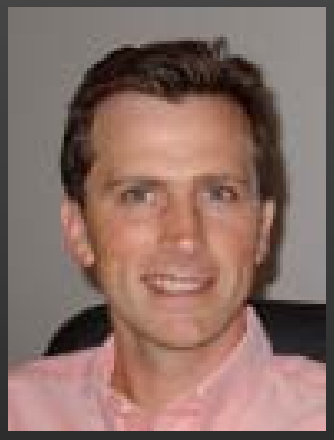
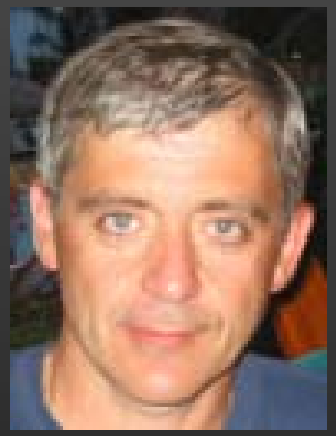
Sparse Coding and Dictionary Learning for Image Analysis

http://www.di.ens.fr/~mairal/tutorial_iccv09/



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A hierarchy of Problems

$$\min_{\alpha} | x - D\alpha |_2^2 + \lambda |\alpha|_0$$

$$\min_{\alpha} | x - D\alpha |_2^2 + \lambda \psi(\alpha)$$

$$\min_{D \in C, \alpha_1, \ldots, \alpha_n} \sum_{1 \le i \le n} [\, 1/2 \, | x_i - D\alpha_i |_2^2 + \lambda \psi(\alpha_i) \,]$$

$$\min_{D \in C, \alpha_1, \ldots, \alpha_n} \sum_{1 \le i \le n} [\, f(x_i, D, \alpha_i) + \lambda \psi(\alpha_i) \,]$$

$$\min_{D \in C, \alpha_1, \ldots, \alpha_n} \sum_{1 \le i \le n} [\, f(x_i, D, \alpha_i) + \lambda \sum_{1 \le j \le p} \psi(d_j) \,]$$

Outline

Introduction

1. Optimization for Sparse Coding
2. Dictionary Learning for Reconstruction
3. Learning for the Task
4. New Sparse Models

Open Questions and Discussion

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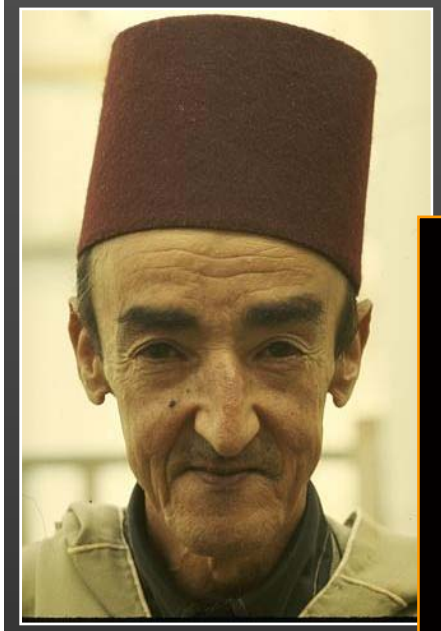

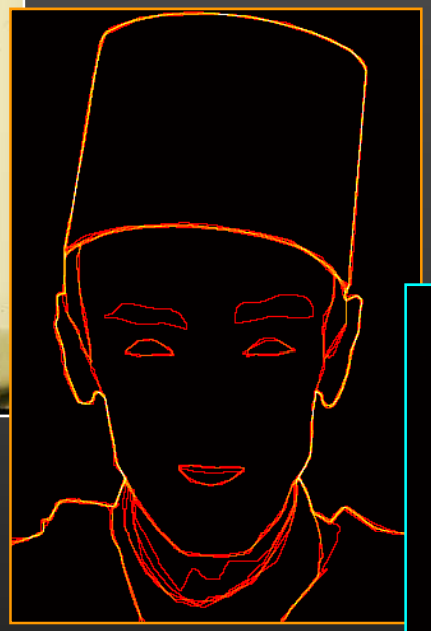

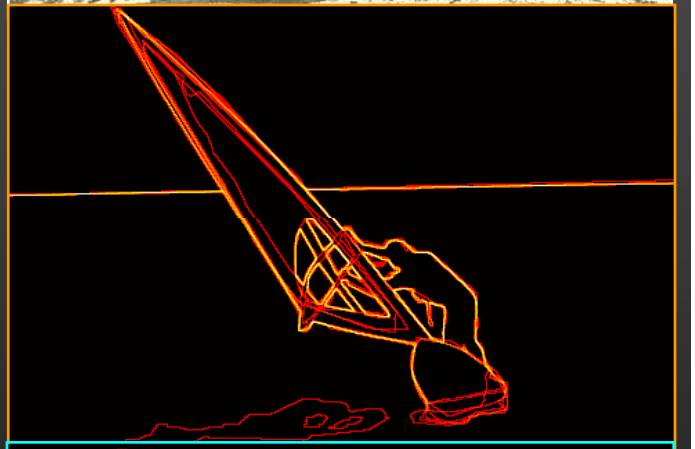




SPArse Modeling Software (SPAMS) available!

http://www.di.ens.fr/willow/SPAMS/