

Supplementary Material for Median Pixel Difference Convolutional Network for Robust Face Recognition

1 Introduction

This is the supplementary material for the paper **Median Pixel Difference Convolutional Network for Robust Face Recognition**. We first exhibit detailed value of results under the single noise in the **Section 4.4**. Then, we show the noisy parameters used for degradation model and the extra test results under other noisy combinations in the **Section 4.5**.

2 The results under the single noise

The Tab. 1 - 7 are the results tested under the single noise. The results demonstrate the advantages of MeDiNet in suppressing noise.

Table 1: The evaluation on the Gaussian Blur

Dataset	Gaussian Blur Robustness					
	LFW			YTF		
Methods	$\sigma = 1$	2	3	1	2	3
baseline	0.9882	0.9783	0.9472	0.9292	0.9196	0.8926
MeDi1	0.9908	0.9802	0.9447	0.9300	0.9206	0.8928
MeDi2	0.9910	0.9797	0.9473	0.9284	0.9214	0.8990
MeDi3	0.9890	0.9788	0.9513	0.9324	0.9248	0.8958
MeDi4	0.9882	0.9812	0.9567	0.9338	0.9276	0.9214
MeDi5	0.9885	0.9820	0.9578	0.9304	0.9220	0.9078

Table 2: The evaluation on the Motion Blur

Dataset	Motion Blur Robustness							
	LFW				YTF			
Methods	$\mathcal{D} = 10$	20	30	40	10	20	30	40
baseline	0.9695	0.8640	0.7797	0.7535	0.9084	0.8214	0.7538	0.7440
MeDi1	0.9710	0.8473	0.7877	0.7443	0.9132	0.8272	0.7674	0.7368
MeDi2	0.9708	0.8640	0.7985	0.7383	0.9130	0.8374	0.7780	0.7424
MeDi3	0.9735	0.8928	0.8025	0.7438	0.9120	0.8362	0.7878	0.7388
MeDi4	0.9743	0.8687	0.7917	0.7650	0.9182	0.8326	0.7706	0.7544
MeDi5	0.9740	0.8625	0.8018	0.7708	0.9142	0.8318	0.7950	0.7684

Table 3: The evaluation on the AWGN

Dataset	AWGN Robustness					
	LFW			YTF		
Methods	$\sigma = 15$	25	50	15	25	50
baseline	0.9822	0.9618	0.7902	0.8986	0.8472	0.6984
MeDi1	0.9855	0.9647	0.8107	0.9170	0.8692	0.7152
MeDi2	0.9860	0.9725	0.8567	0.9196	0.8894	0.7590
MeDi3	0.9872	0.9743	0.8770	0.9186	0.8822	0.7792
MeDi4	0.9852	0.9780	0.9222	0.9302	0.9154	0.8476
MeDi5	0.9863	0.9780	0.9212	0.9266	0.9094	0.8368

Table 4: The evaluation on the Salt-and-Pepper Noise

Dataset	Salt-and-Pepper Noise Robustness							
	LFW				YTF			
Methods	$\rho = 5\%$	10%	15%	20%	5%	10%	15%	20%
baseline	0.7285	0.6635	0.6327	0.5924	0.6754	0.6496	0.6244	0.6202
MeDi1	0.9647	0.8352	0.7097	0.6763	0.9072	0.7722	0.7000	0.6756
MeDi2	0.9737	0.8785	0.7350	0.6703	0.9058	0.7984	0.6984	0.6512
MeDi3	0.9735	0.8928	0.7782	0.6877	0.9076	0.8122	0.7314	0.6802
MeDi4	0.9810	0.9458	0.8580	0.7532	0.9310	0.8948	0.8308	0.7500
MeDi5	0.9810	0.9457	0.8552	0.7413	0.9274	0.8920	0.8044	0.7410

Table 5: The evaluation on the HG and MG Noise

Dataset	HG and MG Noise Robustness											
	LFW						YTF					
Methods	$\alpha=20, \sigma=10$	30,10	30,20	40,10	40,20	$\mathcal{L} = 75$	20,10	30,10	30,20	40,10	40,20	75
baseline	0.9698	0.9480	0.8958	0.9193	0.8437	0.6808	0.8662	0.8354	0.7742	0.7970	0.7386	0.6716
MeDi1	0.9735	0.9523	0.9032	0.9223	0.8638	0.7115	0.8934	0.8656	0.7986	0.8656	0.7680	0.6868
MeDi2	0.9777	0.9665	0.9303	0.9478	0.8993	0.7715	0.9038	0.8772	0.8378	0.8624	0.8104	0.7124
MeDi3	0.9783	0.9672	0.9353	0.9493	0.9095	0.8143	0.9010	0.8782	0.8392	0.8612	0.8146	0.7464
MeDi4	0.9803	0.9730	0.9585	0.9642	0.9447	0.8733	0.9226	0.9116	0.8852	0.8984	0.8744	0.8024
MeDi5	0.9820	0.9737	0.9555	0.9677	0.9410	0.8693	0.9302	0.9042	0.9244	0.8956	0.9156	0.7910

