

Supplemental Material: Unsupervised Model-based Learning for Simultaneous Video Deflickering and Deblotching

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1. Contents

This document contains supplemental material for the main paper. The contents include:

1. Results on the guitar video referred to in the Experiments section of the main paper - see Sec. 2.
2. Some details regarding the procedure to implement LFISTA are included in Sec. 3.
3. An ablation study for LFISTA by varying the window-size W of the temporal smoothing process is presented in Sec. 4.
4. Quantitative results on synthetically generated videos with no-reference and full-reference quality measures are included in Sec. 5.
5. Quantitative results from Sec. 4 of the main paper are included in Sec. 7 for *each* video separately.
6. Quantitative comparisons between LFISTA and NFFA are presented in Sec. 6.
7. Qualitative Results (not in this document, but the accompanying video ‘*revised_supplemental_video_542.mp4*’ available at the link <https://drive.google.com/file/d/1-a0akBb6YVCqZGtCfvTxKB78fCyguA39/view?usp=sharing>): This video shows restoration results on two videos each from the datasets $D1$, $D2$ and four videos (including one color video) from $D3$. The datasets $D1$, $D2$, $D3$ are described in Sec. 4.1 of the main paper. In addition, we also show a result on the (self-acquired) guitar video. In the video file, results obtained using our LFISTA method are shown alongside the original (to be restored) video, as well as results obtained using RTN [7], DeepRemaster [2], OldPhoto [8] + TS [3] and NeatVideo. The superior performance of the proposed technique is very clear from the video results - from the point of view of flicker as well as blotch removal. Note that for all competing methods, we have used the code and parameter settings provided by the respective authors.

2. Results on Guitar Video

Dataset	Method	OFE1	OFE2	OFEF
Guitar	Original	0.021452	0.02017	0.067409
	OldPhoto + TS	0.02078	0.01998	0.07714
	DeepRemaster [2]	0.019439	0.018503	0.04392
	RTN [7]	0.007589	0.008533	0.019989
	NeatVideo	0.016328	0.013719	0.054162
	LFISTA	0.003602	0.004247	0.008376

Table 1. Values of OFE1, OFE2, OFEF metrics (lower is better), computed on the Guitar video from Fig. 1, for various competing methods. In all videos, intensity range was [0, 1].

This is a result on the guitar video in Fig. 1. The video is gathered at 240 fps from a mobile phone and exhibits flicker artifacts. The numerical scores for different methods for this video are presented in Table 1. Please see the accompanying video file ‘*revised_supplemental_video_542.mp4*’ for the restoration results in video format.



Figure 1. Comparison of deflickering performance of different methods on a high speed (240 fps) video gathered from a mobile phone. See accompanying video results, and numerical scores in Table 1.

	OFE1↓	OFE2↓	OFEP↓	BRISQUE↓	NIQE↓
Orig.	0.01	0.01198	0.044	43.54	21.29
$W = 1$	0.0102	0.0115	0.038	44.89	18.8877
$W = 3$	0.0072	0.0091	0.0237	45.088	19.033
$W = 5$	0.0062	0.008	0.022	45.294	19.037
$W = 7$	0.005753	0.0075	0.021916	45.4	18.96
$W = 9$	0.0055	0.0072	0.022	45.46	18.94

Table 2. Ablation study on the effect of temporal smoothing radius W on the LFISTA technique.

3. Details of the video used to train the network for LFISTA

Refer to Sec. 4.2 of the main paper. For implementing LFISTA, the network was trained (in an unsupervised manner) on patches of size 32×32 , as opposed to entire frames in order to reduce the number of parameters being learned. The training patches were extracted from randomly selected pairs of frames from 52 good quality video clips extracted from the Youtube video at <https://www.youtube.com/watch?v=LXb3EKWsInQ> (converted to grayscale). In every pair, both the frames were located within a temporal neighborhood of radius $W = 5$ from each other. The video clips were synthetically degraded by blotch artifacts with average diameter of 10 pixels. We emphasize that none of these video clips were part of the datasets $D1-D3$ on which our algorithm was tested.

4. Ablation Study

We present an ablation study to determine the effect of the temporal smoothing radius W on our LFISTA technique. The results of this study are presented in Table 2. All experiments were carried out on 10 videos from the $D3$ dataset. We generally observed that $W = 5$ (i.e. 5 frames on either side of the reference frame) yielded the best results visually and hence used that value in our experiments. Larger values of W lowered the metric values as seen in the table, but caused slight blurring of moving object boundaries. This is due to errors in optical flow computed between distant frames (due to increase in W). On the other hand, lower values of W did not sufficiently erase flicker or blotches.

Method	OFE1↓	OFE2↓	OFEP↓	BRISQUE [5]↓	NIQE [6]↓	SM [1]↑	SSIM↑	PSNR↑
Original	0.0144	0.015174	0.142124	26.61	18.59	1	0.924	25.56
DeepRm [2]	0.011	0.0135	0.0899	31.81	18.84	1.23	0.92	25.86
NeatVideo	0.006	0.008	0.0563	35.57	17.576	1.58	0.9086	27.03976
RTN [7]	0.009	0.011	0.066	19.96	17.92	1.12	0.8529	24.386
NFFA [4]	0.00455	0.006456	0.115	35.32	15.64	1.4249	0.512	14.88
LFISTA	0.0072	0.00844	0.0477	33.43	17.477	1.69	0.9258	26.524
LFISTA-SHARP	0.0077	0.0094	0.0505	30.937	16.84	1.35	0.903	24.775

Table 3. Comparative results on synthetic data (different evaluation measures averaged across 10 videos).

Method	OFE1↓	OFE2↓	OFEP↓	BRISQUE↓	NIQE↓	SM↑
Original	0.009882	0.012696	0.071894	42.9	19.37	1.0
NFFA [4]	0.006918	0.0101	0.064	46.56	19.07	1.413925
LFISTA	0.005654	0.007826	0.034621	51.86	17.79	1.366949

Table 4. Quantitative comparison (values of different measures averaged across 60 videos) between LFISTA and NFFA.

5. Results on Synthetic Data

We performed a restoration study on a set of 10 clean and temporally consistent videos of size 640×360 gathered from <https://www.videvo.net/>. These videos were degraded synthetically using (1) blotch templates as mentioned in the github repository associated with [8], and (2) flicker induced by multiplying each frame with a number generated from Uniform(0.8, 1.2). The degraded videos were restored by various competing methods and no-reference as well as full-reference quality measures are included in Tab. 3. All measures are averaged over all 10 videos. The full-reference measures are SSIM (structured similarity index) and PSNR (peak signal to noise ratio). We observed that NFFA did not remove blotches and hence produced lower SSIM and PSNR values as compared to our method. RTN again yielded high frequency artifacts. Results on a sample synthetic video are included in the accompanying video file ‘revised_supplemental_video_542.mp4’.

6. Comparisons with NFFA

We present a quantitative comparison between LFISTA and NFFA [4] on a subset of the dataset from [4]. The subset contains 60 video clips from old movies with flicker artifacts. The results are presented in Table 4. From these results, we see that the performance of LFISTA and NFFA are comparable on various metrics, even on a dataset released by their paper.

7. Quantitative Results

This section contains Table 5 which shows numerical results for each video from the datasets $D1$, $D2$, $D3$ described in Sec. 4.1 of the main paper. The actual weblink for every video is also included in the table (wherever applicable). The comparison metrics OFE1, OFE2 and OFEP are defined in Sec. 4 of the main paper.

Table 5. Detailed quantitative comparison of our method on various video sequences to existing methods: RTN [7], DeepRemaster [2], OldPhoto [8] + TS [3] and NeatVideo. For each video sequence, a weblink is included.

