
Computing the M Most Probable Modes of a Graphical Model – Supplemental Material

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This supplemental material contains detail of the experimental setup and additional results for the experiments on synthetic data and on the ChaLearn gesture recognition dataset.

Gesture Dataset

Synthetic Data

All synthetic experiments are performed using chain CRFs of length $n = 100$ with each variable taking one out of $L = 8$ states. We create ground truth labelings in the following way: for each ground truth instance, we create a $L \times n$ matrix of uniformly random values, and we smooth it along the spatial dimension by convolving it with a Gaussian of standard deviation 7. Picking for each variable the state of highest value in the matrix, we obtain a labeling of the sequence with spatial correlation along the chain structure.

Training and test examples are created as noisy instances of the ground truth: for each example, each variable is assigned an L -dimensional feature vectors that is the indicator vector of the corresponding state, distorted by zero-mean additive Gaussian noise of standard deviation σ . We train the CRF using the UGM package ¹.

¹<http://www.di.ens.fr/~mschmidt/Software/UGM.html>

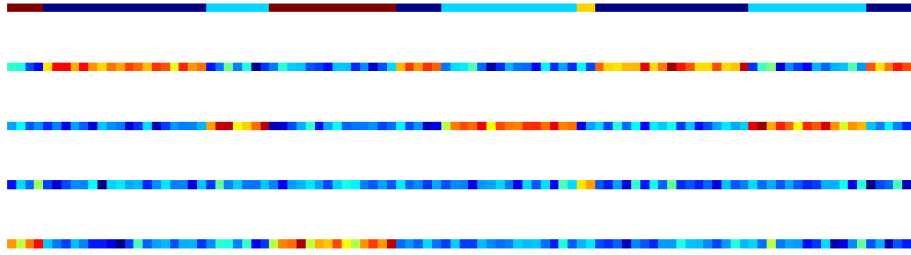


Figure 1: An example data ($L = 4, \sigma = 0.2$).

Top: the true labeling.

Second to fifth row: perturbed features. The ℓ -th feature is the indicator function of whether a node has label ℓ , plus some noise.

