

Compression Analysis on Different Prediction Modes and Quantization for Satellogic Data Set

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1 Summary

Table 1: Pixel

A	B	C	D
E	F	G	H
I	J	[X]	-

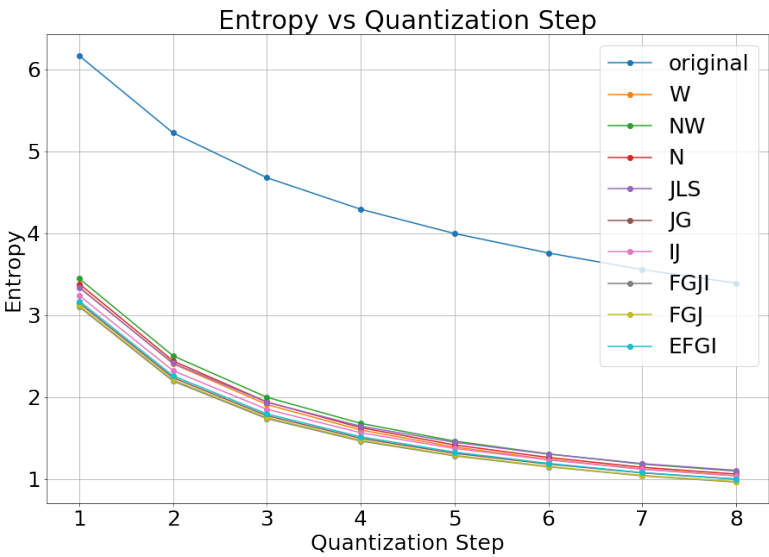


Figure 1: Entropy of each prediction mode for each quantization step

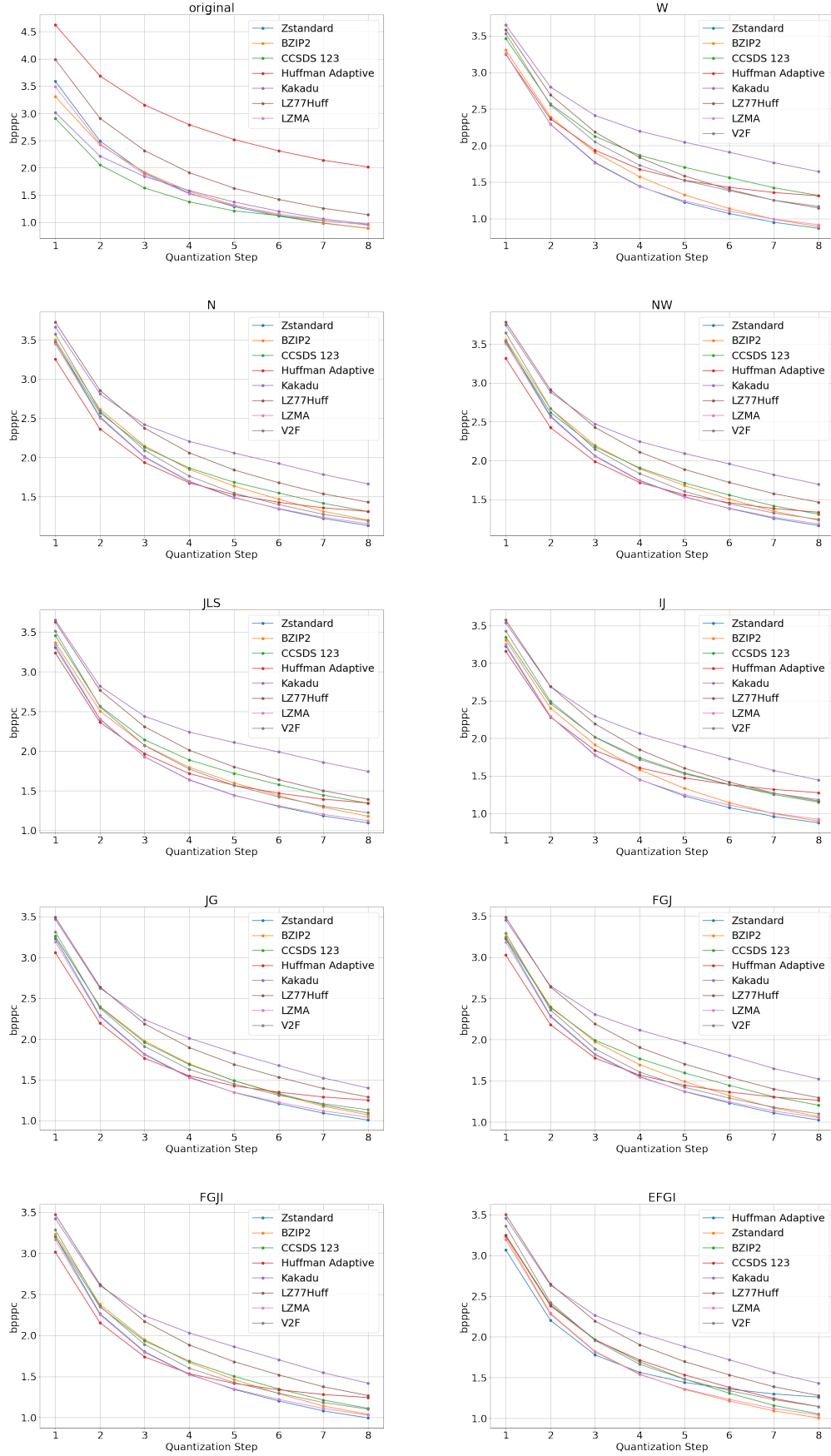


Figure 2: Compressed Bit Rate (bpppc) of each codec for each prediction mode

2 Compression Analysis $q=1$

2.1 Boats2020

Table 2: Boats2020 $q = 1$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.9702	3.3970	3.5343	3.3966	3.3008	3.1591	3.3893	3.2044	3.1640	3.3123
Huffman	4.8613	3.3028	3.4173	3.2820	3.2097	3.0713	3.2986	3.1147	3.0755	3.2128
Zstandard	3.6776	3.3257	3.6026	3.4851	3.2890	3.2381	3.3516	3.2589	3.2507	3.3019
JPEG-LS	2.9577	3.6449	3.7248	3.6450	3.6073	3.4473	3.5815	3.4412	3.4479	3.4886
Kakadu	2.9997	3.6504	3.7587	3.6456	3.6106	3.4469	3.5779	3.4484	3.4501	3.4995
CCSDS 123	2.9025	3.4638	3.5467	3.4503	3.4024	3.2360	3.3871	3.2303	3.2285	3.2910
BZIP2	3.3501	3.3910	3.5996	3.4832	3.3797	3.2788	3.3931	3.2831	3.2844	3.3071
LZ77Huff	4.1897	3.6669	3.8519	3.7327	3.6202	3.5183	3.6952	3.5537	3.5318	3.6063
LZMA	3.5508	3.3104	3.5495	3.4375	3.3139	3.1948	3.3445	3.2219	3.2083	3.2706
V2F	-	3.6617	3.8320	3.6423	3.5055	3.3749	3.7196	3.4960	3.4090	3.6393

Table 3: Boats2020 $q = 1$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.9702	3.3970	3.5343	3.3966	3.3008	3.1591	3.3893	3.2044	3.1640	3.3123
Huffman Adaptive	1.2391	1.0282	1.0340	1.0347	1.0282	1.0283	1.0269	1.0284	1.0284	1.0305
Zstandard	1.6313	1.0233	0.9798	0.9738	1.0038	0.9757	1.0110	0.9820	0.9727	1.0010
JPEG-LS	2.0213	0.9306	0.9469	0.9307	0.9145	0.9154	0.9433	0.9288	0.9160	0.9464
Kakadu	1.9946	0.9295	0.9387	0.9308	0.9138	0.9156	0.9447	0.9272	0.9157	0.9438
CCSDS 123	2.0612	0.9799	0.9954	0.9839	0.9700	0.9756	0.9983	0.9902	0.9789	1.0041
BZIP2	1.7887	1.0033	0.9803	0.9741	0.9771	0.9631	0.9972	0.9740	0.9622	0.9986
LZ77Huff	1.4332	0.9264	0.9160	0.9089	0.9116	0.8972	0.9153	0.8998	0.8946	0.9158
LZMA	1.6899	1.0277	0.9945	0.9873	0.9963	0.9886	1.0128	0.9933	0.9855	1.0106
V2F	-	0.9316	0.9267	0.9353	0.9434	0.9387	0.9189	0.9225	0.9318	0.9173

Table 4: Boats2020 $q = 1$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.9702	3.3970	3.5343	3.3966	3.3008	3.1591	3.3893	3.2044	3.1640	3.3123
Huffman Adaptive	0.1225	0.1192	0.1242	0.1217	0.1158	0.1175	0.1208	0.1233	0.1117	0.0800
Zstandard	27.8817	34.3433	34.9150	35.0175	35.5342	36.0067	34.0092	34.9675	35.2417	35.7983
JPEG-LS	5.9075	6.5117	6.4283	6.2742	6.3558	6.5292	6.5175	6.2242	6.4908	6.4742
Kakadu	2.0217	2.4117	2.5483	2.4775	2.4508	2.3883	2.4442	2.3475	2.3192	2.5325
CCSDS 123	9.1453	9.3729	9.1014	9.2144	9.3816	9.0171	9.5062	9.4787	9.3575	10.6457
BZIP2	4.2672	4.0109	4.0852	4.0667	4.0618	4.2026	4.1341	4.9463	4.6297	4.7750
LZ77Huff	2.1728	2.3694	2.3700	2.4283	2.5356	2.3625	2.3540	2.3519	2.4750	2.6978
LZMA	30.9000	36.9216	36.3493	37.6492	38.0748	38.6318	37.4073	38.5462	38.9990	44.7962
V2F	-	1.5650	1.5925	1.7233	1.6442	1.7225	1.6300	1.6650	1.7050	1.7883

2.2 Fields2020

Table 5: Fields2020 $q = 1$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	6.1801	3.3400	3.4393	3.3801	3.3369	3.1467	3.2275	3.0942	3.1120	3.1604
Huffman Adaptive	4.6051	3.2453	3.3081	3.2498	3.2417	3.0592	3.1454	3.0077	3.0227	3.0576
Zstandard	3.5813	3.2497	3.5368	3.4786	3.3110	3.2344	3.2153	3.1994	3.2209	3.2246
JPEG-LS	2.9905	3.6405	3.7088	3.6588	3.6404	3.4821	3.5581	3.4447	3.4703	3.4766
Kakadu	3.0169	3.6495	3.7425	3.6666	3.6578	3.4698	3.5313	3.4221	3.4518	3.4555
CCSDS 123	2.9094	3.4642	3.5252	3.4738	3.4607	3.2633	3.3409	3.2013	3.2326	3.2410
BZIP2	3.3040	3.2993	3.5534	3.5009	3.3711	3.2563	3.2998	3.2285	3.2517	3.2462
LZ77Huff	3.9753	3.5792	3.7773	3.7259	3.6297	3.4921	3.5641	3.4670	3.4835	3.4957
LZMA	3.4856	3.2590	3.5022	3.4495	3.3419	3.1940	3.2455	3.1611	3.1840	3.1893
V2F	-	3.5233	3.6315	3.5671	3.5134	3.3110	3.4073	3.2710	3.2830	3.3436