Dataset	Video	Method	OFE1	OFE2	OFEP	BRISQUE	NIQE	SM	Link
$D1$	Example 1	Original	0.01246	0.01577	0.07096	40.65	24.39	1.00000	link
		OldPhoto + TS	0.01124	0.01512	0.14651	25.11	15.16	0.85119	link
		Deepremaster	0.01148	0.01630	0.06289	42.74	23.20	0.90080	link
		NeatVideo	0.00765	0.01101	0.05364	46.73	23.06	1.13249	link
		RTN	0.00889	0.01347	0.06570	26.19	22.20	0.89253	link
		NFFA	0.01164	0.01649	0.01556	49.48	16.01	0.98754	link
		LFISTA	0.00886	0.01227	0.06328	45.49	23.50	1.08302	link
		LFISTA-SHARP	0.00917	0.01253	0.08898	41.46	15.61	0.97680	link

De l'importance des chars dans la victoire de 1918	Original	0.01287	0.01860	0.06435	45.62	22.04	1.00000	link
	OldPhoto + TS	0.01017	0.02123	0.09963	51.89	19.27	1.04633	link
	Deepremaster	0.01158	0.01572	0.04588	45.86	22.41	0.94057	link
	NeatVideo	0.01192	0.01155	0.02944	48.23	22.32	1.09836	link
	RTN	0.01319	0.01680	0.07725	25.03	20.03	0.61454	link
	NFFA	0.00621	0.00897	0.06121	50.64	21.39	1.97109	link
	LFISTA	0.00856	0.01394	0.02839	46.61	22.09	1.09591	link
	LFISTA-SHARP	0.01015	0.01548	0.05036	45.50	19.56	0.96152	link
Exemple 2	Original	0.00931	0.01222	0.06804	42.18	23.43	1.00000	link
	OldPhoto + TS	0.01014	0.01253	0.11534	39.97	15.42	0.72417	link
	Deepremaster	0.00893	0.01247	0.04466	48.73	20.33	0.93340	link
	NeatVideo	0.00532	0.00805	0.02696	48.76	20.67	1.02866	link
	RTN	0.00833	0.01052	0.04645	36.19	20.53	0.84309	link
	NFFA	0.00884	0.01639	0.02880	51.00	17.16	0.50311	link
	LFISTA	0.00558	0.00741	0.02884	51.52	20.69	1.02429	link
	LFISTA-SHARP	0.00626	0.00844	0.04124	45.77	17.30	0.91943	link
Exemple 3	Original	0.00757	0.01185	0.01939	55.36	17.71	1.00000	link
	OldPhoto + TS	0.00643	0.00908	0.03009	51.78	20.06	1.39112	link
	Deepremaster	0.00757	0.01217	0.01581	58.89	23.20	0.98448	link
	NeatVideo	0.00529	0.00856	0.01232	58.75	23.26	1.36637	link
	RTN	0.01034	0.01343	0.02846	36.27	22.75	0.90917	link
	NFFA	0.00478	0.00638	0.01193	54.72	18.88	2.07086	link
	LFISTA	0.00515	0.00779	0.01115	56.37	23.70	1.52130	link
	LFISTA-SHARP	0.00625	0.00903	0.01483	55.30	17.74	1.27480	link
Le Mort qui tue (film, 1913) Sequence 1	Original	0.00723	0.01104	0.02058	47.06	18.71	1.00000	link
	OldPhoto + TS	0.00624	0.00848	0.02773	54.84	16.84	1.16491	link
	Deepremaster	0.00750	0.01125	0.01916	49.05	20.12	0.98674	link
	NeatVideo	0.00540	0.00821	0.01571	48.21	20.28	1.15251	link
	RTN	0.00893	0.01144	0.02731	26.93	20.20	0.77193	link
	NFFA	0.00576	0.00752	0.02191	47.30	17.63	1.28934	link
	LFISTA	0.00497	0.00685	0.01228	47.44	20.02	1.39167	link
	LFISTA-SHARP	0.00593	0.00802	0.01440	43.92	18.19	1.09858	link
Le Mort qui tue (film, 1913) Sequence 2	Original	0.00495	0.00734	0.01795	47.78	20.31	1.00000	link
	OldPhoto + TS	0.00500	0.00660	0.02015	59.13	15.97	0.99781	link
	Deepremaster	0.00550	0.00776	0.01688	49.84	20.40	0.97629	link
	NeatVideo	0.00431	0.00623	0.01456	52.20	20.43	1.12097	link
	RTN	0.00699	0.00900	0.01952	33.47	21.64	0.79640	link
	NFFA	0.00503	0.00651	0.02292	51.90	20.19	1.57615	link
	LFISTA	0.00419	0.00573	0.00900	49.29	20.34	1.39048	link
	LFISTA-SHARP	0.00503	0.00681	0.01026	46.10	18.58	1.08330	link
Le Mort qui tue (film, 1913) Sequence 3	Original	0.01003	0.01413	0.02122	80.75	19.33	1.00000	link
	OldPhoto + TS	0.00917	0.01235	0.03227	68.57	16.91	1.18858	link
	Deepremaster	0.01024	0.01426	0.01875	78.47	20.84	1.02114	link
	NeatVideo	0.00880	0.01285	0.01683	82.19	21.34	1.06073	link
	RTN	0.01149	0.01419	0.03016	57.65	21.39	0.72196	link
	NFFA	0.00802	0.01037	0.02541	78.65	21.05	0.97118	link
	LFISTA	0.00710	0.01050	0.01272	74.51	21.35	1.28823	link
	LFISTA-SHARP	0.00853	0.01179	0.01466	74.29	18.39	0.97191	link

Le Mort qui tue (film, 1913) Sequence 4	Original	0.00724	0.01139	0.02006	42.85	21.54	1.00000	link	
	OldPhoto + TS	0.00572	0.00794	0.02810	50.15	18.18	1.37910	link	
	Deepremaster	0.00760	0.01179	0.01870	42.38	20.48	1.00270	link	
	NeatVideo	0.00550	0.00933	0.01252	47.17	20.30	1.15613	link	
	RTN	0.00910	0.01173	0.02811	16.14	20.50	0.82047	link	
	NFFA	0.00813	0.01123	0.02723	75.14	21.72	0.96234	link	
	LFISTA	0.00503	0.00755	0.01133	40.90	20.23	1.48842	link	
	LFISTA-SHARP	0.00591	0.00858	0.01328	37.71	18.92	1.20482	link	
Example 4	Original	0.01747	0.01760	0.12250	36.50	19.47	1.00000	link	
	OldPhoto + TS	0.01749	0.01851	0.22618	34.08	19.12	0.77074	link	
	Deepremaster	0.01410	0.01721	0.09121	43.05	23.23	0.94377	link	
	NeatVideo	0.00513	0.00760	0.04535	48.04	23.13	1.13304	link	
	RTN	0.01090	0.01339	0.08504	18.94	23.38	0.77152	link	
	NFFA	0.00769	0.01103	0.04253	46.39	19.72	0.96726	link	
	LFISTA	0.00714	0.00912	0.05776	47.93	22.87	1.11591	link	
	LFISTA-SHARP	0.00755	0.00973	0.10641	46.25	19.05	0.95865	link	
The study of the Channel Tunnel project	Original	0.01108	0.01796	0.08044	31.23	23.52	1.00000	link	
	OldPhoto + TS	0.00716	0.00973	0.05002	49.27	15.75	1.29625	link	
	Deepremaster	0.00889	0.01595	0.04574	41.44	21.13	0.98691	link	
	NeatVideo	0.00756	0.01777	0.01928	47.22	21.64	1.07383	link	
	RTN	0.00817	0.01517	0.04237	20.81	22.04	0.80364	link	
	NFFA	0.00403	0.00561	0.07413	42.36	18.81	2.01658	link	
	LFISTA	0.00710	0.01479	0.02649	41.92	21.90	1.08459	link	
	LFISTA-SHARP	0.00593	0.01019	0.02844	38.67	16.54	0.93687	link	
Example 5	Original	0.00833	0.01252	0.01956	34.64	18.29	1.00000	link	
	OldPhoto + TS	0.00824	0.01078	0.03401	37.99	17.44	1.13718	link	
	Deepremaster	0.00810	0.01255	0.01625	40.65	24.54	1.02161	link	
	NeatVideo	0.00565	0.00894	0.01443	38.94	24.87	1.25574	link	
	RTN	0.01066	0.01329	0.02866	15.36	25.06	0.75405	link	
	NFFA	0.00525	0.00679	0.01434	36.21	18.48	1.57343	link	
	LFISTA	0.00547	0.00849	0.01229	37.17	24.94	1.32683	link	
	LFISTA-SHARP	0.00683	0.00991	0.01520	33.45	18.67	1.03981	link	
D2	Example 1 (190 fps)	Original	0.01619	0.01184	0.01350	17.17	22.06	1.00000	link
		OldPhoto + TS	0.01240	0.01011	0.01359	27.86	16.61	1.20848	link
		Deepremaster	0.01132	0.01108	0.03390	28.22	21.56	0.89122	link
		NeatVideo	0.00517	0.00434	0.00576	19.99	22.12	2.76306	link
		RTN	0.00979	0.01204	0.02491	40.99	21.43	0.71483	link
		NFFA	0.00344	0.00447	0.00832	28.26	22.64	1.25105	link
		LFISTA	0.00431	0.00420	0.00413	26.54	22.21	2.95666	link
		LFISTA-SHARP	0.00417	0.00463	0.00343	25.61	19.57	2.31342	link
	Example 2 (150 fps)	Original	0.01298	0.01163	0.00807	20.57	20.57	1.00000	link
		OldPhoto + TS	0.01060	0.01028	0.01879	29.37	15.82	1.10486	link
		Deepremaster	0.00949	0.01054	0.01312	36.94	20.56	1.06048	link
		NeatVideo	0.00489	0.00507	0.00412	27.10	20.94	1.11053	link
		RTN	0.00807	0.00950	0.01063	27.39	18.49	0.91092	link
		NFFA	0.00433	0.00564	0.01024	40.85	17.65	0.89206	link
		LFISTA	0.00427	0.00470	0.00369	37.11	20.98	1.15442	link
		LFISTA-SHARP	0.00464	0.00553	0.00606	34.95	15.25	1.03161	link
Guitar Video (240 fps)	Original	0.02145	0.02017	0.06741	31.97	14.35	1.00000	-	