Table 6: The evaluation on the JPEG Compression

Dataset	JPEG Compression Robustness							
	LFW				YTF			
Methods	$\mathcal{C} = 10$	20	30	40	10	20	30	40
baseline	0.9643	0.9833	0.9878	0.9878	0.9040	0.9278	0.9290	0.9272
MeDi1	0.9622	0.9832	0.9863	0.9900	0.9052	0.9244	0.9288	0.9326
MeDi2	0.9633	0.9848	0.9882	0.9890	0.9036	0.9298	0.9312	0.9346
MeDi3	0.9655	0.9830	0.9872	0.9875	0.9062	0.9266	0.9328	0.9290
MeDi4	0.9637	0.9805	0.9840	0.9875	0.9074	0.9286	0.9336	0.9330
MeDi5	0.9653	0.9810	0.9867	0.9873	0.9042	0.9270	0.9286	0.9320

Table 7: The evaluation on the Scaling

Dataset	Scale Robustness							
	LFW				YTF			
Methods	$\mathcal{S} = 2$	4	6	8	2	4	6	8
baseline	0.9910	0.9677	0.8795	0.7995	0.9304	0.9266	0.8992	0.8624
MeDi1	0.9890	0.9677	0.8830	0.7968	0.9292	0.9250	0.8994	0.8530
MeDi2	0.9910	0.9707	0.8947	0.8032	0.9332	0.9288	0.9046	0.8564
MeDi3	0.9898	0.9705	0.8905	0.8140	0.9348	0.9268	0.9014	0.8586
MeDi4	0.9885	0.9728	0.9035	0.8343	0.9340	0.9280	0.9106	0.8804
MeDi5	0.9878	0.9727	0.9023	0.8227	0.9322	0.9274	0.9078	0.8704

3 The results on the degraded images

In this section, we will report the evaluation results of the model on other noise combinations. We first present the parameters of the degradation model which are randomly generated within their respective parameter ranges in **Section 4.2**.

The noise parameters are shown as below:

- JPEG Compression and Scaling: $\mathcal{C} = 40$ and $\mathcal{S} = 2$;
- Gaussian Blur: $\sigma = 3$ and kernel size is set to 13 (when tested on the YTF and CA-LFW, σ is set to 2);
- Motion Blur: $\mathcal{D} = 20$;
- AWGN: $\sigma = 25$;
- HG: ($\alpha = 40, \sigma = 10$) (when tested on the LFW, α is set to 30);
- MG: $\mathcal{L} = 75$;
- Salt-and-Pepper Noise: $\rho = 5\%$.

We also report the result of Motion Blur combined with other noises. These noise combinations are showing as following:

- Motion_blur+AWGN+Scaling+Compression (MB+AWGN);
- Motion_blur+Salt-and-Pepper+Scaling+Compression (MB+SP);
- Motion_blur+HG+Scaling+Compression (MB+HG);
- Motion_blur+MG+Scaling+Compression (MB+MG).

Table 8: The evaluation on the LFW and YTF

	MB+AWGN		MB+SP		MB+HG		MB+MG	
	LFW	YTF	LFW	YTF	LFW	YTF	LFW	YTF
baseline	0.7860	0.7594	0.6840	0.6670	0.7635	0.7250	0.6725	0.6600
MeDi1	0.8132	0.7784	0.7560	0.7542	0.8013	0.7492	0.6850	0.6972
MeDi2	0.8237	0.7984	0.7892	0.7674	0.8117	0.7644	0.7065	0.7020
MeDi3	0.8308	0.7928	0.8048	0.7688	0.8153	0.7744	0.7385	0.7194
MeDi4	0.8675	0.8314	0.8622	0.8310	0.8542	0.8134	0.7375	0.7646
MeDi5	0.8475	0.8308	0.8367	0.8192	0.8432	0.8052	0.7322	0.7468