Table 6: Fields2020 $q = 1$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	6.1801	3.3400	3.4393	3.3801	3.3369	3.1467	3.2275	3.0942	3.1120	3.1604
Huffman Adaptive	1.3438	1.0290	1.0395	1.0400	1.0293	1.0285	1.0258	1.0285	1.0294	1.0333
Zstandard	1.7276	1.0278	0.9721	0.9715	1.0078	0.9728	1.0034	0.9666	0.9659	0.9794
JPEG-LS	2.0670	0.9171	0.9269	0.9235	0.9165	0.9034	0.9064	0.8977	0.8964	0.9083
Kakadu	2.0490	0.9149	0.9185	0.9216	0.9122	0.9066	0.9133	0.9036	0.9012	0.9139
CCSDS 123	2.1250	0.9638	0.9752	0.9728	0.9642	0.9641	0.9653	0.9660	0.9624	0.9744
BZIP2	1.8722	1.0124	0.9674	0.9652	0.9899	0.9662	0.9775	0.9578	0.9567	0.9728
LZ77Huff	1.5569	0.9330	0.9101	0.9069	0.9193	0.9009	0.9050	0.8920	0.8930	0.9034
LZMA	1.7749	1.0249	0.9816	0.9796	0.9985	0.9850	0.9940	0.9783	0.9771	0.9902
V2F	-	0.9490	0.9484	0.9484	0.9501	0.9511	0.9493	0.9477	0.9490	0.9474

Table 7: Fields2020 $q = 1$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	6.1801	3.3400	3.4393	3.3801	3.3369	3.1467	3.2275	3.0942	3.1120	3.1604
Huffman Adaptive	0.1273	0.1223	0.1209	0.1194	0.1182	0.1139	0.1177	0.1186	0.1224	0.1107
Zstandard	26.2111	35.9265	35.2577	35.5388	36.4244	36.7668	35.9277	36.4346	36.5199	36.2198
JPEG-LS	6.1570	6.3862	6.3169	6.2806	6.3036	6.4496	6.4591	6.4075	6.4487	6.4278
Kakadu	2.0187	2.4783	2.5661	2.5009	2.4888	2.3780	2.4046	2.3397	2.3627	2.3766
CCSDS 123	9.1028	9.1344	9.2491	9.0351	9.0665	8.9847	9.1144	9.3124	9.1670	9.2192
BZIP2	4.3391	4.0198	4.1457	4.1383	4.5615	4.2262	3.9332	4.0009	4.4417	4.5325
LZ77Huff	2.1086	2.4371	2.4608	2.4781	2.4936	2.4551	2.4297	2.4223	2.4804	2.4089
LZMA	28.7274	38.3881	37.2425	38.1793	38.9418	39.0158	38.9408	39.1087	39.2343	39.2682
V2F	-	1.5160	1.6644	1.7230	1.6591	1.6813	1.6219	1.6829	1.7185	1.7274

2.3 Full Dataset

Table 8: Full Dataset $q = 1$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	6.1654	3.3439	3.4459	3.3813	3.3344	3.1476	3.2388	3.1019	3.1156	3.1710
Huffman Adaptive	4.6230	3.2493	3.3157	3.2520	3.2395	3.0600	3.1561	3.0152	3.0264	3.0684
Zstandard	3.5880	3.2550	3.5414	3.4790	3.3095	3.2346	3.2248	3.2035	3.2230	3.2300
JPEG-LS	2.9882	3.6408	3.7099	3.6579	3.6381	3.4797	3.5597	3.4445	3.4687	3.4775
Kakadu	3.0157	3.6495	3.7437	3.6652	3.6545	3.4682	3.5346	3.4239	3.4517	3.4586
CCSDS 123	2.9089	3.4642	3.5267	3.4722	3.4567	3.2614	3.3441	3.2034	3.2323	3.2445
BZIP2	3.3072	3.3057	3.5566	3.4996	3.3717	3.2579	3.3063	3.2323	3.2540	3.2504
LZ77Huff	3.9902	3.5853	3.7825	3.7263	3.6290	3.4940	3.5732	3.4731	3.4868	3.5034
LZMA	3.4901	3.2626	3.5055	3.4487	3.3400	3.1941	3.2524	3.1654	3.1857	3.1950
V2F	-	3.5330	3.6455	3.5723	3.5129	3.3155	3.4290	3.2867	3.2918	3.3642

Table 9: Full Dataset $q = 1$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	6.1654	3.3439	3.4459	3.3813	3.3344	3.1476	3.2388	3.1019	3.1156	3.1710
Huffman Adaptive	1.3365	1.0290	1.0391	1.0396	1.0292	1.0285	1.0258	1.0285	1.0293	1.0331
Zstandard	1.7209	1.0275	0.9726	0.9716	1.0075	0.9730	1.0039	0.9677	0.9664	0.9809
JPEG-LS	2.0638	0.9181	0.9283	0.9240	0.9164	0.9043	0.9090	0.8999	0.8978	0.9110
Kakadu	2.0452	0.9159	0.9199	0.9222	0.9123	0.9073	0.9155	0.9053	0.9022	0.9159
CCSDS 123	2.1205	0.9650	0.9766	0.9735	0.9646	0.9649	0.9676	0.9677	0.9635	0.9765
BZIP2	1.8663	1.0117	0.9683	0.9658	0.9890	0.9659	0.9789	0.9590	0.9571	0.9746
LZ77Huff	1.5483	0.9326	0.9105	0.9071	0.9188	0.9006	0.9057	0.8925	0.8932	0.9043
LZMA	1.7690	1.0251	0.9825	0.9801	0.9983	0.9853	0.9953	0.9794	0.9777	0.9917
V2F	-	0.9477	0.9469	0.9475	0.9496	0.9503	0.9472	0.9459	0.9478	0.9453

Table 10: Full Dataset $q = 1$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	6.1654	3.3439	3.4459	3.3813	3.3344	3.1476	3.2388	3.1019	3.1156	3.1710
Huffman Adaptive	0.1269	0.1221	0.1211	0.1195	0.1180	0.1141	0.1179	0.1190	0.1217	0.1086
Zstandard	26.3277	35.8160	35.2338	35.5024	36.3623	36.7138	35.7938	36.3322	36.4307	36.1904
JPEG-LS	6.1396	6.3950	6.3247	6.2802	6.3073	6.4551	6.4632	6.3947	6.4516	6.4310
Kakadu	2.0190	2.4736	2.5648	2.4993	2.4862	2.3787	2.4073	2.3402	2.3597	2.3875
CCSDS 123	9.1058	9.1511	9.2388	9.0476	9.0885	8.9869	9.1417	9.3240	9.1803	9.3187
BZIP2	4.3341	4.0192	4.1415	4.1333	4.5266	4.2245	3.9472	4.0668	4.4548	4.5494
LZ77Huff	2.1131	2.4324	2.4545	2.4746	2.4965	2.4486	2.4244	2.4174	2.4800	2.4290
LZMA	28.8790	38.2858	37.1802	38.1423	38.8814	38.9890	38.8338	39.0694	39.2179	39.6539
V2F	-	1.5194	1.6594	1.7230	1.6580	1.6842	1.6224	1.6817	1.7176	1.7317

3 Compression Analysis $q=2$

3.1 Boats2020

Table 11: Boats2020 $q = 2$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.0309	2.4628	2.5944	2.4616	2.3880	2.2540	2.4739	2.3006	2.2626	2.4028
Huffman Adaptive	3.9235	2.4253	2.5310	2.4053	2.3499	2.2121	2.4275	2.2582	2.2348	2.3503
Zstandard	2.5768	2.3759	2.6285	2.5119	2.3993	2.3083	2.4034	2.3341	2.3262	2.3712
BZIP2	2.4633	2.4765	2.7121	2.6041	2.5169	2.4261	2.4848	2.4315	2.4352	2.4556
CCSDS 123	2.0536	2.5817	2.6598	2.5675	2.5344	2.3796	2.5163	2.3833	2.3977	2.4397
Kakadu	2.2144	2.8141	2.9061	2.8069	2.7925	2.6212	2.7423	2.6436	2.6667	2.6883
LZ77Huff	3.0428	2.7819	2.9789	2.8615	2.7723	2.6725	2.8073	2.7028	2.6891	2.7454
LZMA	2.5257	2.3533	2.6133	2.5008	2.3972	2.2913	2.3898	2.3195	2.3116	2.3588
V2F	15.1729	2.6844	2.8542	2.6708	2.5629	2.4449	2.7760	2.5602	2.4815	2.6891

Table 12: Boats2020 $q = 2$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.0309	2.4628	2.5944	2.4616	2.3880	2.2540	2.4739	2.3006	2.2626	2.4028
Huffman Adaptive	1.3008	1.0145	1.0243	1.0227	1.0157	1.0183	1.0178	1.0177	1.0113	1.0213
Zstandard	1.9735	1.0418	0.9850	0.9785	0.9960	0.9765	1.0296	0.9834	0.9714	1.0095
BZIP2	2.0575	0.9973	0.9537	0.9434	0.9492	0.9281	0.9931	0.9426	0.9270	0.9734
CCSDS 123	2.4584	0.9519	0.9728	0.9572	0.9415	0.9457	0.9789	0.9619	0.9412	0.9805
Kakadu	2.2775	0.8728	0.8896	0.8750	0.8542	0.8581	0.8975	0.8664	0.8457	0.8889
LZ77Huff	1.6666	0.8856	0.8681	0.8584	0.8611	0.8423	0.8782	0.8479	0.8393	0.8707
LZMA	2.0145	1.0517	0.9907	0.9829	0.9969	0.9837	1.0356	0.9897	0.9777	1.0149
V2F	0.3316	0.9230	0.9154	0.9257	0.9342	0.9259	0.9020	0.9072	0.9172	0.9036