		OldPhoto + TS	0.02078	0.01998	0.07714	30.55	11.99	1.00773	-
		Deepremaster	0.01944	0.01850	0.04392	36.89	15.18	1.50771	-
		NeatVideo	0.01633	0.01372	0.05416	31.81	13.81	2.37171	-
		RTN	0.00759	0.00853	0.01999	16.26	13.28	2.96772	-
		NFFA	0.00396	0.00514	0.01700	40.85	16.22	4.26872	-
		LFISTA	0.00360	0.00425	0.00838	36.59	14.86	7.61568	-
		LFISTA-SHARP	0.00415	0.00500	0.01061	32.46	15.54	5.92946	-
	Example 4 (190 fps)	Original	0.01625	0.01281	0.01840	22.80	22.13	1.00000	link
		OldPhoto + TS	0.01189	0.01082	0.01979	25.79	12.81	1.10204	link
		Deepremaster	0.01205	0.01232	0.04981	32.86	22.49	0.85032	link
		NeatVideo	0.00683	0.00687	0.01308	28.05	22.10	1.26899	link
		RTN	0.00947	0.01120	0.02162	16.08	20.60	0.81068	link
		NFFA	0.00359	0.00465	0.00794	34.28	15.28	2.67800	link
		LFISTA	0.00588	0.00642	0.01014	31.24	22.19	1.32682	link
		LFISTA-SHARP	0.00478	0.00543	0.00508	30.48	13.76	1.10209	link
	Example 3 (150 fps)	Original	0.00407	0.00424	0.00697	17.06	22.42	1.00000	link
		OldPhoto + TS	0.00514	0.00618	0.00571	18.28	18.22	0.49762	link
		Deepremaster	0.00428	0.00499	0.01008	27.06	22.60	0.87568	link
		NeatVideo	0.00292	0.00310	0.00390	22.34	22.34	1.18771	link
		RTN	0.00743	0.00941	0.02793	27.40	20.94	0.39044	link
		NFFA	0.00269	0.00324	0.00452	32.31	28.62	0.95253	link
		LFISTA	0.00248	0.00277	0.00295	30.10	22.24	1.44467	link
		LFISTA-SHARP	0.00248	0.00306	0.00297	27.17	27.47	1.14998	link
D3	The Dog Outwits the Kidnapper (1908) Sequence 1	Original	0.00758	0.01172	0.03481	40.51	20.38	1.00000	link
		OldPhoto + TS	0.00956	0.01280	0.05017	27.67	17.78	0.89654	link
		Deepremaster	0.00844	0.01220	0.02907	40.42	20.75	0.97080	link
		NeatVideo	0.00664	0.01042	0.02230	42.19	20.50	1.03256	link
		RTN	0.01112	0.01328	0.04765	20.43	18.81	0.62921	link
		NFFA	0.00697	0.00967	0.04653	43.17	17.39	1.32844	link
		LFISTA	0.00607	0.00830	0.01985	37.52	20.41	1.05341	link
		LFISTA-SHARP	0.00734	0.00981	0.02310	35.88	16.80	0.72825	link
	The Dog Outwits the Kidnapper (1908) Sequence 2	Original	0.00952	0.01526	0.02332	33.03	21.31	1.00000	link
		OldPhoto + TS	0.01015	0.01490	0.03460	19.51	19.55	0.99608	link
		Deepremaster	0.00999	0.01539	0.02307	31.32	21.08	0.99461	link
		NeatVideo	0.00849	0.01388	0.01905	33.45	21.34	1.11652	link
		RTN	0.01121	0.01408	0.04036	10.54	20.71	0.77373	link
		NFFA	0.00676	0.00904	0.02513	32.32	23.64	1.56936	link
		LFISTA	0.00642	0.01019	0.01453	33.15	20.96	1.49502	link
		LFISTA-SHARP	0.00771	0.01137	0.01695	32.68	21.32	1.09239	link
	The Dog Outwits the Kidnapper (1908) Sequence 3	Original	0.00949	0.01416	0.02990	43.28	20.96	1.00000	link
		OldPhoto + TS	0.00996	0.01398	0.03916	33.06	17.34	0.98803	link
		Deepremaster	0.00988	0.01420	0.02749	43.63	20.90	0.99290	link
		NeatVideo	0.00578	0.00927	0.01656	45.91	21.16	1.38328	link
		RTN	0.01062	0.01313	0.04445	20.45	21.06	0.80632	link
		NFFA	0.00680	0.00890	0.03337	43.47	17.31	1.20447	link
		LFISTA	0.00631	0.00935	0.01685	43.13	20.98	1.37794	link
		LFISTA-SHARP	0.00751	0.01051	0.02064	41.67	16.47	1.02737	link