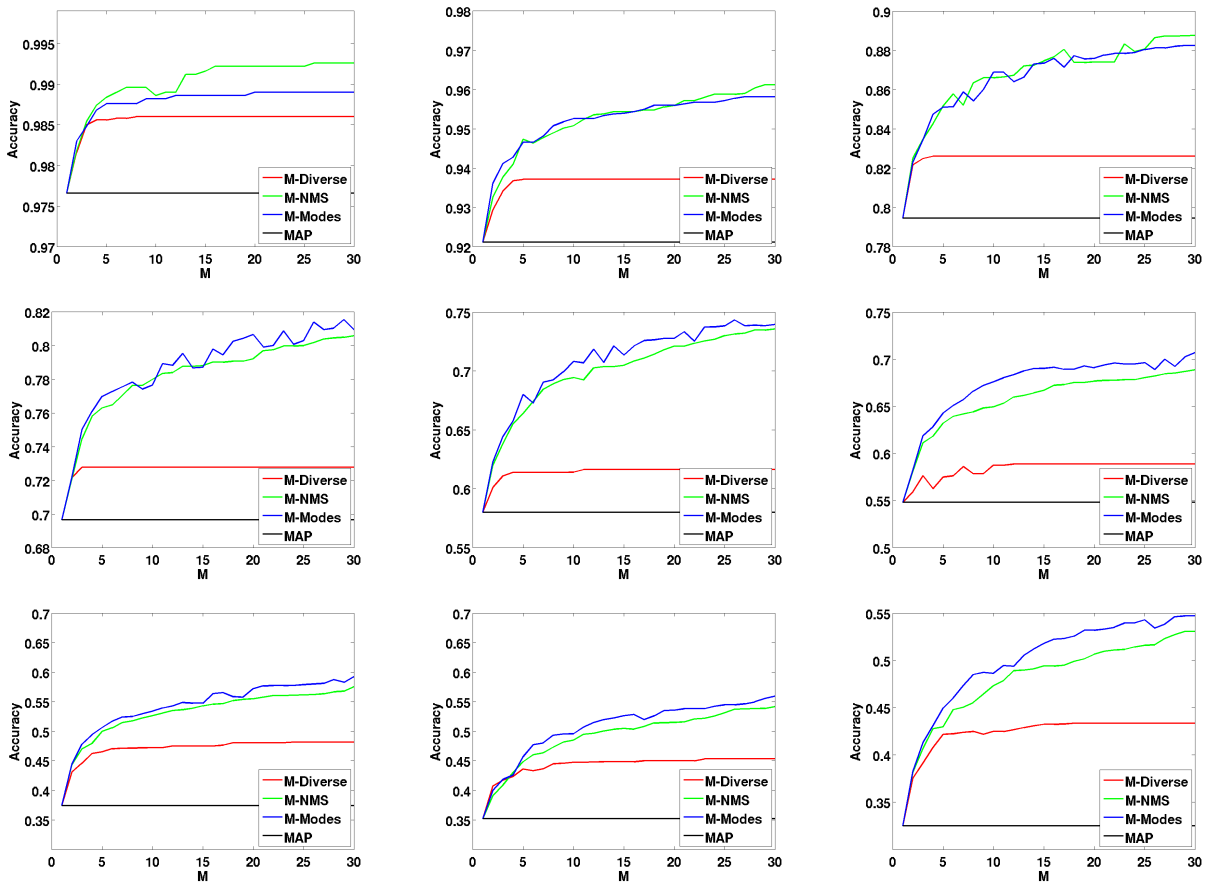


Figure 2: Comparison of the three methods in synthetic experiment in terms of accuracy, top to down, left to right: $\sigma = 0.5, 0.75, 1, \dots, 2.5$.

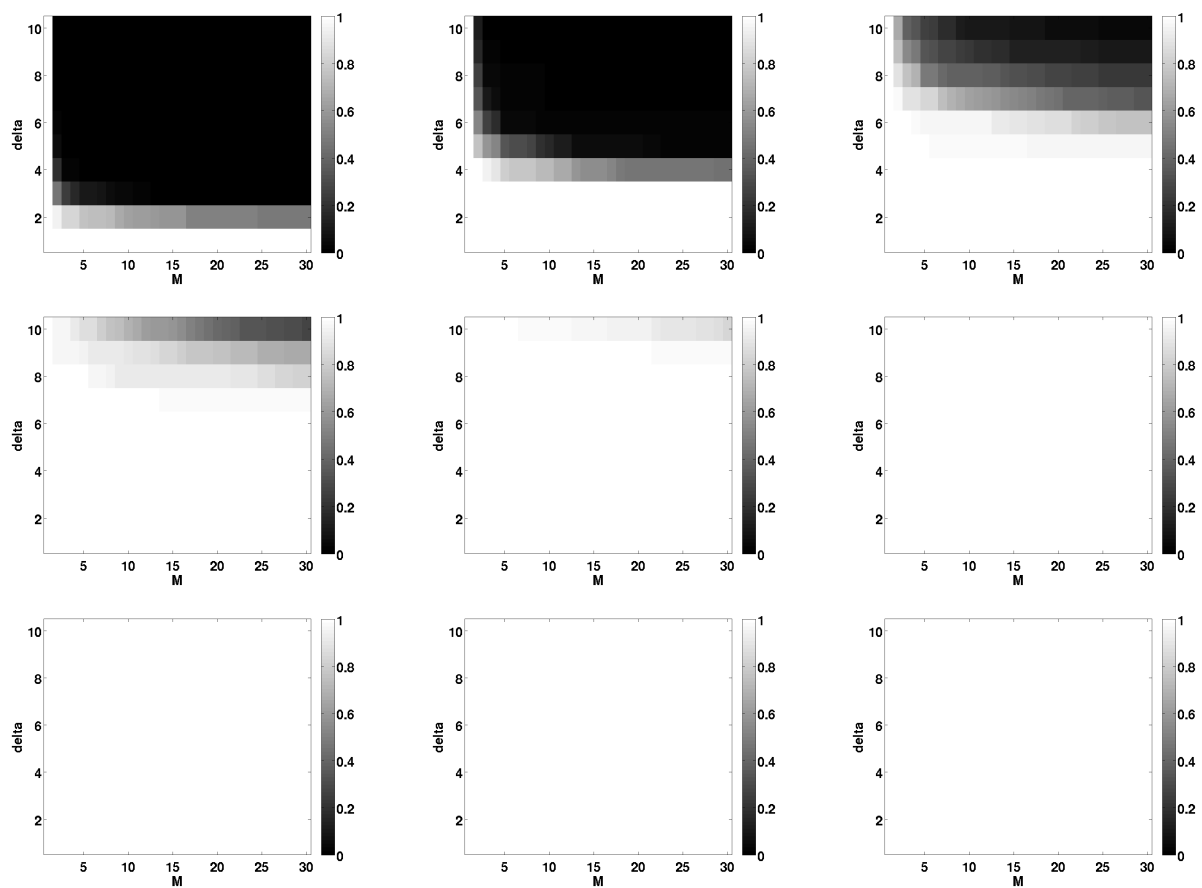


Figure 3: Mode distribution. Top to down, left to right: $\sigma = 0.5, 0.75, 1, \dots, 2.5$.