Table 13: Boats2020 $q = 2$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.0309	2.4628	2.5944	2.4616	2.3880	2.2540	2.4739	2.3006	2.2626	2.4028
Huffman Adaptive	0.1225	0.1183	0.1208	0.1158	0.1192	0.1158	0.1167	0.1133	0.1117	0.0692
Zstandard	29.6700	34.6492	35.2817	36.7300	41.7008	31.8342	34.1967	35.2575	35.1150	34.8692
BZIP2	3.5413	3.8803	4.4344	4.3052	4.3488	4.9305	4.7774	4.0679	3.8192	4.9188
CCSDS 123	6.4003	6.6308	6.6645	6.5573	6.5050	6.4592	6.5361	6.4803	6.5057	6.5421
Kakadu	1.7708	2.2675	2.3517	2.2650	2.2458	2.1017	2.2100	2.1317	2.1500	2.1717
LZ77Huff	3.8915	4.2660	4.1023	3.9375	3.8652	3.7519	4.1005	4.3034	1.6788	1.9332
LZMA	35.8834	39.9922	40.3997	41.3691	41.2137	41.3558	40.1326	41.4410	41.5236	47.1608
V2F	-	1.7675	1.9175	1.9050	1.8442	1.8575	1.8142	1.8725	1.8858	1.8917

3.2 Fields2020

Table 14: Fields2020 $q = 2$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.2390	2.4022	2.4963	2.4400	2.4158	2.2350	2.3104	2.1874	2.2056	2.2483
Huffman Adaptive	3.6687	2.3587	2.4156	2.3615	2.3648	2.1937	2.2707	2.1477	2.1776	2.1933
Zstandard	2.4881	2.2850	2.5701	2.5188	2.4020	2.2846	2.2837	2.2599	2.2848	2.2837
BZIP2	2.4200	2.3846	2.6664	2.6171	2.5068	2.3982	2.3956	2.3741	2.3988	2.3925
CCSDS 123	2.0556	2.5661	2.6160	2.5696	2.5711	2.3959	2.4585	2.3454	2.3888	2.3793
Kakadu	2.2163	2.8008	2.8791	2.8121	2.8212	2.6267	2.6854	2.6048	2.6504	2.6327
LZ77Huff	2.9011	2.6873	2.9072	2.8563	2.7681	2.6377	2.6828	2.6174	2.6364	2.6422
LZMA	2.4364	2.2822	2.5568	2.5061	2.4092	2.2745	2.2829	2.2490	2.2743	2.2736
V2F	-	2.5440	2.6575	2.5871	2.5612	2.3754	2.4701	2.3409	2.3528	2.4034

Table 15: Fields2020 $q = 2$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.2390	2.4022	2.4963	2.4400	2.4158	2.2350	2.3104	2.1874	2.2056	2.2483
Huffman Adaptive	1.4311	1.0182	1.0331	1.0331	1.0215	1.0186	1.0169	1.0180	1.0125	1.0245
Zstandard	2.1102	1.0517	0.9706	0.9682	1.0057	0.9781	1.0110	0.9671	0.9648	0.9833
BZIP2	2.1682	1.0075	0.9354	0.9318	0.9637	0.9316	0.9634	0.9204	0.9188	0.9384
CCSDS 123	2.5504	0.9356	0.9535	0.9491	0.9395	0.9325	0.9385	0.9317	0.9227	0.9438
Kakadu	2.3647	0.8572	0.8663	0.8672	0.8562	0.8505	0.8592	0.8389	0.8316	0.8529
LZ77Huff	1.8094	0.8938	0.8580	0.8538	0.8727	0.8470	0.8603	0.8349	0.8360	0.8498
LZMA	2.1553	1.0529	0.9756	0.9731	1.0028	0.9824	1.0113	0.9718	0.9693	0.9876
V2F	-	0.9459	0.9415	0.9446	0.9437	0.9421	0.9387	0.9372	0.9392	0.9391

Table 16: Fields2020 $q = 2$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.2390	2.4022	2.4963	2.4400	2.4158	2.2350	2.3104	2.1874	2.2056	2.2483
Huffman Adaptive	0.1210	0.1183	0.1160	0.1175	0.1170	0.1167	0.1166	0.1141	0.1154	0.1046
Zstandard	27.3525	34.9498	35.8610	35.8074	37.7803	40.1675	35.1872	34.9679	35.2594	35.2374
BZIP2	3.8667	4.4836	4.2858	4.1184	4.3305	4.5312	4.5041	4.4285	4.1607	4.2523
CCSDS 123	6.4311	6.5905	6.6112	6.6059	6.5715	6.5314	6.5381	6.4998	6.5231	6.5024
Kakadu	1.7617	2.2484	2.3221	2.2636	2.2678	2.1117	2.1624	2.0961	2.1326	2.1212
LZ77Huff	3.7446	3.9278	4.0705	3.8795	3.9492	4.1594	4.0246	4.0232	2.2511	1.6960
LZMA	33.1236	40.7281	40.9159	41.1782	41.5886	41.5819	41.0084	41.6150	41.7266	41.8167
V2F	-	1.7714	1.9256	1.9235	1.8456	1.8813	1.8396	1.8943	1.9066	1.8879

3.3 Full Dataset

Table 17: Full Dataset $q = 2$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.2245	2.4064	2.5032	2.4415	2.4139	2.2364	2.3218	2.1953	2.2095	2.2591
Huffman Adaptive	3.6865	2.3633	2.4237	2.3646	2.3638	2.1950	2.2816	2.1554	2.1816	2.2042
Zstandard	2.4943	2.2913	2.5742	2.5183	2.4018	2.2862	2.2920	2.2651	2.2877	2.2898
BZIP2	2.4230	2.3910	2.6696	2.6162	2.5075	2.4001	2.4018	2.3781	2.4014	2.3969
CCSDS 123	2.0554	2.5672	2.6190	2.5694	2.5686	2.3947	2.4626	2.3480	2.3894	2.3835
Kakadu	2.2162	2.8017	2.8810	2.8117	2.8192	2.6263	2.6894	2.6075	2.6516	2.6366
LZ77Huff	2.9110	2.6939	2.9122	2.8566	2.7684	2.6402	2.6915	2.6234	2.6401	2.6494
LZMA	2.4426	2.2872	2.5607	2.5058	2.4084	2.2757	2.2904	2.2540	2.2769	2.2795
V2F	-	2.5538	2.6712	2.5929	2.5613	2.3802	2.4914	2.3562	2.3618	2.4234

Table 18: Full Dataset $q = 2$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.2245	2.4064	2.5032	2.4415	2.4139	2.2364	2.3218	2.1953	2.2095	2.2591
Huffman Adaptive	1.4220	1.0180	1.0325	1.0323	1.0211	1.0186	1.0170	1.0180	1.0124	1.0243
Zstandard	2.1007	1.0510	0.9716	0.9690	1.0051	0.9780	1.0123	0.9682	0.9653	0.9851
BZIP2	2.1604	1.0068	0.9367	0.9326	0.9627	0.9314	0.9655	0.9220	0.9194	0.9408
CCSDS 123	2.5440	0.9367	0.9548	0.9497	0.9396	0.9334	0.9413	0.9338	0.9240	0.9464
Kakadu	2.3586	0.8583	0.8679	0.8678	0.8560	0.8510	0.8619	0.8408	0.8325	0.8554
LZ77Huff	1.7994	0.8932	0.8587	0.8541	0.8719	0.8467	0.8615	0.8358	0.8363	0.8512
LZMA	2.1454	1.0528	0.9767	0.9738	1.0024	0.9825	1.0130	0.9730	0.9698	0.9895
V2F	-	0.9443	0.9397	0.9433	0.9430	0.9410	0.9361	0.9351	0.9376	0.9366

Table 19: Full Dataset $q = 2$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	5.2245	2.4064	2.5032	2.4415	2.4139	2.2364	2.3218	2.1953	2.2095	2.2591
Huffman Adaptive	0.1211	0.1183	0.1163	0.1174	0.1172	0.1167	0.1166	0.1141	0.1151	0.1021
Zstandard	27.5142	34.9288	35.8206	35.8717	38.0538	39.5861	35.1181	34.9881	35.2494	35.2117
BZIP2	3.8440	4.4415	4.2961	4.1314	4.3318	4.5591	4.5232	4.4034	4.1369	4.2988
CCSDS 123	6.4290	6.5933	6.6149	6.6025	6.5668	6.5264	6.5379	6.4984	6.5219	6.5052
Kakadu	1.7624	2.2498	2.3242	2.2637	2.2663	2.1110	2.1658	2.0986	2.1338	2.1247
LZ77Huff	3.7548	3.9514	4.0727	3.8836	3.9433	4.1310	4.0298	4.0427	2.2112	1.7125
LZMA	33.3161	40.6768	40.8799	41.1915	41.5625	41.5661	40.9473	41.6029	41.7124	42.1895
V2F	-	1.7712	1.9250	1.9222	1.8455	1.8797	1.8378	1.8928	1.9051	1.8881

4 Compression Analysis $q=3$

4.1 Boats2020

Table 20: Boats2020 $q = 3$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.4865	1.9682	2.0917	1.9664	1.9194	1.7961	2.0009	1.8420	1.8065	1.9369
Huffman Adaptive	3.3919	1.9829	2.0779	1.9624	1.9441	1.7858	1.9783	1.8350	1.8272	1.9167
Zstandard	1.9931	1.8660	2.1218	2.0118	1.9365	1.8467	1.8863	1.8748	1.8709	1.9051
BZIP2	1.9574	1.9809	2.2390	2.1403	2.0839	1.9940	1.9863	1.9962	2.0014	2.0214
CCSDS 123	1.6351	2.1459	2.2172	2.1327	2.1164	1.9489	2.0730	1.9733	2.0084	2.0260
Kakadu	1.8300	2.4310	2.5047	2.4270	2.4279	2.2398	2.3487	2.2775	2.3262	2.3154
LZ77Huff	2.4253	2.2716	2.4932	2.3802	2.3145	2.2166	2.2981	2.2463	2.2375	2.2833
LZMA	1.9654	1.8441	2.1103	2.0036	1.9276	1.8327	1.8733	1.8625	1.8586	1.8952
V2F	-	2.1715	2.3285	2.1650	2.0784	1.9742	2.2854	2.0859	2.0037	2.2182

Table 21: Boats2020 $q = 3$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.4865	1.9682	2.0917	1.9664	1.9194	1.7961	2.0009	1.8420	1.8065	1.9369
Huffman Adaptive	1.3484	0.9906	1.0047	1.0004	0.9863	1.0043	1.0091	1.0010	0.9862	1.0076
Zstandard	2.2899	1.0636	0.9829	0.9754	0.9922	0.9726	1.0628	0.9794	0.9637	1.0116
BZIP2	2.3227	0.9990	0.9302	0.9161	0.9211	0.8994	1.0058	0.9184	0.8999	0.9518
CCSDS 123	2.7548	0.9141	0.9395	0.9196	0.9058	0.9197	0.9597	0.9288	0.8960	0.9500
Kakadu	2.4584	0.8064	0.8308	0.8074	0.7891	0.7996	0.8460	0.8040	0.7732	0.8304
LZ77Huff	1.8742	0.8679	0.8353	0.8237	0.8290	0.8090	0.8677	0.8160	0.8047	0.8427
LZMA	2.3229	1.0767	0.9884	0.9794	0.9968	0.9801	1.0708	0.9860	0.9703	1.0170
V2F	-	0.9131	0.9066	0.9136	0.9264	0.9145	0.8886	0.8931	0.9077	0.8857