The Dog Outwits the Kidnapper (1908) Sequence 4	Original	0.00812	0.01272	0.02913	36.10	22.10	1.00000	link
	OldPhoto + TS	0.00866	0.01231	0.03944	24.72	17.84	0.93871	link
	Deepremaster	0.00850	0.01288	0.02549	36.48	21.67	0.96929	link
	NeatVideo	0.00501	0.00759	0.01990	38.22	22.24	1.08419	link
	RTN	0.01008	0.01223	0.04340	15.93	20.29	0.68978	link
	NFFA	0.00617	0.00820	0.03414	43.53	18.34	1.02252	link
	LFISTA	0.00558	0.00770	0.01648	35.02	21.64	1.11579	link
	LFISTA-SHARP	0.00667	0.00899	0.02142	32.33	18.74	0.85639	link
The Dog Outwits the Kidnapper (1908) Sequence 5	Original	0.01088	0.01797	0.04111	35.53	20.26	1.00000	link
	OldPhoto + TS	0.01123	0.01677	0.05730	21.00	15.64	1.08419	link
	Deepremaster	0.01123	0.01767	0.03237	35.40	21.01	1.02365	link
	NeatVideo	0.00787	0.01321	0.02700	37.05	20.33	1.40940	link
	RTN	0.01142	0.01464	0.04891	16.61	19.30	0.99579	link
	NFFA	0.00633	0.00852	0.03484	35.58	15.31	2.24099	link
	LFISTA	0.00715	0.01184	0.01781	33.32	20.30	1.62353	link
	LFISTA-SHARP	0.00833	0.01273	0.02327	30.16	16.31	1.30894	link
The Dog Outwits the Kidnapper (1908) Sequence 6	Original	0.00812	0.01299	0.02723	39.55	19.68	1.00000	link
	OldPhoto + TS	0.00980	0.01338	0.04132	30.38	18.88	0.89377	link
	Deepremaster	0.00878	0.01330	0.02521	40.15	19.69	0.97111	link
	NeatVideo	0.00502	0.00795	0.01773	41.44	19.76	1.09725	link
	RTN	0.01157	0.01377	0.04229	25.01	18.38	0.66748	link
	NFFA	0.00656	0.00897	0.03397	37.23	16.88	1.24093	link
	LFISTA	0.00591	0.00844	0.01671	38.15	19.69	1.08761	link
	LFISTA-SHARP	0.00727	0.00997	0.01904	37.47	19.22	0.80084	link
The Dog Outwits the Kidnapper (1908) Sequence 7	Original	0.00747	0.01192	0.03485	42.84	21.67	1.00000	link
	OldPhoto + TS	0.00790	0.01103	0.04300	32.35	17.62	1.00291	link
	Deepremaster	0.00778	0.01203	0.02843	43.43	21.82	0.99744	link
	NeatVideo	0.00504	0.00756	0.02372	46.01	21.75	1.16513	link
	RTN	0.00960	0.01160	0.04403	19.42	20.68	0.65195	link
	NFFA	0.00590	0.00763	0.03888	44.30	16.60	0.95972	link
	LFISTA	0.00523	0.00734	0.01618	39.68	21.46	1.10698	link
	LFISTA-SHARP	0.00638	0.00865	0.02076	35.13	16.57	0.84180	link
The Dog Outwits the Kidnapper (1908) Sequence 8	Original	0.00929	0.01466	0.03262	35.55	20.15	1.00000	link
	OldPhoto + TS	0.00998	0.01409	0.04639	22.35	15.85	0.96370	link
	Deepremaster	0.00968	0.01471	0.02779	35.20	20.34	0.99441	link
	NeatVideo	0.00522	0.00853	0.01748	38.67	20.26	1.23861	link
	RTN	0.01076	0.01311	0.04173	14.32	19.54	0.67675	link
	NFFA	0.00614	0.00893	0.03723	44.23	17.35	0.98234	link
	LFISTA	0.00596	0.00900	0.01818	33.55	20.24	1.22483	link
	LFISTA-SHARP	0.00716	0.01027	0.02047	29.64	16.93	0.85714	link
The Dog Outwits the Kidnapper (1908) Sequence 9	Original	0.00714	0.01112	0.02902	36.90	19.87	1.00000	link

	OldPhoto + TS	0.00947	0.01259	0.04422	24.37	17.33	0.86835	link
	Deepremaster	0.00801	0.01160	0.02609	37.29	20.25	0.98959	link
	NeatVideo	0.00564	0.00833	0.02174	38.62	19.95	1.07314	link
	RTN	0.01132	0.01343	0.04983	16.91	18.37	0.60024	link
	NFFA	0.00638	0.00855	0.03526	44.53	17.56	1.11593	link
	LFISTA	0.00605	0.00824	0.01738	34.35	19.93	1.10902	link
	LFISTA-SHARP	0.00751	0.00989	0.02093	33.42	15.66	0.78885	link
Kanch Ki Gudiya 1961	Original	0.00638	0.00801	0.02851	50.79	23.34	1.00000	link
	OldPhoto + TS	0.00600	0.00759	0.03232	46.67	15.81	1.21837	link
	Deepremaster	0.00689	0.00907	0.02524	47.80	23.51	0.91302	link
	NeatVideo	0.00513	0.00681	0.01860	53.73	22.95	1.04101	link
	RTN	0.00707	0.00874	0.03061	38.62	21.82	0.66838	link
	NFFA	0.00608	0.00884	0.04613	46.21	15.67	1.53962	link
	LFISTA	0.00480	0.00641	0.01709	47.75	23.17	1.07537	link
	LFISTA-SHARP	0.00580	0.00752	0.01995	45.24	13.81	0.81795	link
Indian song	Original	0.00459	0.00724	0.02613	50.54	25.97	1.00000	link
	OldPhoto + TS	0.00479	0.00664	0.03380	48.02	15.43	0.92676	link
	Deepremaster	0.00464	0.00733	0.02343	54.35	26.27	0.92952	link
	NeatVideo	0.00297	0.00447	0.01529	55.44	26.13	1.13874	link
	RTN	0.00529	0.00716	0.03307	34.66	23.75	0.82591	link
	NFFA	0.00599	0.00892	0.03551	45.23	17.23	1.30013	link
	LFISTA	0.00318	0.00466	0.01503	52.58	26.02	1.15312	link
	LFISTA-SHARP	0.00374	0.00527	0.02228	50.71	16.72	0.95135	link
Mabel and Fatty's Married Life 1915 Sequence 1	Original	0.00600	0.01068	0.01644	55.21	21.57	1.00000	link
	OldPhoto + TS	0.00706	0.01091	0.02478	36.77	21.30	0.92290	link
	Deepremaster	0.00692	0.01125	0.01847	49.04	20.67	0.95763	link
	NeatVideo	0.00426	0.00738	0.01006	56.30	21.60	1.43142	link
	RTN	0.00948	0.01223	0.04130	22.80	18.91	0.76779	link
	NFFA	0.00609	0.00865	0.02347	46.35	18.25	1.29017	link
	LFISTA	0.00504	0.00764	0.01229	53.12	20.62	1.38248	link
	LFISTA-SHARP	0.00612	0.00890	0.01522	50.16	19.60	1.03407	link
Mabel and Fatty's Married Life 1915 Sequence 2	Original	0.01495	0.01940	0.04758	56.14	23.45	1.00000	link
	OldPhoto + TS	0.01476	0.01792	0.07980	40.56	16.93	0.89677	link
	Deepremaster	0.01467	0.01958	0.04359	54.56	23.59	0.93974	link
	NeatVideo	0.00981	0.01365	0.02344	59.19	23.42	1.19818	link
	RTN	0.01082	0.01446	0.05544	34.96	22.71	0.84073	link
	NFFA	0.00902	0.01273	0.04476	44.23	18.52	0.92633	link
	LFISTA	0.01046	0.01379	0.03352	55.88	22.96	1.11548	link
	LFISTA-SHARP	0.01121	0.01410	0.05195	49.04	17.56	0.90382	link
Alphonse and Gas- ton, no. 3	Original	0.00954	0.01568	0.04477	55.41	20.34	1.00000	link
	OldPhoto + TS	0.01091	0.01607	0.06589	39.09	20.07	0.90077	link
	Deepremaster	0.01032	0.01585	0.04415	54.06	20.27	0.95327	link
	NeatVideo	0.00654	0.01060	0.02928	57.66	20.61	1.26671	link
	RTN	0.01135	0.01459	0.05284	35.08	19.06	0.73488	link
	NFFA	0.00902	0.01205	0.07683	53.47	19.28	1.38516	link
	LFISTA	0.00699	0.01045	0.03144	52.91	20.26	1.19557	link
	LFISTA-SHARP	0.00833	0.01206	0.04074	48.81	18.71	0.85416	link

