Image Compression Through Multi-Scale Learned Dictionaries

PATCH SIZE EXPERIMENT REPORT-DRAFT

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1 Summary

Definitions:

- BBP - Byte per pixel

- NNZD - Number of non zeros entries in all sparse dictionaries.

- NNZG - Number of non zeros entries in all GAMMAs.

The compression scheme is based on 6 levels of wavelet decomposition, each level has a sparse dictionary and a GAMMA (sparse representation). In this experiment one for each level we hold all the other parameters and change the size of the patch size, notice that dictionary redundancy is kept those when the patch size grows there are more columns/rows in the dictionary.

Original images are 512x512 level 1 is corresponding to 256x256 coefficients sub-bands images. level 6 is corresponding to 8x8 coefficients sub-bands images.

2 PSNR=25 results
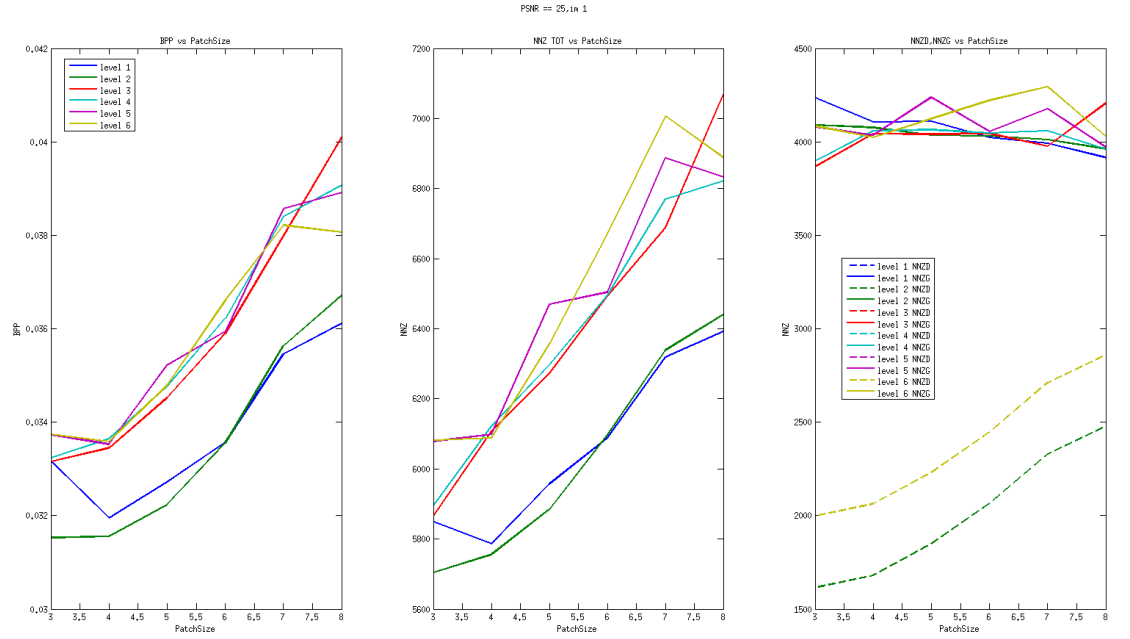
PSNR == 25,im 1

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BPP vs PatchSize
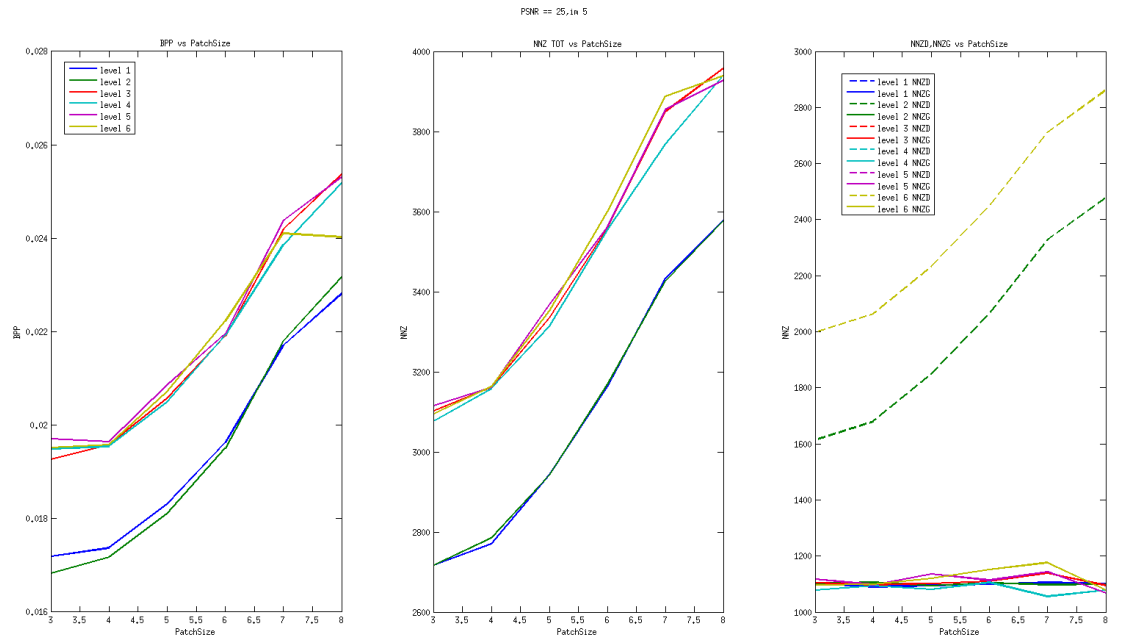
NNZ TOT vs PatchSize