Table 22: Boats2020 $q = 3$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.4865	1.9682	2.0917	1.9664	1.9194	1.7961	2.0009	1.8420	1.8065	1.9369
Huffman Adaptive	0.1083	0.1075	0.1033	0.1033	0.1017	0.1008	0.1017	0.1008	0.1050	0.1025
Zstandard	28.8067	32.4350	34.1175	34.1367	34.2592	33.3142	31.9300	32.9592	33.2342	32.7833
BZIP2	3.7646	4.3426	4.4091	4.3695	4.4479	4.3095	4.2325	4.1765	4.2015	4.6432
CCSDS 123	6.3265	6.4457	6.5489	6.4900	6.4604	6.3933	6.4705	6.4278	6.4634	6.5026
Kakadu	1.4875	1.9483	2.0225	1.9500	1.9492	1.8042	1.8892	1.8350	1.8708	1.8717
LZ77Huff	2.0021	1.9548	2.2480	2.0580	2.0447	2.0356	2.0303	1.9458	1.7685	2.4885
LZMA	36.2567	40.0352	42.0565	42.2598	42.2254	41.8822	40.1328	41.8064	41.9856	41.5345
V2F	-	1.6925	1.8983	1.8825	1.7875	1.8317	1.7383	1.8433	1.8625	1.8550

4.2 Fields2020

Table 23: Fields2020 $q = 3$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.6919	1.9042	1.9909	1.9387	1.9384	1.7719	1.8397	1.7298	1.7457	1.7840
Huffman Adaptive	3.1365	1.9325	1.9797	1.9344	1.9706	1.7624	1.8269	1.7319	1.7725	1.7684
Zstandard	1.8983	1.7630	2.0561	2.0084	1.9286	1.8135	1.7674	1.7961	1.8204	1.8161
BZIP2	1.9195	1.8988	2.1925	2.1490	2.0725	1.9761	1.9060	1.9466	1.9722	1.9655
CCSDS 123	1.6307	2.1243	2.1714	2.1294	2.1450	1.9613	2.0119	1.9302	1.9914	1.9587
Kakadu	1.8426	2.4089	2.4683	2.4178	2.4412	2.2388	2.2901	2.2383	2.3064	2.2609
LZ77Huff	2.3084	2.1774	2.4210	2.3731	2.3076	2.1842	2.1819	2.1660	2.1875	2.1880
LZMA	1.8710	1.7549	2.0498	2.0024	1.9273	1.8065	1.7611	1.7887	1.8138	1.8096
V2F	-	2.0397	2.1303	2.0853	2.0702	1.9055	1.9911	1.8759	1.8793	1.9378

Table 24: Fields2020 $q = 3$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.6919	1.9042	1.9909	1.9387	1.9384	1.7719	1.8397	1.7298	1.7457	1.7840
Huffman Adaptive	1.5002	0.9848	1.0051	1.0018	0.9835	1.0051	1.0061	0.9980	0.9842	1.0079
Zstandard	2.4802	1.0810	0.9673	0.9646	1.0052	0.9767	1.0401	0.9619	0.9582	0.9806
BZIP2	2.4500	1.0031	0.9070	0.9015	0.9353	0.8962	0.9639	0.8874	0.8843	0.9059
CCSDS 123	2.8797	0.8956	0.9158	0.9098	0.9035	0.9029	0.9128	0.8949	0.8757	0.9091
Kakadu	2.5473	0.7898	0.8056	0.8012	0.7938	0.7910	0.8019	0.7717	0.7561	0.7876
LZ77Huff	2.0383	0.8744	0.8214	0.8163	0.8399	0.8108	0.8419	0.7975	0.7973	0.8138
LZMA	2.5165	1.0859	0.9703	0.9675	1.0058	0.9805	1.0438	0.9659	0.9617	0.9842
V2F	-	0.9357	0.9375	0.9315	0.9369	0.9314	0.9283	0.9256	0.9311	0.9252

Table 25: Fields2020 $q = 3$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.6919	1.9042	1.9909	1.9387	1.9384	1.7719	1.8397	1.7298	1.7457	1.7840
Huffman Adaptive	0.1087	0.1028	0.1042	0.1018	0.1025	0.1014	0.1024	0.1040	0.1017	0.1020
Zstandard	26.6861	33.2047	34.7350	34.6056	34.7292	33.9523	32.9158	33.6601	33.9043	33.6313
BZIP2	3.8740	4.4771	4.4534	4.4841	4.5603	4.4846	4.3486	4.3590	4.2727	4.3073
CCSDS 123	6.3401	6.4936	6.4700	6.4800	6.4958	6.4738	6.4569	6.4808	6.4950	6.4498
Kakadu	1.4835	1.9274	1.9857	1.9376	1.9532	1.7909	1.8356	1.7942	1.8463	1.8134
LZ77Huff	2.0665	2.0957	2.1060	2.1178	2.0920	2.1118	1.9984	2.0984	2.1057	1.9369
LZMA	34.3661	41.1225	42.2240	42.3684	42.4759	42.5054	41.2471	42.5453	42.4487	42.2869
V2F	-	1.6891	1.9020	1.8918	1.7921	1.8491	1.7586	1.8763	1.8796	1.8588

4.3 Full Dataset

Table 26: Full Dataset $q = 3$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.6775	1.9087	1.9980	1.9406	1.9371	1.7736	1.8509	1.7376	1.7499	1.7947
Huffman Adaptive	3.1543	1.9360	1.9865	1.9363	1.9687	1.7640	1.8375	1.7391	1.7764	1.7788
Zstandard	1.9049	1.7702	2.0607	2.0086	1.9291	1.8158	1.7757	1.8016	1.8239	1.8223
BZIP2	1.9221	1.9045	2.1957	2.1484	2.0733	1.9773	1.9116	1.9500	1.9742	1.9694
CCSDS 123	1.6310	2.1258	2.1746	2.1296	2.1430	1.9605	2.0161	1.9332	1.9926	1.9634
Kakadu	1.8417	2.4104	2.4708	2.4184	2.4403	2.2388	2.2942	2.2411	2.3078	2.2647
LZ77Huff	2.3166	2.1839	2.4260	2.3736	2.3081	2.1865	2.1900	2.1716	2.1910	2.1946
LZMA	1.8776	1.7612	2.0540	2.0025	1.9273	1.8083	1.7690	1.7938	1.8170	1.8156
V2F	-	2.0489	2.1441	2.0909	2.0708	1.9103	2.0116	1.8905	1.8880	1.9574

Table 27: Full Dataset $q = 3$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.6775	1.9087	1.9980	1.9406	1.9371	1.7736	1.8509	1.7376	1.7499	1.7947
Huffman Adaptive	1.4896	0.9853	1.0051	1.0017	0.9837	1.0050	1.0063	0.9982	0.9844	1.0079
Zstandard	2.4669	1.0798	0.9684	0.9654	1.0043	0.9764	1.0417	0.9631	0.9586	0.9828
BZIP2	2.4411	1.0028	0.9086	0.9025	0.9343	0.8964	0.9668	0.8895	0.8854	0.9091
CCSDS 123	2.8709	0.8969	0.9175	0.9105	0.9037	0.9041	0.9161	0.8972	0.8772	0.9119
Kakadu	2.5411	0.7910	0.8074	0.8017	0.7935	0.7916	0.8049	0.7739	0.7573	0.7906
LZ77Huff	2.0268	0.8740	0.8224	0.8169	0.8392	0.8107	0.8437	0.7988	0.7978	0.8158
LZMA	2.5030	1.0853	0.9715	0.9683	1.0052	0.9805	1.0457	0.9673	0.9623	0.9865
V2F	-	0.9341	0.9354	0.9303	0.9362	0.9302	0.9255	0.9233	0.9294	0.9224

Table 28: Full Dataset $q = 3$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.6775	1.9087	1.9980	1.9406	1.9371	1.7736	1.8509	1.7376	1.7499	1.7947
Huffman Adaptive	0.1087	0.1031	0.1041	0.1019	0.1024	0.1014	0.1024	0.1038	0.1020	0.1020
Zstandard	26.8340	33.1510	34.6919	34.5729	34.6964	33.9078	32.8470	33.6112	33.8575	33.5721
BZIP2	3.8663	4.4677	4.4503	4.4761	4.5525	4.4723	4.3405	4.3463	4.2677	4.3307
CCSDS 123	6.3391	6.4903	6.4755	6.4807	6.4933	6.4682	6.4579	6.4771	6.4928	6.4535
Kakadu	1.4838	1.9289	1.9883	1.9384	1.9529	1.7919	1.8394	1.7971	1.8480	1.8174
LZ77Huff	2.0620	2.0859	2.1159	2.1137	2.0887	2.1065	2.0006	2.0877	2.0822	1.9753
LZMA	34.4980	41.0467	42.2123	42.3608	42.4584	42.4619	41.1693	42.4937	42.4164	42.2344
V2F	-	1.6893	1.9017	1.8911	1.7918	1.8479	1.7572	1.8740	1.8784	1.8585

5 Compression Analysis $q=4$

5.1 Boats2020

Table 29: Boats2020 $q = 4$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.1044	1.6588	1.7734	1.6567	1.6327	1.5196	1.7072	1.5602	1.5284	1.6484
Huffman Adaptive	3.0287	1.7198	1.7999	1.7024	1.7022	1.5672	1.7229	1.6087	1.6079	1.6768
Zstandard	1.6314	1.5471	1.8078	1.7054	1.6527	1.5663	1.5626	1.5935	1.5951	1.6191
BZIP2	1.6160	1.6470	1.9329	1.8408	1.8027	1.7071	1.6523	1.7078	1.7162	1.7341
CCSDS 123	1.3836	1.8858	1.9429	1.8688	1.8664	1.6742	1.7887	1.7143	1.7687	1.7660
Kakadu	1.5566	2.2072	2.2714	2.2080	2.2278	1.9990	2.1015	2.0456	2.1143	2.0787
LZ77Huff	2.0237	1.9257	2.1744	2.0682	2.0175	1.9220	1.9540	1.9500	1.9465	1.9831
LZMA	1.6275	1.5414	1.7979	1.6984	1.6425	1.5579	1.5656	1.5904	1.5895	1.6179
V2F	-	1.8495	2.0089	1.8381	1.7846	1.6848	1.9736	1.7742	1.7138	1.8971

