



# ICA FEATURE EXTRACTION AND SUPPORT VECTOR MACHINE IMAGE CLASSIFICATION: Theory and Practice

*Jeff Fortuna*

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This book presents a detailed examination of the use of Independent Component Analysis (ICA) for feature extraction and a support vector machine (SVM) for applications of image recognition. The performance of ICA as a feature extractor is compared against the benchmark of Principal Component Analysis (PCA). Given the intrinsic relationship between PCA and ICA, the theoretical implications of this relationship in the context of feature extraction is investigated in detail. The study outlines specific theoretical issues which motivate the need for a feature selection scheme with ICA when used with Euclidean distance classification. Experimental verification of the behavior of ICA with Euclidean distance classifiers is provided by pose and position measurement experiments under conditions of lighting variance and occlusion. It is shown that (provided that the features are selected in an intelligent way), ICA derived features are more discriminating than PCA. ICA's utility in object recognition under varying illumination is exemplified with databases of specular objects and faces..

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