

INDEPENDENT COMPONENT ANALYSIS FOR BLIND SOURCE SEPARATION OF SDSS GALAXY SPECTRA : A STABILITY DEPENDENT APPROACH

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SUMMARY

Blind Source Separation (BSS) is a common problem in many scientific fields like medicine, communications, image processing and also astronomy and astrophysics. Independent Component Analysis (ICA) has become a widely accepted technique to solve BSS problems. In this investigation with the Sloan Digital Sky Survey (SDSS) spectroscopic data, we have used BSS technique to separate hidden sources behind energy emission or absorption in the spectra of different galaxies. To overcome the problem of indeterminacy like the order of ICs, we proposed a technique based on the stability measures obtained from multiple runs of ICA of different sub-samples. Using this technique, we have determined the optimum number of hidden sources among different choices of number of ICs for different (early and late) types of galaxies. After proper identification of sources, we analyzed each of them by fitting a probability distribution for their physical interpretation and relationship with true sources. Among a large number of probability distributions, the best one has been chosen on the basis of the AIC values.

Keywords and phrases: AIC; Blind source separation; Independent Component Analysis; Distribution fit; SDSS galaxy; and Stability measure.

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