Supplementary Material

I. Introduction

In this supplementary material, we first present the implementation details on the PnP-TRPCA gray-video recovery result and more comparison results. Then, we will shows more detail for color images recovery results and multispectral image recovery reuslt.

II. Gray video recover

In this experiment, we chose the seven data[1] to test the performance of the proposed method. The size of the videos is $144 \times 176 \times 100$. Table. 1 demonstrated the PSNR values and SSIM values resulting from different methods. From table. 1, we can swiftly observe that the PnP-TRPCA gets the best performance among the different types of noise. We can observe that our method has greater advantages compared with other methods in the case of a low noise rate. In sparse noise 0.1 level, our method gets the 5 dB PSNR gain more than the second-ranked mode in all comparison methods. For visual effects, we show the 10-th frame of the recovered videos with the sparse noise 0.1 level, sparse noise 0.2 level, and the mixed with sparse noise 0.2 level and gaussian 0.05 level in Fig .1. It can be seen that our method still has good recovery performance even in the case of high-intensity mixed noise. It is precise that we simultaneously combine the model-based method and data-driven approaches to preserve the global structure and fine local information, our method gets better performance.

III. Color image and multispectral image recover

In this part, we will show our effect in the form of pictures.

TABLE I: The video recovering average PSNR and SSIM results of video recovery by different methods, the best and second results are highlighted in bold and in italic bold, respectively

nosie	TNN		TNN-DCT		3DTNN		SNN		PSTNN		RPCA		Ours	
	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM
s0.1	32.4702	0.9655	33.0279	0.9682	32.3319	0.9667	28.2411	0.9279	33.7743	0.9717	28.1914	0.9206	**38.0964**	**0.9897**
s0.2	31.6024	0.9557	32.1014	0.9557	31.5488	0.9578	27.2975	0.9061	32.6624	0.9584	27.3704	0.8977	**36.9632**	**0.9742**
s0.3	30.6414	0.9365	31.0876	0.9380	30.7639	0.9459	26.3587	0.8781	29.7019	0.9040	26.4852	0.8658	**32.9614**	**0.9400**
s0.1g0.05	28.0898	0.7342	28.2036	0.7349	30.0259	0.9060	26.8461	0.7671	23.7755	0.5432	27.0784	0.8493	**31.8161**	**0.9036**
s0.2g0.05	26.8786	0.6789	26.9617	0.6790	29.3927	0.8843	25.9780	0.7277	19.0453	0.3728	26.4226	0.8273	**30.7674**	**0.8830**

[1]http://trace.eas.asu.edu/yuv/

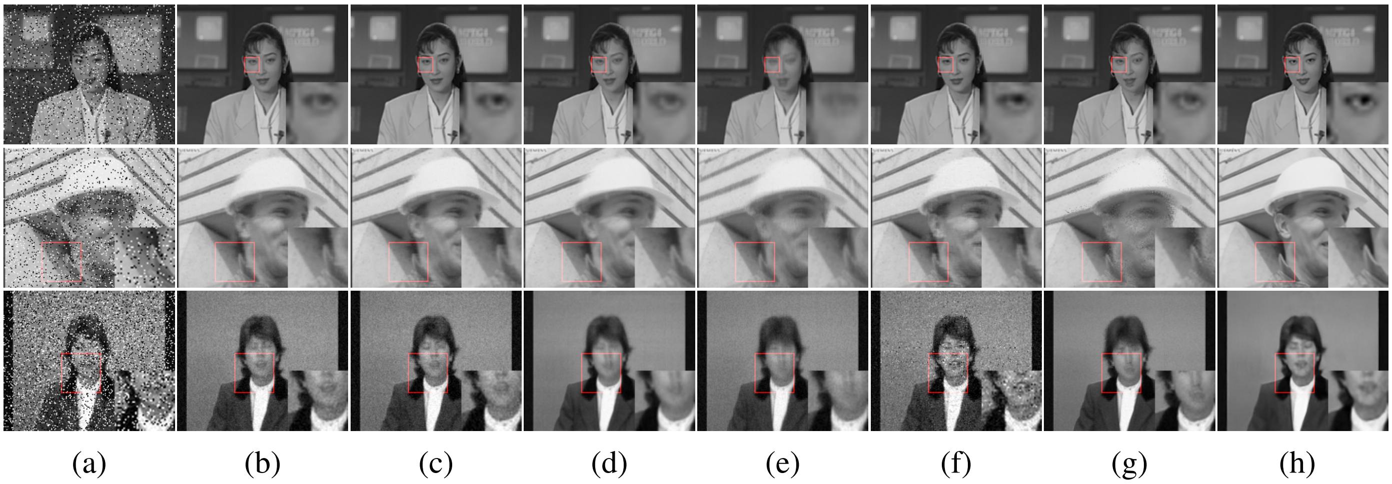


Fig. 1: Visual comparison of gray video data denoising by different methods. from top to bottom: video containing sparse noise 0.1, sparse noise 0.2 and mixed sparse noise 0.2 and gaussian noise 0.05. (a)Observed (b) TNN; (c) TNN-DCT ; (d) 3DTNN; (e) SNN; (f) PSTNN; (g) RPCA; (h) Ours.

