In this presentation, different sparsity models for object detection and classification are discussed. The key innovative idea here is the use of different structured sparse constraints to simultaneously represent a multi-sensor (multi-measurement) test data by a linear combination of a few common training samples (basis) but weighted with a different set of coefficients for each measurement. Structured sparsity models (joint, Laplacian, group) automatically incorporate the inter-correlations (or dependencies) between multiple homogeneous (or heterogeneous) sensor data by assuming that the multi-measurement data represents the same physical event. The sparse representations of the measurements are obtained by simultaneously decomposing them over the given multi-modal dictionaries consisting of the training samples of all the classes and sensors. The recovered sparse coefficient vectors are then directly used for determining the label of the test measurements. Simulation results for several army applications show that the structured sparse-based classifier outperforms the classical SVM-based classification approach.

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