

HYPERSPECTRAL MEASURES FOR SPECTRAL CHARACTERIZATION

A hyperspectral image can be considered as an image cube where the third dimension is represented by hundreds of contiguous spectral bands. As a result, a hyperspectral pixel is actually a column vector with dimensions equal to the number of spectral bands. Such between-band spectral information is very useful and can be used for spectral characterization. Many measures proposed in signal processing and pattern recognition can be used for this purpose. Nevertheless, most of them are spatial-based measures, and they are not particularly designed to measure spectral properties inherent in a single pixel vector. In this chapter, two new hyperspectral measures, spectral information measure (SIM) (Chang, 2000) and hidden Markov model (HMM)-based spectral measure (Du and Chang, 2001) are presented, both of which are derived from the Kullback-Leibler information distance to capture the spectral variability of a pixel vector. Additionally, spectral information divergence (SID), relative spectral discriminatory probability, relative spectral discriminatory power and relative spectral discriminatory entropy are also introduced to further account for spectral similarity and discriminability among pixel vectors.