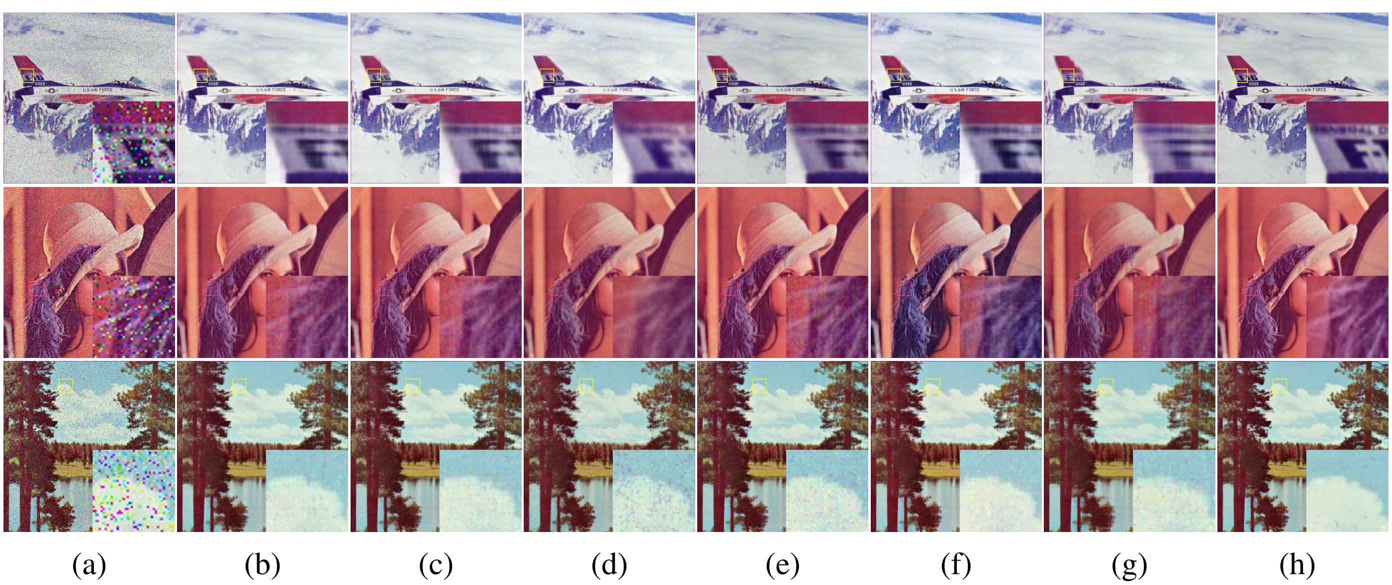
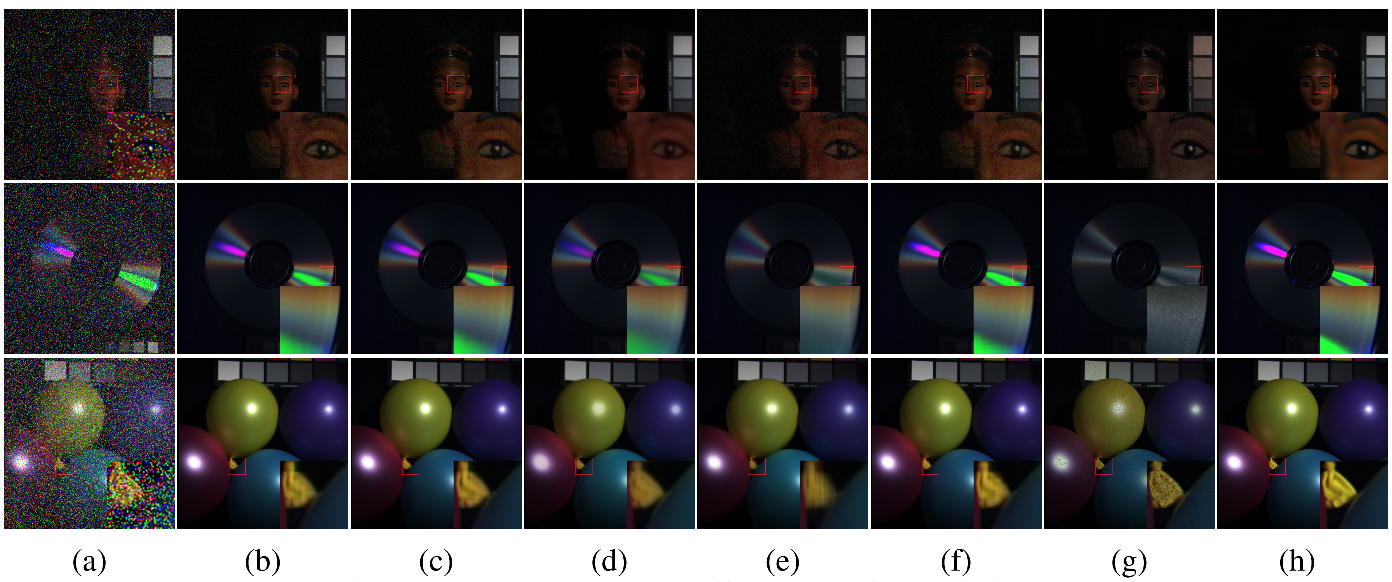


Fig. 2: Visual comparison of color images data denoising by different methods. from top to bottom: iamges containing sparse noise 0.1, mixed sparse noise 0.1 and gaussian noise 0.05 and sparse noise 0.2, . (a)Observed (b) TNN; (c) TNN-DCT ; (d) 3DTNN; (e) SNN; (f) PSTNN; (g) RPCA; (h) Ours.



In this part, we will show our effect in the form of pictures.

Fig. 3: Visual comparison of data denoising by different methods. from top to bottom: multispectral iamges containing mixed sparse noise 0.1 and gaussian noise 0.05, sparse noise 0.2 and noise 0.3. (a)Observed different types and different levels of noise images; (b) TNN; (c) TNN-DCT ; (d) 3DTNN; (e) SNN; (f) PSTNN; (g) RPCA; (h) Ours.