A gesture fight in Hester Street	Original	0.01125	0.01877	0.05761	50.30	22.11	1.00000	link
	OldPhoto + TS	0.01252	0.01850	0.08699	32.56	17.83	0.87244	link
	Deepremaster	0.01237	0.01905	0.05704	47.00	22.43	0.94530	link
	NeatVideo	0.00926	0.01583	0.03429	51.85	22.80	1.14264	link
	RTN	0.01344	0.01760	0.06561	28.23	20.09	0.77724	link
	NFFA	0.00592	0.01134	0.03515	45.32	17.45	1.13514	link
	LFISTA	0.00971	0.01597	0.04231	48.79	22.67	1.11672	link
	LFISTA-SHARP	0.01111	0.01648	0.06266	44.71	18.73	0.83937	link
Panama Pacific Expo World's Fair in San Francisco 1915 Sequence 1	Original	0.00634	0.00906	0.07257	63.01	24.18	1.00000	link
	OldPhoto + TS	0.00666	0.00895	0.06888	52.53	17.04	0.94053	link
	Deepremaster	0.00622	0.00932	0.03642	63.46	24.28	0.96163	link
	NeatVideo	0.00411	0.00628	0.01271	61.09	23.08	1.44503	link
	RTN	0.00648	0.00839	0.02731	44.21	25.03	0.80439	link
	NFFA	0.00449	0.00615	0.06476	46.44	16.23	1.27850	link
	LFISTA	0.00420	0.00587	0.01213	57.57	22.37	1.47812	link
	LFISTA-SHARP	0.00494	0.00671	0.01594	54.69	15.36	1.14781	link
Panama Pacific Expo World's Fair in San Francisco 1915 Sequence 2	Original	0.00999	0.01370	0.03390	49.73	22.57	1.00000	link
	OldPhoto + TS	0.01106	0.01441	0.05109	32.56	18.75	0.84466	link
	Deepremaster	0.00941	0.01370	0.02535	46.21	22.51	1.06345	link
	NeatVideo	0.00566	0.00818	0.02087	51.10	22.74	1.52531	link
	RTN	0.00816	0.01026	0.03228	31.65	23.40	0.92725	link
	NFFA	0.00508	0.00677	0.02495	47.15	16.66	1.50904	link
	LFISTA	0.00500	0.00680	0.01379	48.39	22.45	1.76780	link
	LFISTA-SHARP	0.00607	0.00796	0.01699	42.25	17.29	1.29414	link
Panama Pacific Expo World's Fair in San Francisco 1915 Sequence 3	Original	0.00719	0.01021	0.04281	51.58	24.37	1.00000	link
	OldPhoto + TS	0.00894	0.01170	0.05708	36.49	21.80	0.79807	link
	Deepremaster	0.00729	0.01046	0.03307	48.61	23.86	1.03678	link
	NeatVideo	0.00519	0.00752	0.02552	54.17	24.43	1.28871	link
	RTN	0.00805	0.01031	0.04099	34.68	24.82	0.91092	link
	NFFA	0.00570	0.00729	0.03605	46.24	17.24	1.57865	link
	LFISTA	0.00486	0.00701	0.01864	47.73	23.62	1.44974	link
	LFISTA-SHARP	0.00583	0.00809	0.02187	43.06	21.86	1.13982	link
RaviShankar	Original	0.00650	0.00634	0.03299	62.71	22.66	1.00000	link
	OldPhoto + TS	0.00620	0.00804	0.06452	53.11	15.92	0.71124	link
	Deepremaster	0.00524	0.00771	0.02913	65.06	23.17	0.94563	link
	NeatVideo	0.00416	0.00550	0.02348	64.52	22.85	1.00750	link
	RTN	0.00553	0.00712	0.04434	37.67	23.44	0.81588	link
	NFFA	0.00477	0.00686	0.03893	45.23	16.92	1.00876	link
	LFISTA	0.00483	0.00540	0.02019	66.04	22.69	1.02279	link
	LFISTA-SHARP	0.00466	0.00564	0.03337	61.20	16.74	0.84520	link
Indian song #2	Original	0.00878	0.00970	0.10937	40.90	24.29	1.00000	link
	OldPhoto + TS	0.01009	0.01136	0.14336	23.47	18.33	0.77925	link
	Deepremaster	0.00794	0.00979	0.05651	37.87	24.04	0.91490	link

	NeatVideo	0.00634	0.00732	0.04388	41.21	23.52	1.06481	link
	RTN	0.00858	0.00962	0.05805	23.41	22.51	0.74619	link
	NFFA	0.00666	0.00862	0.09048	45.96	17.89	1.08447	link
	LFISTA	0.00602	0.00681	0.03861	42.82	23.62	1.08581	link
	LFISTA-SHARP	0.00698	0.00815	0.05130	38.88	17.74	0.86957	link
Old Norse Vikings Festival (1927) - Britain on Film (Total duration of 1 min 6 sec divided into 4 sequences)	Original	0.00724	0.01126	0.02988	54.85	19.59	1.00000	link
	OldPhoto + TS	0.00831	0.01158	0.04094	43.61	14.66	0.91406	link
	Deepremaster	0.00841	0.01229	0.03117	54.85	19.59	0.95918	link
	NeatVideo	0.00531	0.00814	0.02239	55.93	19.89	1.15724	link
	RTN	0.00821	0.01068	0.03753	35.83	19.05	0.78252	link
	NFFA	0.00342	0.00935	0.04524	42.35	18.34	1.95324	link
	LFISTA	0.00535	0.00819	0.02005	52.97	20.03	1.17650	link
	LFISTA-SHARP	0.00624	0.00867	0.02361	53.07	14.76	0.87038	link
St. Andrew's Wells (1920) (Total duration of 9 min 23 sec divided into 20 sequences)	Original	0.00480	0.00666	0.02836	46.68	20.94	1.00000	link
	OldPhoto + TS	0.00675	0.00886	0.03109	43.88	15.36	0.78870	link
	Deepremaster	0.00589	0.00873	0.02648	59.69	20.96	0.90276	link
	NeatVideo	0.00303	0.00461	0.01320	66.13	21.40	1.08616	link
	RTN	0.00706	0.00901	0.02883	63.17	20.25	0.89063	link
	NFFA	0.00314	0.00446	0.01066	75.82	17.52	2.22192	link
	LFISTA	0.00343	0.00479	0.01278	67.82	21.24	1.12401	link
	LFISTA-SHARP	0.00483	0.00684	0.01750	54.92	15.85	0.93678	link
Wedding of Miss Carrie Alexander, Faversham 1913 (Total duration of 3 min 59 sec divided into 15 sequences)	Original	0.00783	0.01248	0.04102	38.35	20.38	1.00000	link
	OldPhoto + TS	0.00818	0.01170	0.05849	33.64	14.86	0.90821	link
	Deepremaster	0.00853	0.01272	0.05187	38.35	20.38	0.94495	link
	NeatVideo	0.00607	0.00968	0.03228	46.01	20.78	1.03253	link
	RTN	0.00941	0.01193	0.05800	30.39	19.30	0.76856	link
	NFFA	0.00471	0.00693	0.03692	42.01	15.30	2.26568	link
	LFISTA	0.00578	0.00886	0.03215	43.38	20.67	1.09870	link
	LFISTA-SHARP	0.00672	0.00974	0.04536	44.04	15.07	0.86946	link
New Zealanders Win At Rugby (1916) - Britain on Film Sequence 1	Original	0.00731	0.01037	0.01839	40.46	20.13	1.00000	link
	OldPhoto + TS	0.00839	0.01085	0.02517	27.53	13.08	0.90075	link
	Deepremaster	0.00772	0.01110	0.01714	36.15	20.33	0.87210	link
	NeatVideo	0.00460	0.00737	0.01357	41.68	20.22	1.47734	link
	RTN	0.00886	0.01082	0.02822	19.22	19.91	0.77250	link
	NFFA	0.00478	0.00614	0.01821	39.38	15.41	1.89204	link
	LFISTA	0.00438	0.00663	0.01024	38.45	20.20	1.64308	link