NNZD,NNZG vs PatchSize

3 Images results are presented, other images results are similar. it can be observed here that, for low PSNR smaller patch size are better, we can see in the right graph that this is due to the fact more atoms are added to the dictionary as the the patch size grows but GAMMA does has less columns, but the number of total coefficients is decreasing only in level 1-2 and not as fast as dictionary atoms are added.
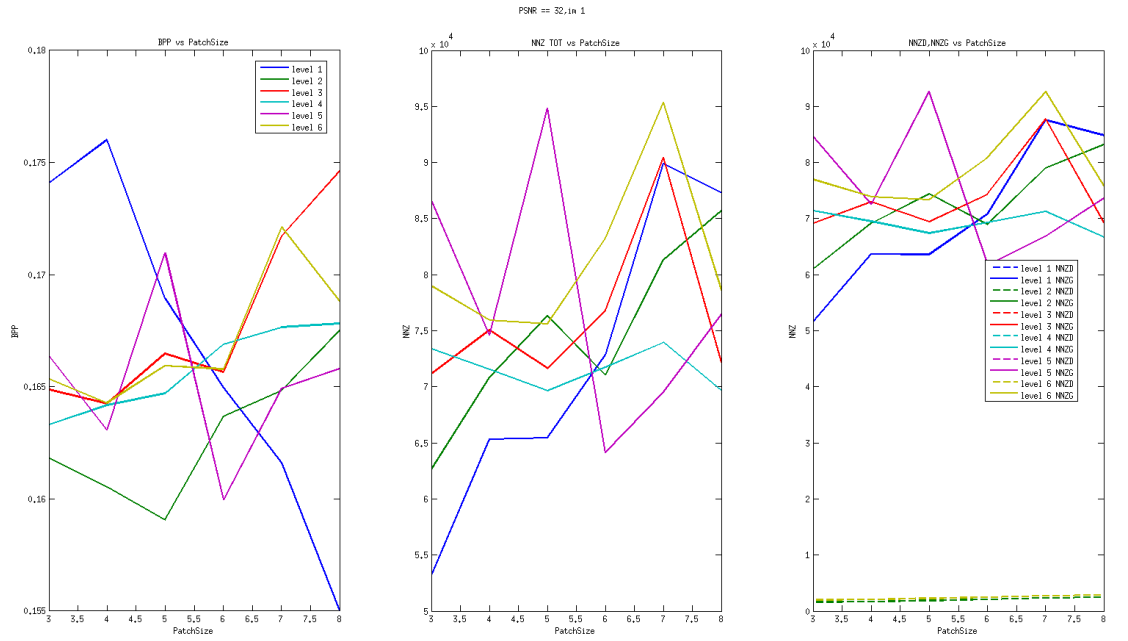
PSNR == 25, im 6