Table 30: Boats2020 $q = 4$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.1044	1.6588	1.7734	1.6567	1.6327	1.5196	1.7072	1.5602	1.5284	1.6484
Huffman Adaptive	1.3870	0.9611	0.9815	0.9701	0.9576	0.9669	0.9860	0.9648	0.9466	0.9774
Zstandard	2.5729	1.0847	0.9772	0.9688	0.9891	0.9703	1.0972	0.9757	0.9560	1.0123
BZIP2	2.5928	1.0174	0.9129	0.8970	0.9059	0.8893	1.0351	0.9095	0.8880	0.9441
CCSDS 123	2.9784	0.8758	0.9081	0.8835	0.8734	0.9059	0.9485	0.9052	0.8604	0.9269
Kakadu	2.6491	0.7479	0.7760	0.7473	0.7313	0.7578	0.8060	0.7578	0.7194	0.7865
LZ77Huff	2.0657	0.8647	0.8113	0.7982	0.8091	0.7895	0.8717	0.7960	0.7824	0.8253
LZMA	2.5736	1.0872	0.9827	0.9729	0.9953	0.9755	1.0938	0.9774	0.9592	1.0129
V2F	-	0.9040	0.8921	0.9066	0.9178	0.9063	0.8792	0.8897	0.8984	0.8815

Table 31: Boats2020 $q = 4$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.1044	1.6588	1.7734	1.6567	1.6327	1.5196	1.7072	1.5602	1.5284	1.6484
Huffman Adaptive	0.1050	0.1025	0.0975	0.1017	0.0983	0.1033	0.1017	0.1025	0.0975	0.0983
Zstandard	26.7383	29.5492	32.3183	32.2300	32.4750	30.9092	29.0617	30.0858	30.3142	30.2367
BZIP2	3.3808	4.0095	4.2003	4.0908	4.1412	3.9964	3.8720	3.8057	3.8352	4.2643
CCSDS 123	6.1941	6.4497	6.4330	6.4026	6.4185	6.3656	6.3768	6.3519	6.3705	6.9952
Kakadu	1.2650	1.7725	1.8242	1.7683	1.7800	1.6150	1.6958	1.6517	1.6925	1.6800
LZ77Huff	1.7381	1.7771	2.1268	2.0454	1.8886	2.0301	1.8166	1.8432	1.9174	2.3144
LZMA	32.1475	36.0496	40.4896	40.6522	40.7402	39.5387	35.9813	38.2752	38.7575	38.8449
V2F	-	1.6425	1.8558	1.8633	1.7558	1.8092	1.6875	1.8108	1.8258	1.8275

5.2 Fields2020

Table 32: Fields2020 $q = 4$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.3068	1.5938	1.6723	1.6248	1.6459	1.4954	1.5546	1.4567	1.4695	1.5053
Huffman Adaptive	2.7738	1.6727	1.7098	1.6741	1.7178	1.5483	1.5964	1.5283	1.5657	1.5562
Zstandard	1.5279	1.4350	1.7383	1.6952	1.6383	1.5314	1.4404	1.5222	1.5475	1.5376
BZIP2	1.5659	1.5669	1.8903	1.8490	1.7964	1.6956	1.5740	1.6692	1.6938	1.6894
CCSDS 123	1.3771	1.8639	1.9010	1.8656	1.8902	1.6895	1.7343	1.6848	1.7680	1.7116
Kakadu	1.5864	2.1958	2.2421	2.2060	2.2407	2.0124	2.0619	2.0301	2.1163	2.0478
LZ77Huff	1.9044	1.8286	2.1043	2.0598	2.0114	1.8940	1.8401	1.8789	1.9021	1.8975
LZMA	1.5172	1.4299	1.7323	1.6891	1.6342	1.5238	1.4375	1.5160	1.5404	1.5315
V2F	-	1.7203	1.8175	1.7570	1.7728	1.6247	1.6998	1.5881	1.5976	1.6454

Table 33: Fields2020 $q = 4$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.3068	1.5938	1.6723	1.6248	1.6459	1.4954	1.5546	1.4567	1.4695	1.5053
Huffman Adaptive	1.5581	0.9521	0.9772	0.9700	0.9579	0.9653	0.9725	0.9520	0.9377	0.9658
Zstandard	2.8323	1.1122	0.9608	0.9576	1.0047	0.9762	1.0786	0.9556	0.9488	0.9770
BZIP2	2.7602	1.0178	0.8834	0.8779	0.9162	0.8814	0.9863	0.8712	0.8666	0.8890
CCSDS 123	3.1306	0.8542	0.8784	0.8701	0.8705	0.8846	0.8944	0.8632	0.8302	0.8774
Kakadu	2.7162	0.7251	0.7448	0.7359	0.7343	0.7426	0.7523	0.7164	0.6936	0.7335
LZ77Huff	2.2706	0.8716	0.7936	0.7881	0.8183	0.7891	0.8435	0.7740	0.7717	0.7915
LZMA	2.8522	1.1161	0.9641	0.9611	1.0073	0.9810	1.0808	0.9596	0.9531	0.9809
V2F	-	0.9289	0.9236	0.9268	0.9291	0.9219	0.9195	0.9210	0.9222	0.9197

Table 34: Fields2020 $q = 4$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.3068	1.5938	1.6723	1.6248	1.6459	1.4954	1.5546	1.4567	1.4695	1.5053
Huffman Adaptive	0.1071	0.1016	0.1009	0.1009	0.1002	0.0992	0.1002	0.0989	0.0989	0.0991
Zstandard	25.8266	30.4318	33.2751	33.2025	33.3064	31.9141	30.0999	31.1678	31.4546	31.2312
BZIP2	3.5369	4.2121	4.2607	4.2780	4.2984	4.2115	3.9927	3.9935	4.0413	3.9403
CCSDS 123	6.3028	6.4687	6.4511	6.4579	6.4513	6.4192	6.3854	6.3961	6.4311	6.3843
Kakadu	1.2940	1.7503	1.7963	1.7579	1.7863	1.6150	1.6527	1.6264	1.6863	1.6420
LZ77Huff	1.9092	1.8665	1.9976	2.0356	2.0490	2.0049	1.8584	1.9645	1.9970	1.9447
LZMA	33.1490	38.3430	41.2841	41.3689	41.3695	41.2211	38.5632	40.6731	40.8907	40.6624
V2F	-	1.6407	1.8731	1.8773	1.7626	1.8161	1.7001	1.8496	1.8693	1.8349

5.3 Full Dataset

Table 35: Full Dataset $q = 4$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.2927	1.5983	1.6794	1.6270	1.6450	1.4971	1.5652	1.4639	1.4736	1.5153
Huffman Adaptive	2.7915	1.6760	1.7161	1.6760	1.7167	1.5497	1.6052	1.5339	1.5686	1.5647
Zstandard	1.5351	1.4428	1.7432	1.6959	1.6393	1.5338	1.4489	1.5272	1.5508	1.5433
BZIP2	1.5694	1.5725	1.8933	1.8484	1.7968	1.6964	1.5794	1.6719	1.6954	1.6925
CCSDS 123	1.3775	1.8654	1.9040	1.8658	1.8886	1.6884	1.7381	1.6869	1.7681	1.7154
Kakadu	1.5843	2.1966	2.2442	2.2061	2.2398	2.0115	2.0647	2.0312	2.1161	2.0499
LZ77Huff	1.9127	1.8354	2.1092	2.0604	2.0118	1.8960	1.8481	1.8839	1.9052	1.9035
LZMA	1.5249	1.4377	1.7368	1.6898	1.6348	1.5262	1.4464	1.5211	1.5439	1.5375
V2F	-	1.7293	1.8308	1.7627	1.7736	1.6289	1.7189	1.6011	1.6057	1.6630

Table 36: Full Dataset $q = 4$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.2927	1.5983	1.6794	1.6270	1.6450	1.4971	1.5652	1.4639	1.4736	1.5153
Huffman Adaptive	1.5462	0.9527	0.9775	0.9700	0.9579	0.9654	0.9734	0.9529	0.9383	0.9666
Zstandard	2.8142	1.1103	0.9619	0.9584	1.0037	0.9758	1.0799	0.9570	0.9493	0.9794
BZIP2	2.7485	1.0178	0.8854	0.8793	0.9155	0.8820	0.9897	0.8739	0.8681	0.8928
CCSDS 123	3.1199	0.8557	0.8805	0.8711	0.8707	0.8861	0.8982	0.8661	0.8323	0.8809
Kakadu	2.7115	0.7267	0.7470	0.7367	0.7341	0.7436	0.7561	0.7192	0.6954	0.7372
LZ77Huff	2.2563	0.8711	0.7948	0.7888	0.8176	0.7891	0.8454	0.7756	0.7725	0.7939
LZMA	2.8327	1.1140	0.9654	0.9619	1.0064	0.9807	1.0817	0.9608	0.9535	0.9831
V2F	-	0.9272	0.9214	0.9253	0.9283	0.9208	0.9167	0.9188	0.9205	0.9170

Table 37: Full Dataset $q = 4$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.2927	1.5983	1.6794	1.6270	1.6450	1.4971	1.5652	1.4639	1.4736	1.5153
Huffman Adaptive	0.1069	0.1016	0.1006	0.1010	0.1001	0.0995	0.1003	0.0992	0.0988	0.0991
Zstandard	25.8902	30.3702	33.2084	33.1347	33.2484	31.8440	30.0275	31.0923	31.3751	31.1619
BZIP2	3.5260	4.1980	4.2565	4.2649	4.2874	4.1964	3.9842	3.9804	4.0270	3.9629
CCSDS 123	6.2952	6.4673	6.4499	6.4541	6.4490	6.4154	6.3848	6.3930	6.4269	6.4269
Kakadu	1.2920	1.7518	1.7983	1.7586	1.7859	1.6150	1.6557	1.6282	1.6867	1.6447
LZ77Huff	1.8973	1.8603	2.0066	2.0363	2.0378	2.0067	1.8555	1.9560	1.9915	1.9705
LZMA	33.0791	38.1830	41.2287	41.3189	41.3256	41.1038	38.3831	40.5058	40.7419	40.5356
V2F	-	1.6409	1.8719	1.8763	1.7621	1.8156	1.6992	1.8469	1.8663	1.8344