	LFISTA-SHARP	0.00614	0.00845	0.01178	39.55	13.75	1.16966	link
New Zealanders Win At Rugby (1916) - Britain on Film Sequence 2	Original	0.00659	0.00994	0.02161	41.94	20.67	1.00000	link
	OldPhoto + TS	0.00812	0.01079	0.02945	26.87	14.96	0.81714	link
	Deepremaster	0.00730	0.01060	0.02030	38.15	20.62	0.95685	link
	NeatVideo	0.00452	0.00678	0.01774	43.53	20.72	1.23579	link
	RTN	0.00897	0.01071	0.03180	20.12	20.77	0.64280	link
	NFFA	0.00543	0.00705	0.02460	38.13	16.23	1.15081	link
	LFISTA	0.00464	0.00664	0.01421	40.22	20.54	1.34741	link
	LFISTA-SHARP	0.00643	0.00850	0.01634	39.45	15.26	0.89828	link
Round the Wirral with a Movie Camera (1934) Sequence 1	Original	0.00937	0.01058	0.05061	44.55	18.95	1.00000	link
	OldPhoto + TS	0.00806	0.00936	0.06387	46.19	16.34	1.02347	link
	Deepremaster	0.00806	0.01003	0.04004	39.35	22.19	1.00013	link
	NeatVideo	0.00470	0.00612	0.03231	50.13	22.65	1.19531	link
	RTN	0.00917	0.01042	0.05190	33.65	23.13	0.89387	link
	NFFA	0.00466	0.00584	0.03340	42.34	17.35	2.28079	link
	LFISTA	0.00493	0.00631	0.02071	47.83	22.75	1.77048	link
	LFISTA-SHARP	0.00595	0.00746	0.02387	49.21	13.43	1.35691	link
Round the Wirral with a Movie Camera (1934) Sequence 2	Original	0.00788	0.00974	0.05494	37.86	18.82	1.00000	link
	OldPhoto + TS	0.00749	0.00909	0.06142	45.88	14.37	1.11008	link
	Deepremaster	0.00823	0.01095	0.04825	37.01	19.95	0.96934	link
	NeatVideo	0.00529	0.00662	0.04308	40.63	20.36	1.30269	link
	RTN	0.00922	0.01039	0.06163	48.14	20.20	0.77131	link
	NFFA	0.00459	0.00596	0.03502	43.92	16.20	1.84327	link
	LFISTA	0.00535	0.00683	0.03252	40.54	20.07	1.37521	link
	LFISTA-SHARP	0.00646	0.00800	0.03953	39.39	13.29	1.03091	link
The Kiss in the Tunnel (BFI National Archive)	Original	0.00705	0.01195	0.07099	43.54	20.42	1.00000	link
	OldPhoto + TS	0.00868	0.01300	0.08410	17.83	17.13	0.81189	link
	Deepremaster	0.00885	0.01251	0.07146	38.01	20.54	0.98911	link
	NeatVideo	0.00609	0.00907	0.04080	40.55	21.59	1.17375	link
	RTN	0.00964	0.01180	0.06094	30.53	21.00	0.71899	link
	NFFA	0.00749	0.00906	0.10538	30.57	18.88	1.75659	link
	LFISTA	0.00581	0.00838	0.03179	39.52	19.90	1.26722	link
	LFISTA-SHARP	0.00692	0.00957	0.03380	31.45	17.03	0.89180	link
Indian song 2 (color video)	Original	0.00535	0.01111	0.02937	51.81	22.83	1.00000	link
	OldPhoto + TS	0.00788	0.01043	0.04409	44.20	16.03	0.96605	link
	Deepremaster	0.00891	0.01122	0.03012	53.02	23.01	0.92529	link
	NeatVideo	0.00471	0.01297	0.02181	54.82	22.88	1.03584	link
	RTN	0.00706	0.01264	0.04920	29.81	22.00	0.83803	link
	NFFA	0.00692	0.01153	0.03831	47.24	22.31	1.15552	link
	LFISTA	0.00552	0.01139	0.02546	61.63	22.52	1.10329	link
	LFISTA-SHARP	0.00568	0.00973	0.03493	58.03	17.68	1.01544	link

Atlas	1907 001.mp4	Canada	Original	0.00656	0.00963	0.04941	53.14	15.33	1.00000	-
			NFFA	0.00567	0.00804	0.05193	60.05	16.54	1.31205	-
			LFISTA	0.00596	0.00795	0.02978	52.51	13.55	1.11208	-
	1907 002.mp4	Canada	Original	0.00655	0.00990	0.03896	42.25	15.87	1.00000	-
			NFFA	0.00522	0.00722	0.04537	52.25	18.09	1.40957	-
			LFISTA	0.00618	0.00826	0.03330	43.27	13.83	1.07833	-
	1928 001.mp4	Manchester	Original	0.00338	0.00660	0.01119	69.95	17.50	1.00000	-
			NFFA	0.00293	0.00456	0.01538	68.61	16.37	1.10633	-
			LFISTA	0.00327	0.00512	0.00899	67.39	17.91	1.25818	-
	97377 001.mp4		Original	0.01031	0.01261	0.16277	46.09	16.62	1.00000	-
			NFFA	0.00623	0.00782	0.08886	55.23	16.36	0.96032	-
			LFISTA	0.00569	0.00667	0.05563	63.81	16.42	1.12171	-
	97377 002.mp4		Original	0.00755	0.01224	0.14563	64.87	17.74	1.00000	-
			NFFA	0.00448	0.00844	0.09901	66.66	15.54	1.47109	-
			LFISTA	0.00524	0.00680	0.04370	82.17	17.30	1.13870	-
	97377 003.mp4		Original	0.00920	0.01208	0.12446	47.69	20.66	1.00000	-
			NFFA	0.00561	0.00712	0.05758	53.96	17.06	1.20441	-
			LFISTA	0.00632	0.00686	0.05572	56.15	16.69	1.07617	-
	97377 004.mp4		Original	0.00983	0.01266	0.08101	38.41	16.48	1.00000	-
			NFFA	0.00758	0.00943	0.07279	43.06	15.47	0.51097	-
			LFISTA	0.00519	0.00679	0.03835	49.97	16.38	1.03681	-
	africa 001.mp4	speaks	Original	0.00799	0.01100	0.07598	48.83	20.39	1.00000	-
			NFFA	0.00588	0.00776	0.07315	51.22	17.75	1.58463	-
			LFISTA	0.00428	0.00624	0.02958	54.75	16.33	1.53632	-
	africa 002.mp4	speaks	Original	0.00717	0.01057	0.07941	49.47	16.17	1.00000	-
			NFFA	0.00471	0.00605	0.07084	51.98	18.48	1.10735	-
			LFISTA	0.00568	0.00788	0.04136	49.82	14.76	1.15204	-
africa 003.mp4	speaks	Original	0.00703	0.01024	0.04267	50.30	19.04	1.00000	-	
		NFFA	0.00430	0.00572	0.03252	52.07	16.82	1.92371	-	
		LFISTA	0.00342	0.00497	0.01434	54.40	15.13	1.70497	-	
africa 004.mp4	speaks	Original	0.00938	0.01358	0.06373	49.35	26.13	1.00000	-	
		NFFA	0.00709	0.01061	0.06413	51.06	23.73	1.09605	-	
		LFISTA	0.00462	0.00694	0.02846	59.94	22.18	1.22829	-	
africa 005.mp4	speaks	Original	0.01563	0.01912	0.15502	42.99	33.84	1.00000	-	
		NFFA	0.01403	0.01730	0.13652	44.90	32.27	1.23531	-	
		LFISTA	0.00909	0.01158	0.07958	55.63	25.57	1.11964	-	
Around the world in 1896 001.mp4		Original	0.00757	0.01191	0.02822	56.66	16.06	1.00000	-	
		NFFA	0.00636	0.00871	0.03808	60.42	16.48	1.38117	-	
		LFISTA	0.00573	0.00942	0.01553	54.64	16.49	1.63312	-	
Around the world in 1896 002.mp4		Original	0.00583	0.00902	0.01604	55.45	18.74	1.00000	-	
		NFFA	0.00474	0.00624	0.02129	56.41	17.65	1.30430	-	
		LFISTA	0.00430	0.00615	0.01161	56.40	18.65	1.20295	-	