PSNR == 25, im 6

PSNR == 32,im 5
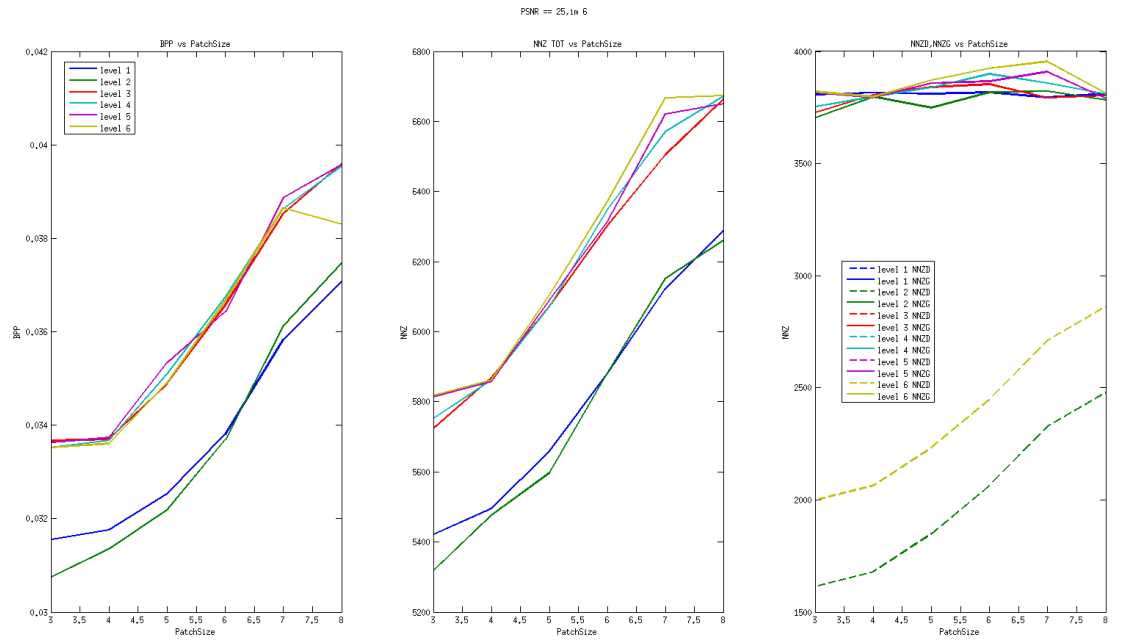
PSNR == 25,im 5

Sometimes dictionaries take more space than GAMMAS, as we can see here big parts of the image has the same characteristics.

3   PSNR=32 results
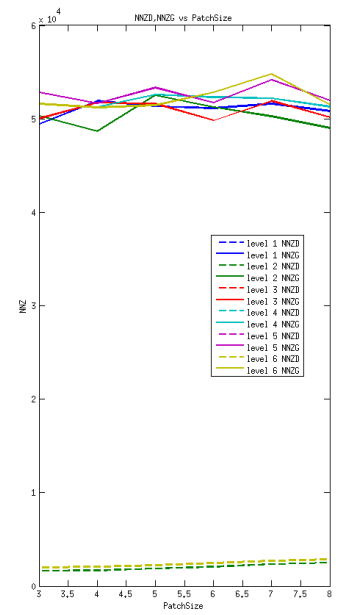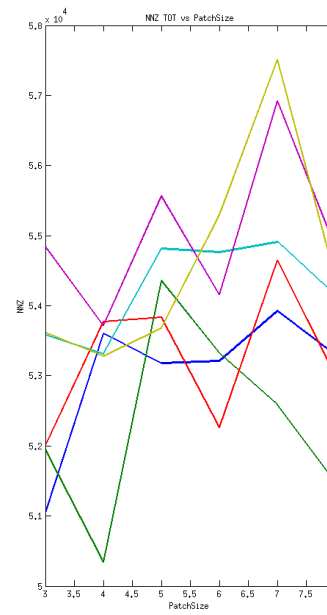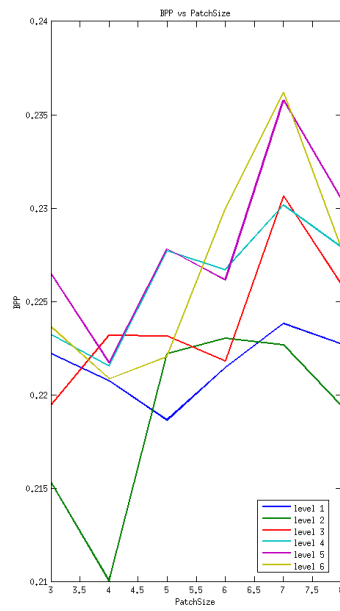

PSNR == 25,im 1

PSNR == 32,im 1

3 Images results are presented, other images results are similar. it can be observed here that, for low PSNR smaller patch size are better, we can see in the right graph that this is due to the fact more atoms are added to the dictionary as the the patch size grows but GAMMA does has less columns, but the number of total coefficients is decreasing only in level 1-2 and not as fast as dictionary atoms are added.

PSNR == 25,im 6

PSNR == 32,im 6

PSNR == 32,im 5