quantity of the compounds.This factor is being looked into

REFERENCES

[1] Chemical Principles of Near Infrared Technology by Charles E Miller

[2] Independent Component Analysis: Algorithms and Applications by Aapo Hyvrinen and Erkki Oja