6 Compression Analysis $q=5$

6.1 Boats2020

Table 38: Boats2020 $q = 5$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.8149	1.4505	1.5562	1.4483	1.4401	1.3357	1.5055	1.3706	1.3428	1.4518
Huffman Adaptive	2.7638	1.5639	1.6303	1.5498	1.5574	1.4417	1.5680	1.4761	1.4792	1.5322
Zstandard	1.3910	1.3326	1.5948	1.5019	1.4592	1.3757	1.3453	1.3995	1.4058	1.4225
BZIP2	1.3811	1.4088	1.7092	1.6252	1.5956	1.4960	1.4127	1.4937	1.5056	1.5192
CCSDS 123	1.2174	1.7014	1.7392	1.6798	1.6864	1.4767	1.5833	1.5245	1.5867	1.5732
Kakadu	1.3527	2.0359	2.0967	2.0402	2.0795	1.8081	1.9031	1.8545	1.9352	1.8838
LZ77Huff	1.7461	1.6813	1.9477	1.8495	1.8044	1.7127	1.7100	1.7370	1.7381	1.7664
LZMA	1.4095	1.3433	1.5922	1.5015	1.4538	1.3800	1.3633	1.4088	1.4116	1.4331
V2F	-	1.6392	1.7714	1.6238	1.5795	1.5037	1.7680	1.5862	1.5271	1.6949

Table 39: Boats2020 $q = 5$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.8149	1.4505	1.5562	1.4483	1.4401	1.3357	1.5055	1.3706	1.3428	1.4518
Huffman Adaptive	1.4164	0.9233	0.9494	0.9309	0.9228	0.9233	0.9536	0.9226	0.9033	0.9403
Zstandard	2.8139	1.1042	0.9717	0.9616	0.9882	0.9715	1.1257	0.9763	0.9531	1.0150
BZIP2	2.8366	1.0467	0.9062	0.8886	0.9034	0.8934	1.0730	0.9150	0.8904	0.9504
CCSDS 123	3.1459	0.8488	0.8904	0.8593	0.8527	0.9037	0.9454	0.8949	0.8429	0.9169
Kakadu	2.8405	0.7090	0.7374	0.7069	0.6910	0.7368	0.7848	0.7345	0.6906	0.7644
LZ77Huff	2.2339	0.8685	0.7947	0.7803	0.7982	0.7792	0.8799	0.7854	0.7700	0.8162
LZMA	2.7635	1.0918	0.9732	0.9617	0.9916	0.9678	1.1077	0.9691	0.9487	1.0068
V2F	-	0.8924	0.8884	0.8979	0.9145	0.8929	0.8664	0.8747	0.8865	0.8694

Table 40: Boats2020 $q = 5$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.8149	1.4505	1.5562	1.4483	1.4401	1.3357	1.5055	1.3706	1.3428	1.4518
Huffman Adaptive	0.1042	0.1000	0.1000	0.0983	0.0992	0.0975	0.1000	0.0983	0.0992	0.0967
Zstandard	25.5150	27.0442	29.9900	29.7617	30.2100	28.3667	26.6333	27.2983	27.6050	27.5642
BZIP2	3.1598	3.7044	4.0437	3.7546	3.9646	3.6822	3.5395	3.4595	3.5197	4.0004
CCSDS 123	6.1942	6.3453	6.3552	6.3604	6.3960	6.3219	6.3588	6.2890	6.3482	6.8046
Kakadu	1.1258	1.6400	1.6883	1.6425	1.6633	1.4775	1.5550	1.5075	1.5625	1.5300
LZ77Huff	1.6666	1.7862	2.0351	1.8559	1.8024	1.7442	1.8318	1.7604	1.7659	2.1665
LZMA	28.8153	32.0986	38.3066	38.3660	38.5013	35.9285	31.8536	34.3383	34.9960	34.9044
V2F	-	1.6167	1.8375	1.8317	1.7450	1.7425	1.6467	1.7642	1.7800	1.7742

6.2 Fields2020

Table 41: Fields2020 $q = 5$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.0104	1.3856	1.4564	1.4135	1.4488	1.3127	1.3633	1.2757	1.2861	1.3191
Huffman Adaptive	2.5022	1.5235	1.5537	1.5246	1.5695	1.4271	1.4641	1.4117	1.4437	1.4347
Zstandard	1.2817	1.2165	1.5292	1.4908	1.4438	1.3441	1.2222	1.3387	1.3671	1.3510
BZIP2	1.3121	1.3200	1.6748	1.6374	1.5998	1.4900	1.3270	1.4610	1.4914	1.4804
CCSDS 123	1.2118	1.7028	1.7092	1.6848	1.7216	1.4925	1.5360	1.5010	1.5970	1.5312
Kakadu	1.3761	2.0479	2.0905	2.0596	2.1122	1.8365	1.8887	1.8640	1.9642	1.8800
LZ77Huff	1.6202	1.5773	1.8815	1.8407	1.8012	1.6882	1.5933	1.6768	1.7022	1.6921
LZMA	1.2977	1.2341	1.5234	1.4852	1.4393	1.3460	1.2407	1.3451	1.3700	1.3571
V2F	-	1.5137	1.5903	1.5408	1.5667	1.4456	1.5102	1.4145	1.4144	1.4653

Table 42: Fields2020 $q = 5$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.0104	1.3856	1.4564	1.4135	1.4488	1.3127	1.3633	1.2757	1.2861	1.3191
Huffman Adaptive	1.6094	0.9085	0.9361	0.9263	0.9228	0.9192	0.9294	0.9022	0.8898	0.9176
Zstandard	3.1477	1.1412	0.9509	0.9472	1.0036	0.9764	1.1151	0.9515	0.9398	0.9742
BZIP2	3.0718	1.0512	0.8681	0.8623	0.9056	0.8806	1.0264	0.8717	0.8613	0.8889
CCSDS 123	3.3129	0.8127	0.8506	0.8381	0.8413	0.8790	0.8855	0.8484	0.8043	0.8593
Kakadu	2.9166	0.6758	0.6956	0.6856	0.6857	0.7142	0.7201	0.6832	0.6540	0.7000
LZ77Huff	2.4880	0.8788	0.7727	0.7671	0.8043	0.7771	0.8544	0.7595	0.7547	0.7777
LZMA	3.1072	1.1244	0.9545	0.9508	1.0067	0.9749	1.0981	0.9469	0.9378	0.9698
V2F	-	0.9180	0.9195	0.9198	0.9253	0.9097	0.9082	0.9059	0.9120	0.9052

Table 43: Fields2020 $q = 5$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	4.0104	1.3856	1.4564	1.4135	1.4488	1.3127	1.3633	1.2757	1.2861	1.3191
Huffman Adaptive	0.1053	0.1008	0.1006	0.0998	0.0992	0.0982	0.0991	0.0992	0.0978	0.0977
Zstandard	24.3908	27.5659	31.1728	31.0194	31.3859	29.3287	27.0837	28.1368	28.5114	28.3727
BZIP2	3.2055	3.8576	4.0138	3.8907	4.1418	3.8913	3.6812	3.6553	3.7016	3.6289
CCSDS 123	6.2119	6.4216	6.3784	6.4088	6.3909	6.3550	6.3477	6.3677	6.3993	6.3320
Kakadu	1.1363	1.6337	1.6722	1.6438	1.6826	1.4876	1.5277	1.5028	1.5726	1.5176
LZ77Huff	1.9091	1.7555	1.9395	1.9378	1.9372	1.8871	1.6938	1.8937	1.8346	1.8336
LZMA	29.5791	34.1385	40.6200	40.7034	40.7490	38.9756	34.1915	37.0075	37.6603	37.2834
V2F	-	1.6000	1.8780	1.8704	1.7545	1.7901	1.6519	1.8125	1.8389	1.7916

6.3 Full Dataset

Table 44: Full Dataset $q = 5$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.9967	1.3901	1.4633	1.4159	1.4482	1.3143	1.3732	1.2823	1.2900	1.3283
Huffman Adaptive	2.5204	1.5264	1.5590	1.5263	1.5687	1.4281	1.4713	1.4162	1.4462	1.4415
Zstandard	1.2893	1.2246	1.5338	1.4916	1.4449	1.3463	1.2308	1.3429	1.3698	1.3560
BZIP2	1.3170	1.3262	1.6772	1.6366	1.5995	1.4904	1.3330	1.4633	1.4924	1.4831
CCSDS 123	1.2122	1.7027	1.7113	1.6845	1.7191	1.4914	1.5393	1.5026	1.5963	1.5342
Kakadu	1.3745	2.0471	2.0910	2.0582	2.1099	1.8345	1.8897	1.8633	1.9622	1.8803
LZ77Huff	1.6290	1.5845	1.8861	1.8413	1.8015	1.6899	1.6015	1.6810	1.7047	1.6973
LZMA	1.3055	1.2417	1.5282	1.4863	1.4403	1.3484	1.2493	1.3495	1.3729	1.3624
V2F	-	1.5224	1.6030	1.5466	1.5676	1.4496	1.5282	1.4265	1.4223	1.4813

Table 45: Full Dataset $q = 5$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.9967	1.3901	1.4633	1.4159	1.4482	1.3143	1.3732	1.2823	1.2900	1.3283
Huffman Adaptive	1.5959	0.9095	0.9370	0.9266	0.9228	0.9195	0.9311	0.9036	0.8907	0.9191
Zstandard	3.1244	1.1386	0.9524	0.9482	1.0025	0.9760	1.1159	0.9533	0.9407	0.9771
BZIP2	3.0554	1.0509	0.8708	0.8642	0.9054	0.8815	1.0297	0.8747	0.8634	0.8932
CCSDS 123	3.3013	0.8152	0.8534	0.8396	0.8421	0.8807	0.8897	0.8516	0.8070	0.8633
Kakadu	2.9113	0.6781	0.6985	0.6871	0.6861	0.7158	0.7246	0.6868	0.6565	0.7045
LZ77Huff	2.4703	0.8780	0.7743	0.7680	0.8039	0.7773	0.8561	0.7613	0.7557	0.7804
LZMA	3.0832	1.1221	0.9558	0.9516	1.0057	0.9744	1.0988	0.9485	0.9385	0.9724
V2F	-	0.9162	0.9173	0.9182	0.9245	0.9085	0.9052	0.9037	0.9102	0.9027

Table 46: Full Dataset $q = 5$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.9967	1.3901	1.4633	1.4159	1.4482	1.3143	1.3732	1.2823	1.2900	1.3283
Huffman Adaptive	0.1052	0.1008	0.1006	0.0997	0.0992	0.0982	0.0991	0.0991	0.0979	0.0976
Zstandard	24.4692	27.5295	31.0902	30.9316	31.3039	29.2616	27.0523	28.0783	28.4482	28.3163
BZIP2	3.2023	3.8470	4.0159	3.8812	4.1294	3.8767	3.6713	3.6416	3.6890	3.6548
CCSDS 123	6.2107	6.4163	6.3768	6.4054	6.3912	6.3527	6.3485	6.3622	6.3957	6.3650
Kakadu	1.1356	1.6341	1.6733	1.6437	1.6812	1.4869	1.5297	1.5031	1.5719	1.5185
LZ77Huff	1.8921	1.7576	1.9462	1.9321	1.9278	1.8772	1.7034	1.8844	1.8298	1.8568
LZMA	29.5258	33.9962	40.4586	40.5403	40.5921	38.7630	34.0284	36.8213	37.4744	37.1174
V2F	-	1.6012	1.8752	1.8677	1.7538	1.7868	1.6515	1.8091	1.8348	1.7904