born to the saddle 001.mp4	Original	0.00738	0.01039	0.03702	48.21	22.01	1.00000	-
	NFFA	0.00669	0.00919	0.04952	52.67	20.77	0.98386	-
	LFISTA	0.00661	0.00890	0.02226	49.14	20.76	1.16437	-
born to the saddle 002.mp4	Original	0.00768	0.00987	0.06188	47.28	15.27	1.00000	-
	NFFA	0.00665	0.00884	0.05388	48.25	15.41	1.19333	-
	LFISTA	0.00666	0.00856	0.02388	44.56	15.40	1.06856	-
CHRISTMAS 1932 001.mp4	Original	0.00770	0.00980	0.04614	45.52	18.65	1.00000	-
	NFFA	0.00626	0.00846	0.05160	50.71	18.71	1.08206	-
	LFISTA	0.00630	0.00806	0.03442	46.52	18.74	1.06803	-
CHRISTMAS 1932 002.mp4	Original	0.00731	0.00979	0.05395	52.36	17.61	1.00000	-
	NFFA	0.00645	0.00832	0.06911	56.40	17.17	1.05773	-
	LFISTA	0.00670	0.00868	0.04531	52.19	16.43	1.03796	-
CHRISTMAS 1932 003.mp4	Original	0.00734	0.00975	0.04546	42.50	18.07	1.00000	-
	NFFA	0.00643	0.00969	0.05618	48.98	17.74	1.00560	-
	LFISTA	0.00640	0.00787	0.03186	44.30	18.23	1.07297	-
danger ahead 001.mp4	Original	0.01089	0.01440	0.04271	41.25	26.76	1.00000	-
	NFFA	0.00822	0.01069	0.04418	42.05	28.30	1.28042	-
	LFISTA	0.00478	0.00715	0.01426	45.42	27.07	1.77432	-
danger ahead 002.mp4	Original	0.01368	0.01685	0.12669	42.45	18.22	1.00000	-
	NFFA	0.01407	0.01830	0.11298	42.95	24.19	0.98231	-
	LFISTA	0.01155	0.01362	0.08778	46.09	17.51	1.06368	-
danger ahead 003.mp4	Original	0.00963	0.01357	0.04641	36.61	22.03	1.00000	-
	NFFA	0.00727	0.01010	0.04324	37.72	22.37	1.17014	-
	LFISTA	0.00778	0.01064	0.03397	37.21	21.38	1.18385	-
danger ahead 004.mp4	Original	0.01077	0.01323	0.05223	41.27	19.97	1.00000	-
	NFFA	0.01205	0.01652	0.08719	44.52	21.38	0.63058	-
	LFISTA	0.00832	0.01061	0.03139	42.08	18.91	1.07064	-
Die 001.mp4	Original	0.01181	0.01278	0.05411	34.48	20.29	1.00000	-
	NFFA	0.00528	0.00653	0.04732	39.19	20.68	1.62794	-
	LFISTA	0.00476	0.00598	0.02513	39.55	17.51	1.36538	-
Die 002.mp4	Original	0.01831	0.01940	0.13488	48.19	21.26	1.00000	-
	NFFA	0.00507	0.00638	0.08072	52.59	18.90	2.76358	-
	LFISTA	0.00619	0.00884	0.03672	64.35	14.80	1.99030	-
Die 003.mp4	Original	0.01945	0.02061	0.14431	45.44	22.73	1.00000	-
	NFFA	0.00567	0.00705	0.10667	49.79	18.12	2.85076	-
	LFISTA	0.00620	0.00866	0.04015	62.04	15.40	2.12312	-
HOF 001.mp4	Original	0.01359	0.01634	0.10772	30.20	15.46	1.00000	-
	NFFA	0.01080	0.01398	0.10083	37.52	16.85	1.06046	-
	LFISTA	0.00770	0.01004	0.06656	50.39	18.07	1.05154	-
HOF 2 001.mp4	Original	0.01751	0.01844	0.16415	15.90	16.33	1.00000	-
	NFFA	0.00991	0.01278	0.09328	18.92	18.41	0.91674	-
	LFISTA	0.00629	0.00819	0.06323	45.15	18.69	1.10806	-
HOF 2 002.mp4	Original	0.01397	0.01602	0.14445	19.54	12.60	1.00000	-
	NFFA	0.01027	0.01456	0.11648	27.91	14.58	1.07767	-

	LFISTA	0.00889	0.01059	0.07942	51.09	18.44	1.04599	-
HOF 2 003.mp4	Original	0.01439	0.01378	0.13499	50.44	12.16	1.00000	-
	NFFA	0.00502	0.00577	0.08117	53.90	12.02	1.30126	-
	LFISTA	0.00707	0.00840	0.05306	55.12	17.73	1.17605	-
HOF 2 004.mp4	Original	0.01347	0.01528	0.13841	27.81	14.07	1.00000	-
	NFFA	0.01014	0.01306	0.11866	34.87	16.39	1.18384	-
	LFISTA	0.00748	0.00906	0.07995	53.21	16.22	1.03620	-
HOF 2 005.mp4	Original	0.01634	0.01806	0.18749	28.37	14.49	1.00000	-
	NFFA	0.01023	0.01327	0.18524	40.51	16.30	1.48768	-
	LFISTA	0.00694	0.00895	0.09100	61.43	15.72	1.42178	-
HOF 2 006.mp4	Original	0.01171	0.01265	0.17687	23.87	18.27	1.00000	-
	NFFA	0.00897	0.01150	0.13411	30.83	20.89	1.01547	-
	LFISTA	0.00523	0.00604	0.07336	55.58	18.55	1.01421	-
HOF 2 007.mp4	Original	0.01281	0.01429	0.20788	24.37	12.75	1.00000	-
	NFFA	0.00782	0.01055	0.12501	34.17	16.55	0.46386	-
	LFISTA	0.00678	0.00744	0.10172	53.14	18.67	1.14741	-
HOF 2 008.mp4	Original	0.01466	0.01722	0.14806	14.09	18.31	1.00000	-
	NFFA	0.01081	0.01275	0.12739	16.36	21.22	0.84228	-
	LFISTA	0.00790	0.01117	0.05851	40.83	21.36	1.04698	-
HOF 3 001.mp4	Original	0.01098	0.01406	0.07749	37.65	17.16	1.00000	-
	NFFA	0.00624	0.00777	0.05479	38.57	18.66	1.02559	-
	LFISTA	0.00799	0.01183	0.03591	42.58	20.94	1.08173	-
HOF 3 002.mp4	Original	0.01702	0.01755	0.13910	6.81	13.96	1.00000	-
	NFFA	0.01093	0.01334	0.11227	6.06	15.37	1.00801	-
	LFISTA	0.00625	0.00753	0.05230	41.40	18.21	1.13110	-
HOF 3 003.mp4	Original	0.01617	0.01684	0.15215	7.59	14.47	1.00000	-
	NFFA	0.01101	0.01323	0.12487	3.39	15.91	1.22096	-
	LFISTA	0.00544	0.00662	0.04443	36.17	20.41	1.90534	-
IA 35000011 001 001.mp4	Original	0.00749	0.00889	0.06956	42.99	17.87	1.00000	-
	NFFA	0.00702	0.00923	0.07894	44.95	16.47	1.17441	-
	LFISTA	0.00645	0.00730	0.05454	49.74	15.96	1.00591	-
Lagent 001.mp4	Original	0.01087	0.01580	0.03281	43.56	20.03	1.00000	-
	NFFA	0.00669	0.00890	0.02692	44.89	20.28	4.73668	-
	LFISTA	0.00677	0.01036	0.01319	51.43	16.61	2.28647	-
Lagent 002.mp4	Original	0.00861	0.01227	0.02064	44.16	22.87	1.00000	-
	NFFA	0.00617	0.00825	0.02180	45.12	23.22	1.49480	-
	LFISTA	0.00471	0.00684	0.01079	44.71	21.67	1.45318	-
Lagent 003.mp4	Original	0.00886	0.01319	0.02224	32.66	18.63	1.00000	-
	NFFA	0.00582	0.00750	0.02290	34.83	17.72	1.29914	-
	LFISTA	0.00576	0.00903	0.01377	33.24	16.58	1.48611	-
Lagent 004.mp4	Original	0.00852	0.01305	0.02382	37.90	22.81	1.00000	-
	NFFA	0.00593	0.00832	0.02638	39.21	21.29	1.64946	-
	LFISTA	0.00513	0.00803	0.01442	40.31	21.02	1.60354	-
Lagent 005.mp4	Original	0.01013	0.01332	0.05195	45.68	24.16	1.00000	-
	NFFA	0.00819	0.01059	0.05497	46.71	23.45	1.22579	-
	LFISTA	0.00569	0.00827	0.02073	48.59	21.38	1.73138	-
Lagent 006.mp4	Original	0.00789	0.01217	0.02076	54.08	21.13	1.00000	-
	NFFA	0.00531	0.00691	0.01967	55.76	21.32	1.91077	-
	LFISTA	0.00450	0.00684	0.01176	60.48	18.27	1.57985	-
Lagent 007.mp4	Original	0.00833	0.01180	0.01970	42.24	21.89	1.00000	-
	NFFA	0.00562	0.00734	0.01901	41.95	21.50	1.62098	-
	LFISTA	0.00451	0.00704	0.00873	50.89	16.87	1.90928	-