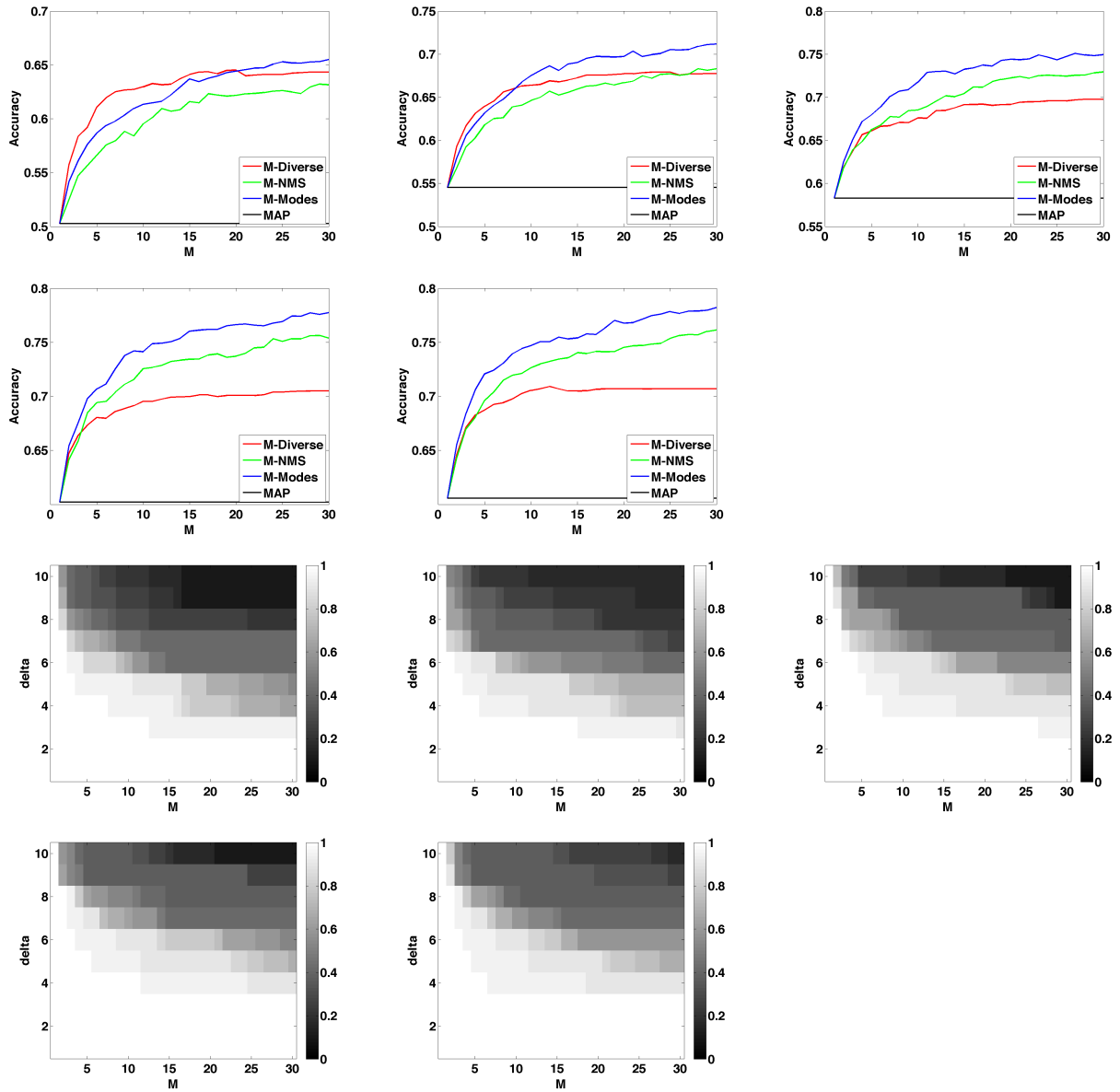


Figure 4: Results on the gesture dataset: top to down, left to right: training set size is 10, 15, 20, 25 and 28 respectively. Top: accuracy, Bottom: modes distribution