7 Compression Analysis q=6

7.1 Boats2020

Table 47: Boats2020 $q = 6$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5815	1.2979	1.3957	1.2958	1.2991	1.2057	1.3586	1.2310	1.2043	1.3064
Huffman Adaptive	2.5555	1.4605	1.5166	1.4483	1.4602	1.3623	1.4659	1.3896	1.3931	1.4373
Zstandard	1.2182	1.1762	1.4329	1.3490	1.3100	1.2359	1.1882	1.2529	1.2594	1.2737
BZIP2	1.2095	1.2333	1.5281	1.4513	1.4255	1.3337	1.2368	1.3278	1.3372	1.3517
CCSDS 123	1.1039	1.5432	1.5737	1.5279	1.5356	1.3241	1.4268	1.3761	1.4373	1.4211
Kakadu	1.1976	1.8790	1.9388	1.8872	1.9371	1.6485	1.7346	1.6911	1.7746	1.7183
LZ77Huff	1.5398	1.4987	1.7699	1.6795	1.6364	1.5528	1.5258	1.5688	1.5706	1.5953
LZMA	1.2498	1.1976	1.4395	1.3578	1.3171	1.2506	1.2149	1.2711	1.2741	1.2931
V2F	-	1.4920	1.5972	1.4774	1.4383	1.3634	1.6035	1.4409	1.3824	1.5383

Table 48: Boats2020 $q = 6$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5815	1.2979	1.3957	1.2958	1.2991	1.2057	1.3586	1.2310	1.2043	1.3064
Huffman Adaptive	1.4403	0.8843	0.9144	0.8909	0.8877	0.8820	0.9195	0.8798	0.8600	0.9012
Zstandard	3.0230	1.1221	0.9699	0.9580	0.9936	0.9770	1.1525	0.9805	0.9548	1.0208
BZIP2	3.0561	1.0765	0.9099	0.8912	0.9136	0.9066	1.1120	0.9269	0.9009	0.9631
CCSDS 123	3.2580	0.8379	0.8833	0.8458	0.8453	0.9115	0.9480	0.8918	0.8356	0.9144
Kakadu	3.0197	0.6875	0.7152	0.6840	0.6694	0.7303	0.7777	0.7239	0.6757	0.7545
LZ77Huff	2.3854	0.8742	0.7844	0.7691	0.7945	0.7766	0.8919	0.7819	0.7649	0.8139
LZMA	2.9280	1.0970	0.9650	0.9514	0.9874	0.9644	1.1227	0.9652	0.9429	1.0043
V2F	-	0.8773	0.8835	0.8834	0.9062	0.8885	0.8612	0.8640	0.8773	0.8620

Table 49: Boats2020 $q = 6$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5815	1.2979	1.3957	1.2958	1.2991	1.2057	1.3586	1.2310	1.2043	1.3064
Huffman Adaptive	0.1067	0.1000	0.1050	0.0983	0.1042	0.1025	0.0992	0.1000	0.0992	0.0933
Zstandard	23.7900	24.7933	27.6050	27.2233	27.6150	25.8025	24.3792	24.9667	25.0742	25.1525
BZIP2	2.8743	3.3889	3.7250	3.4407	3.6172	3.4753	3.2897	3.2473	3.2585	3.6419
CCSDS 123	6.1482	6.3374	6.3065	6.2477	6.3737	6.2821	6.3501	6.2623	6.2961	6.6892
Kakadu	1.0125	1.5317	1.5742	1.5325	1.5667	1.3617	1.4333	1.3950	1.4542	1.4142
LZ77Huff	1.5527	1.6117	1.8974	1.6864	1.7976	1.6765	1.6315	1.5566	1.5954	2.0901
LZMA	25.4963	28.6694	34.8352	34.7811	35.0435	32.4152	28.3487	30.6825	31.2348	31.2436
V2F	-	1.5817	1.8092	1.8050	1.7100	1.7308	1.6192	1.7283	1.7533	1.7450

7.2 Fields2020

Table 50: Fields2020 $q = 6$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.7727	1.2363	1.3002	1.2611	1.3048	1.1810	1.2239	1.1430	1.1508	1.1820
Huffman Adaptive	2.2951	1.4267	1.4522	1.4278	1.4698	1.3484	1.3776	1.3352	1.3621	1.3547
Zstandard	1.1089	1.0625	1.3785	1.3448	1.3021	1.2065	1.0683	1.1986	1.2287	1.2092
BZIP2	1.1280	1.1319	1.5014	1.4690	1.4404	1.3234	1.1377	1.2884	1.3203	1.3064
CCSDS 123	1.1271	1.5643	1.5554	1.5497	1.5811	1.3334	1.3816	1.3480	1.4469	1.3784
Kakadu	1.2059	1.9123	1.9582	1.9269	1.9944	1.6782	1.7286	1.7053	1.8119	1.7205
LZ77Huff	1.4132	1.3925	1.7146	1.6781	1.6411	1.5311	1.4099	1.5164	1.5434	1.5297
LZMA	1.1494	1.0972	1.3820	1.3491	1.3089	1.2235	1.1034	1.2183	1.2435	1.2291
V2F	-	1.3753	1.4305	1.3943	1.4216	1.3081	1.3669	1.2856	1.2844	1.3260

Table 51: Fields2020 $q = 6$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.7727	1.2363	1.3002	1.2611	1.3048	1.1810	1.2239	1.1430	1.1508	1.1820
Huffman Adaptive	1.6513	0.8655	0.8938	0.8823	0.8874	0.8752	0.8864	0.8544	0.8437	0.8704
Zstandard	3.4262	1.1664	0.9416	0.9368	1.0022	0.9786	1.1457	0.9522	0.9356	0.9753
BZIP2	3.3664	1.0950	0.8644	0.8576	0.9059	0.8921	1.0755	0.8858	0.8707	0.9026
CCSDS 123	3.3509	0.7893	0.8344	0.8129	0.8250	0.8852	0.8837	0.8464	0.7943	0.8553
Kakadu	3.1330	0.6457	0.6628	0.6538	0.6540	0.7032	0.7063	0.6690	0.6343	0.6852
LZ77Huff	2.6860	0.8885	0.7569	0.7507	0.7950	0.7709	0.8670	0.7525	0.7447	0.7707
LZMA	3.3014	1.1285	0.9392	0.9338	0.9969	0.9649	1.1085	0.9367	0.9244	0.9594
V2F	-	0.9017	0.9127	0.9072	0.9184	0.9044	0.9008	0.8930	0.8985	0.8967

Table 52: Fields2020 $q = 6$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.7727	1.2363	1.3002	1.2611	1.3048	1.1810	1.2239	1.1430	1.1508	1.1820
Huffman Adaptive	0.1042	0.1001	0.0996	0.0984	0.0994	0.0994	0.0985	0.0985	0.0987	0.0979
Zstandard	22.5930	24.8466	28.6354	28.3732	28.8739	26.6447	24.3622	25.2240	25.5545	25.5064
BZIP2	2.9265	3.5294	3.7191	3.5816	3.8688	3.5811	3.3842	3.3370	3.3607	3.3092
CCSDS 123	6.1635	6.3526	6.3323	6.3442	6.3763	6.3138	6.3037	6.3083	6.3448	6.2884
Kakadu	1.0132	1.5414	1.5722	1.5501	1.5962	1.3778	1.4168	1.3922	1.4665	1.4061
LZ77Huff	1.6568	1.6274	1.8109	1.8221	1.8659	1.7780	1.6113	1.7381	1.7281	1.7180
LZMA	25.1963	29.1992	37.5294	37.5451	37.8259	34.5444	29.0412	32.0264	32.7837	32.4058
V2F	-	1.5610	1.8421	1.8444	1.7357	1.7576	1.6141	1.7682	1.7964	1.7623

7.3 Full Dataset

Table 53: Full Dataset $q = 6$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.7594	1.2406	1.3068	1.2636	1.3044	1.1827	1.2333	1.1492	1.1545	1.1907
Huffman Adaptive	2.3132	1.4290	1.4567	1.4292	1.4691	1.3493	1.3838	1.3390	1.3643	1.3605
Zstandard	1.1165	1.0705	1.3823	1.3451	1.3027	1.2086	1.0767	1.2024	1.2309	1.2137
BZIP2	1.1337	1.1390	1.5033	1.4677	1.4394	1.3241	1.1446	1.2911	1.3215	1.3096
CCSDS 123	1.1255	1.5628	1.5566	1.5482	1.5779	1.3327	1.3848	1.3500	1.4462	1.3814
Kakadu	1.2054	1.9099	1.9569	1.9241	1.9904	1.6761	1.7290	1.7044	1.8093	1.7204
LZ77Huff	1.4221	1.3999	1.7185	1.6782	1.6408	1.5326	1.4180	1.5201	1.5453	1.5343
LZMA	1.1564	1.1042	1.3861	1.3497	1.3095	1.2254	1.1112	1.2219	1.2457	1.2335
V2F	-	1.3835	1.4421	1.4001	1.4228	1.3120	1.3834	1.2964	1.2912	1.3408

Table 54: Full Dataset $q = 6$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.7594	1.2406	1.3068	1.2636	1.3044	1.1827	1.2333	1.1492	1.1545	1.1907
Huffman Adaptive	1.6366	0.8668	0.8953	0.8829	0.8875	0.8756	0.8887	0.8562	0.8449	0.8725
Zstandard	3.3981	1.1633	0.9436	0.9383	1.0016	0.9785	1.1462	0.9542	0.9369	0.9784
BZIP2	3.3447	1.0937	0.8676	0.8599	0.9064	0.8931	1.0781	0.8887	0.8728	0.9068
CCSDS 123	3.3444	0.7927	0.8378	0.8152	0.8264	0.8871	0.8882	0.8496	0.7972	0.8594
Kakadu	3.1251	0.6487	0.6665	0.6559	0.6551	0.7051	0.7113	0.6728	0.6372	0.6901
LZ77Huff	2.6650	0.8875	0.7588	0.7520	0.7950	0.7713	0.8687	0.7545	0.7461	0.7738
LZMA	3.2754	1.1263	0.9410	0.9350	0.9962	0.9648	1.1095	0.9387	0.9257	0.9625
V2F	-	0.9000	0.9107	0.9056	0.9176	0.9033	0.8980	0.8910	0.8970	0.8943