Scarlet Street 001.mp4	Original	0.00610	0.00843	0.01915	49.34	18.55	1.00000	-
	NFFA	0.00427	0.00571	0.01471	50.70	19.47	1.64251	-
	LFISTA	0.00401	0.00523	0.00959	50.51	15.64	1.37280	-
SGL 4 001.mp4	Original	0.00950	0.01289	0.08031	31.18	18.68	1.00000	-
	NFFA	0.01095	0.04513	0.06774	33.54	18.74	0.68892	-
	LFISTA	0.00722	0.01550	0.04324	31.89	17.10	1.04968	-
SGL 4 002.mp4	Original	0.01837	0.02159	0.06880	29.72	17.44	1.00000	-
	NFFA	0.02163	0.03015	0.06468	46.28	17.35	1.05982	-
	LFISTA	0.01423	0.01593	0.05510	33.47	16.96	1.05985	-
SGL 4 003.mp4	Original	0.01343	0.01693	0.11222	36.67	18.56	1.00000	-
	NFFA	0.00924	0.01282	0.10144	45.11	17.19	1.04376	-
	LFISTA	0.00939	0.01236	0.08714	42.66	15.60	1.13837	-
SGL 4 004.mp4	Original	0.00744	0.01013	0.08181	33.53	16.08	1.00000	-
	NFFA	0.00528	0.00742	0.05166	40.52	15.56	1.52285	-
	LFISTA	0.00518	0.00699	0.03397	42.42	15.85	1.16996	-
TheFrontPage1931 001.mp4	Original	0.00620	0.00867	0.01950	57.95	18.64	1.00000	-
	NFFA	0.00457	0.00624	0.01708	61.86	18.57	0.83515	-
	LFISTA	0.00326	0.00487	0.00984	66.01	14.67	1.47641	-
TheGoodforNothing 001.mp4	Original	0.01029	0.01325	0.04730	27.40	16.63	1.00000	-
	NFFA	0.00781	0.01011	0.05118	29.10	16.39	1.03019	-
	LFISTA	0.00566	0.00729	0.02576	38.37	14.48	1.22978	-
Winter Scenes in Holland 001.mp4	Original	0.00734	0.00975	0.04546	42.50	18.07	1.00000	-
	NFFA	0.00646	0.00969	0.05756	48.68	17.19	0.99821	-
	LFISTA	0.00640	0.00787	0.03186	44.30	18.23	1.07297	-
Winter Scenes in Holland 002.mp4	Original	0.00770	0.00980	0.04614	45.52	18.65	1.00000	-
	NFFA	0.00616	0.00839	0.05163	50.74	18.98	1.12887	-
	LFISTA	0.00630	0.00806	0.03442	46.52	18.74	1.06803	-
Winter Scenes in Holland 003.mp4	Original	0.00694	0.01029	0.03109	45.68	15.30	1.00000	-
	NFFA	0.00570	0.00812	0.03252	48.59	15.76	0.78119	-
	LFISTA	0.00525	0.00772	0.01640	49.14	14.75	1.13670	-
Winter Scenes in Holland 004.mp4	Original	0.00799	0.01156	0.05276	50.02	16.01	1.00000	-
	NFFA	0.00601	0.00830	0.06094	58.46	18.14	1.61320	-
	LFISTA	0.00526	0.00778	0.01860	54.57	15.78	1.80398	-
Winter Scenes in Holland 005.mp4	Original	0.00997	0.01504	0.04406	36.05	17.97	1.00000	-
	NFFA	0.00790	0.01105	0.05589	36.22	18.10	1.07171	-
	LFISTA	0.00750	0.01106	0.01998	36.76	15.72	1.19862	-
Winter Scenes in Holland 006.mp4	Original	0.00828	0.01197	0.05091	44.26	14.47	1.00000	-
	NFFA	0.00670	0.00919	0.06491	49.94	15.75	0.94599	-
	LFISTA	0.00682	0.00908	0.03559	45.90	14.51	1.33872	-
Winter Scenes in Holland 007.mp4	Original	0.00749	0.00946	0.06015	52.08	17.65	1.00000	-
	NFFA	0.00646	0.00829	0.06970	56.30	17.16	1.03692	-
	LFISTA	0.00676	0.00845	0.05126	53.24	16.09	1.04254	-

References

- [1] G. Eilertsen, R. Mantiuk, and J. Unger. Single-frame regularization for temporally stable cnns. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 11176–11185, 2019. 3
- [2] S. Iizuka and E. Simo-Serra. Deepremaster: Temporal source-reference attention networks for comprehensive video enhancement. *ACM Trans. Graph.*, 38(6), 2019. 1, 2, 3
- [3] W.-S. Lai, J.-B. Huang, O. Wang, E. Shechtman, E. Yumer, and M.-H. Yang. Learning blind video temporal consistency. In *ECCV*, 2018. 1, 3
- [4] C. Lei, X. Ren, Z. Zhang, and Q. Chen. Blind video deflickering by neural filtering with a flawed atlas. In *CVPR*, 2023. 3
- [5] A. Mittal, A.K. Moorthy, and A. C. Bovik. Blind/referenceless image spatial quality evaluator. In *Asilomar conference on signals, systems and computers*, 2011. 3
- [6] A. Mittal, R. Soundararajan, and A. C. Bovik. Making a “completely blind” image quality analyzer. *IEEE Signal Processing Letters*, 20(3), 2012. 3
- [7] Z. Wan, B. Zhang, D. Chen, and J. Liao. Bringing old films back to life. In *IEEE CVPR*, 2022. 1, 2, 3
- [8] Z. Wan, B. Zhang, D. Chen, P. Zhang, D. Chen, J. Liao, and F. Wen. Bringing old photos back to life. In *CVPR*, 2020. 1, 3