Sparse Coding Minimizing ℓ_0: Matching Pursuit Variants

Mathematical Models and Methods for Image Processing

Stefano Bertolasi

March 19th 2026

Assignment

Matching Pursuit Variants

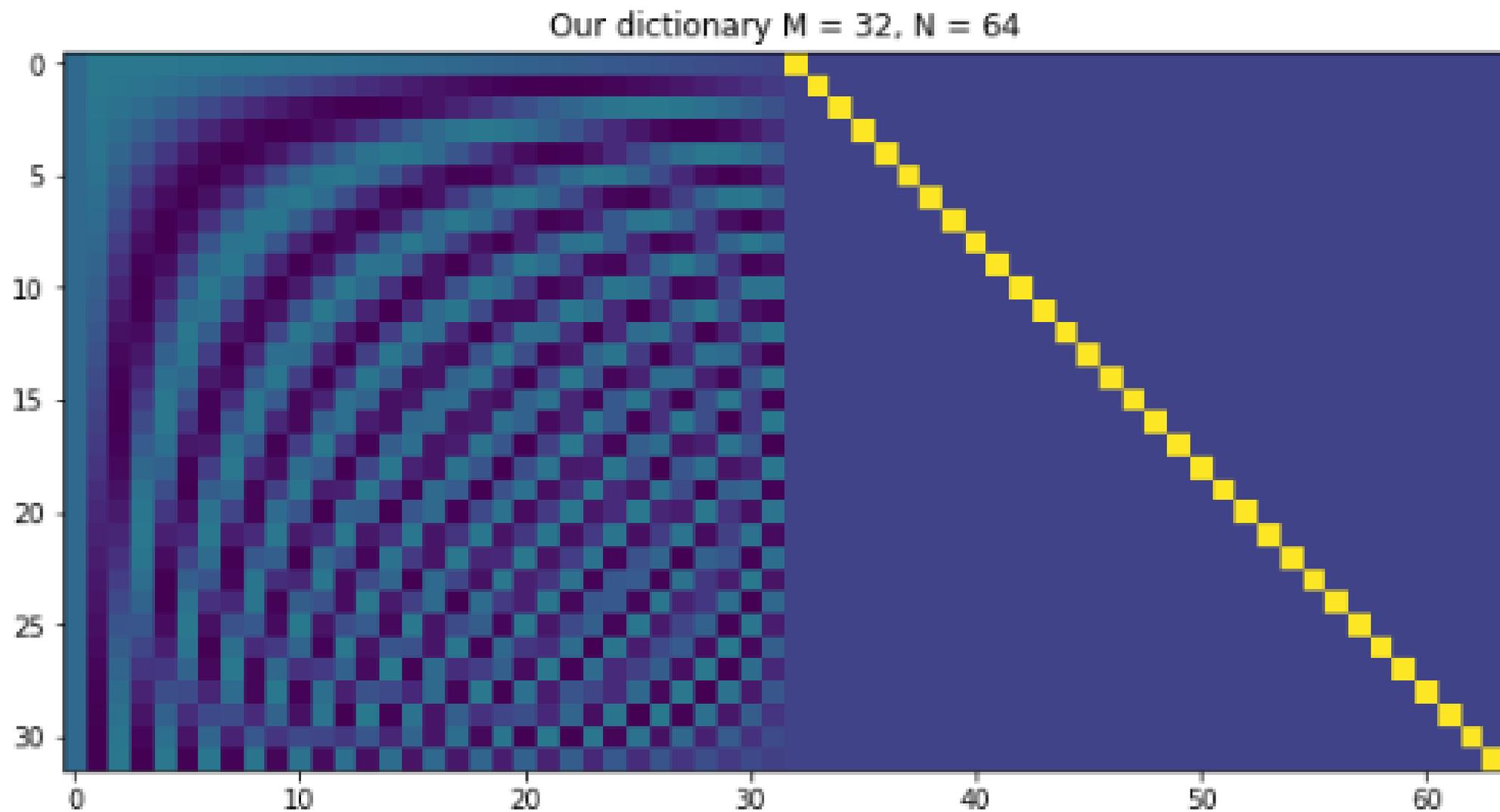# Implement all the variants of the Matching Pursuit

Take the setup of Assignment 7

- Implement OMP and LSOMP to solve

$$\widehat{\boldsymbol{x}} = \underset{\boldsymbol{x} \in \mathbb{R}^M}{\operatorname{argmin}} \|\boldsymbol{x}\|_0 \quad \text{s.t.} \quad D\boldsymbol{x} = \boldsymbol{s}$$

- Where $D = [DCT, C]$ and $\boldsymbol{s}$ is an $L-$sparse signal w.r.t DCT and $1-$sparse signal w.r.t. the canonical basis C

The Dictionary

Our dictionary M = 32, N = 64

The Signal and Coefficients

S. Bertolasi