EURASIP+ PhD Summer School
Mathematics and Machine Learning for Image Analysis
Bologna, June 2026

Exam question
(Selesnick session)

Revisit the example where we estimate the missing values of a 500-point speech signal. This example is the folder “lab 2 - missing signal values” in the Google folder:

https://drive.google.com/drive/folders/13DV2a-sY1E655ppa21uzLioigduaWWRH?usp=sharing

The example shows the use of Basis Pursuit (BP) and the Fourier Transform (FFT/DFT) to estimate the missing values. In the example, the missing values were distributed randomly. For this exam question, change the example so that the missing values are a result of clipping -- all values outside [-C C] are lost due to clipping/saturation.

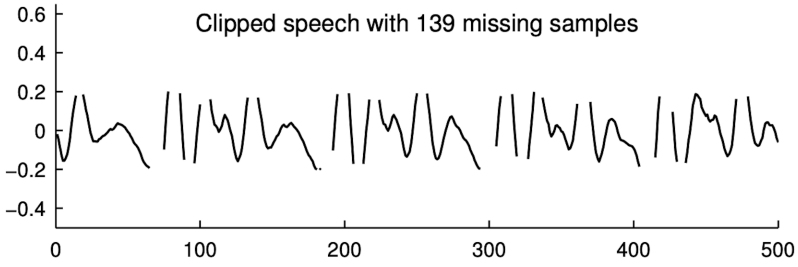
1) For each of multiple clipping values, estimate the missing signal values using BP as in the example. Create a graph showing the RMSE versus the clipping value. The RMSE is expected to be higher for more severe clipping (smaller values of C).

2) Implement a second method for estimating the missing values and compare it to BP. Plot the RMSE of both algorithms in one axis to compare the results. The goal is to improve the result of BP. For example, the method could use iterative reweighting, non-convex regularization, or a heuristic greedy algorithm. You may use a method you find in the literature (cite papers appropriately) or you can create a new method of your own.

To submit:

> A written explaination of your approach, evaluation of the results, including figures (submit a PDF file).

> Computer code (with comments) to reproduce your results (either Python or Matlab).



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