Table 55: Full Dataset $q = 6$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.7594	1.2406	1.3068	1.2636	1.3044	1.1827	1.2333	1.1492	1.1545	1.1907
Huffman Adaptive	0.1044	0.1001	0.1000	0.0984	0.0998	0.0996	0.0985	0.0986	0.0988	0.0976
Zstandard	22.6765	24.8429	28.5635	28.2930	28.7860	26.5859	24.3634	25.2060	25.5210	25.4817
BZIP2	2.9228	3.5196	3.7196	3.5718	3.8512	3.5737	3.3776	3.3308	3.3535	3.3324
CCSDS 123	6.1624	6.3515	6.3305	6.3375	6.3761	6.3116	6.3069	6.3051	6.3414	6.3163
Kakadu	1.0132	1.5407	1.5724	1.5489	1.5941	1.3767	1.4180	1.3924	1.4656	1.4067
LZ77Huff	1.6496	1.6263	1.8170	1.8126	1.8611	1.7709	1.6127	1.7254	1.7188	1.7440
LZMA	25.2172	29.1622	37.3414	37.3523	37.6318	34.3959	28.9929	31.9327	32.6756	32.3247
V2F	-	1.5624	1.8398	1.8416	1.7340	1.7557	1.6145	1.7654	1.7934	1.7611

8 Compression Analysis $q=7$

8.1 Boats2020

Table 56: Boats2020 $q = 7$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.3796	1.1607	1.2516	1.1591	1.1719	1.0807	1.2191	1.0979	1.0756	1.1686
Huffman Adaptive	2.3785	1.3776	1.4257	1.3669	1.3808	1.2947	1.3812	1.3171	1.3219	1.3583
Zstandard	1.0731	1.0427	1.2827	1.2069	1.1750	1.1029	1.0540	1.1138	1.1206	1.1323
BZIP2	1.0612	1.0831	1.3568	1.2845	1.2645	1.1780	1.0862	1.1687	1.1770	1.1910
CCSDS 123	0.9860	1.3888	1.4163	1.3762	1.3906	1.1760	1.2752	1.2274	1.2852	1.2676
Kakadu	1.0539	1.7099	1.7680	1.7217	1.7830	1.4793	1.5573	1.5146	1.5965	1.5396
LZ77Huff	1.3628	1.3380	1.5980	1.5152	1.4776	1.3957	1.3619	1.4031	1.4064	1.4268
LZMA	1.1118	1.0712	1.2980	1.2243	1.1914	1.1261	1.0855	1.1386	1.1424	1.1587
V2F	-	1.3311	1.4610	1.3238	1.3087	1.2352	1.4558	1.2919	1.2440	1.3969

Table 57: Boats2020 $q = 7$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.3796	1.1607	1.2516	1.1591	1.1719	1.0807	1.2191	1.0979	1.0756	1.1686
Huffman Adaptive	1.4631	0.8370	0.8704	0.8431	0.8460	0.8307	0.8734	0.8260	0.8078	0.8505
Zstandard	3.2701	1.1363	0.9717	0.9581	1.0009	0.9830	1.1681	0.9850	0.9597	1.0278
BZIP2	3.3418	1.1073	0.9209	0.9026	0.9327	0.9244	1.1447	0.9436	0.9179	0.9815
CCSDS 123	3.4626	0.8333	0.8812	0.8409	0.8430	0.9236	0.9540	0.8942	0.8365	0.9186
Kakadu	3.2759	0.6754	0.7025	0.6704	0.6562	0.7310	0.7782	0.7216	0.6713	0.7535
LZ77Huff	2.5705	0.8792	0.7789	0.7625	0.7949	0.7757	0.8989	0.7806	0.7637	0.8144
LZMA	3.1301	1.0992	0.9591	0.9434	0.9853	0.9606	1.1284	0.9612	0.9395	1.0022
V2F	-	0.8779	0.8667	0.8803	0.8980	0.8782	0.8511	0.8579	0.8699	0.8482

Table 58: Boats2020 $q = 7$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.3796	1.1607	1.2516	1.1591	1.1719	1.0807	1.2191	1.0979	1.0756	1.1686
Huffman Adaptive	0.1042	0.1000	0.0983	0.0992	0.0983	0.0975	0.0958	0.0975	0.0967	0.0958
Zstandard	21.6100	22.6333	25.1892	24.5800	25.0208	23.2625	22.2525	22.5692	22.6217	22.7900
BZIP2	2.6575	3.1376	3.1455	3.1686	3.3641	3.1312	3.0956	2.9548	2.9426	3.4567
CCSDS 123	6.1116	6.2488	6.3328	6.2779	6.2588	6.2200	6.2311	6.1967	6.2366	6.5744
Kakadu	0.9058	1.4183	1.4508	1.4158	1.4575	1.2483	1.3083	1.2675	1.3308	1.2875
LZ77Huff	1.5158	1.4815	1.8863	1.6256	1.7698	1.5741	1.5775	1.5089	1.6189	1.9862
LZMA	22.3087	25.2896	30.9605	30.6887	30.9329	28.3283	24.8670	26.9825	27.3348	27.5331
V2F	-	1.5708	1.7842	1.7675	1.6708	1.6900	1.5850	1.6942	1.7117	1.6933

8.2 Fields2020

Table 59: Fields2020 $q = 7$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5692	1.1185	1.1775	1.1418	1.1893	1.0748	1.1118	1.0346	1.0412	1.0706
Huffman Adaptive	2.1238	1.3560	1.3784	1.3576	1.3955	1.2902	1.3143	1.2783	1.3013	1.2956
Zstandard	0.9778	0.9441	1.2534	1.2234	1.1842	1.0922	0.9508	1.0792	1.1088	1.0890
BZIP2	0.9849	0.9851	1.3460	1.3170	1.2941	1.1774	0.9903	1.1397	1.1705	1.1564
CCSDS 123	1.0363	1.4259	1.4153	1.4191	1.4492	1.1951	1.2491	1.2121	1.3083	1.2430
Kakadu	1.0652	1.7701	1.8203	1.7884	1.8658	1.5272	1.5714	1.5483	1.6546	1.5621
LZ77Huff	1.2518	1.2456	1.5718	1.5394	1.5032	1.3952	1.2629	1.3733	1.4006	1.3856
LZMA	1.0331	0.9892	1.2672	1.2386	1.2045	1.1204	0.9948	1.1085	1.1332	1.1189
V2F	-	1.2469	1.3139	1.2719	1.3066	1.2057	1.2537	1.1760	1.1741	1.2180

Table 60: Fields2020 $q = 7$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5692	1.1185	1.1775	1.1418	1.1893	1.0748	1.1118	1.0346	1.0412	1.0706
Huffman Adaptive	1.6892	0.8237	0.8526	0.8400	0.8519	0.8323	0.8437	0.8076	0.7989	0.8240
Zstandard	3.6808	1.1885	0.9378	0.9322	1.0046	0.9840	1.1701	0.9574	0.9381	0.9809
BZIP2	3.6551	1.1401	0.8733	0.8661	0.9193	0.9130	1.1240	0.9068	0.8890	0.9239
CCSDS 123	3.4482	0.7834	0.8304	0.8037	0.8205	0.8991	0.8880	0.8522	0.7949	0.8591
Kakadu	3.3591	0.6311	0.6456	0.6377	0.6372	0.7033	0.7057	0.6668	0.6284	0.6835
LZ77Huff	2.8727	0.8992	0.7477	0.7409	0.7912	0.7701	0.8797	0.7521	0.7425	0.7707
LZMA	3.4775	1.1329	0.9275	0.9208	0.9874	0.9590	1.1172	0.9319	0.9178	0.9545
V2F	-	0.8995	0.9005	0.8999	0.9108	0.8927	0.8924	0.8832	0.8890	0.8841

Table 61: Fields2020 $q = 7$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5692	1.1185	1.1775	1.1418	1.1893	1.0748	1.1118	1.0346	1.0412	1.0706
Huffman Adaptive	0.1037	0.0987	0.0991	0.0994	0.0970	0.0989	0.0978	0.0988	0.0978	0.0979
Zstandard	20.7769	22.5564	25.9261	25.6604	26.2016	24.0744	22.0583	22.6502	22.9332	22.9423
BZIP2	2.6904	3.1913	3.3488	3.3250	3.5717	3.2872	3.0479	3.0409	3.0747	3.0202
CCSDS 123	6.1291	6.3150	6.2914	6.2624	6.3644	6.2566	6.2590	6.2572	6.2889	6.2403
Kakadu	0.9129	1.4476	1.4763	1.4575	1.5087	1.2757	1.3104	1.2854	1.3601	1.2969
LZ77Huff	1.5723	1.5658	1.7686	1.7513	1.7950	1.7000	1.5113	1.5937	1.6311	1.5859
LZMA	21.4151	24.8650	33.0999	32.9096	33.3042	29.8672	24.6476	27.4478	28.1391	27.8289
V2F	-	1.5466	1.8124	1.8073	1.6894	1.7130	1.5966	1.7362	1.7639	1.7219

8.3 Full Dataset

Table 62: Full Dataset $q = 7$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5560	1.1215	1.1827	1.1430	1.1881	1.0752	1.1193	1.0390	1.0436	1.0775
Huffman Adaptive	2.1415	1.3575	1.3817	1.3582	1.3945	1.2906	1.3190	1.2810	1.3027	1.3000
Zstandard	0.9844	0.9510	1.2555	1.2223	1.1835	1.0930	0.9580	1.0816	1.1097	1.0920
BZIP2	0.9903	0.9919	1.3468	1.3147	1.2920	1.1774	0.9970	1.1417	1.1709	1.1588
CCSDS 123	1.0328	1.4233	1.4154	1.4161	1.4451	1.1938	1.2510	1.2132	1.3067	1.2447
Kakadu	1.0644	1.7659	1.8166	1.7838	1.8600	1.5238	1.5704	1.5460	1.6506	1.5606
LZ77Huff	1.2595	1.2520	1.5737	1.5377	1.5014	1.3952	1.2698	1.3754	1.4010	1.3885
LZMA	1.0386	0.9949	1.2693	1.2376	1.2036	1.1208	1.0012	1.1106	1.1338	1.1217
V2F	-	1.2528	1.3242	1.2756	1.3067	1.2078	1.2678	1.1841	1.1790	1.2305

Table 63: Full Dataset $q = 7$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5560	1.1215	1.1827	1.1430	1.1881	1.0752	1.1193	1.0390	1.0436	1.0775
Huffman Adaptive	1.6734	0.8246	0.8538	0.8402	0.8515	0.8322	0.8458	0.8089	0.7996	0.8259
Zstandard	3.6521	1.1848	0.9401	0.9340	1.0043	0.9839	1.1700	0.9593	0.9396	0.9842
BZIP2	3.6332	1.1378	0.8766	0.8686	0.9203	0.9138	1.1254	0.9094	0.8910	0.9279
CCSDS 123	3.4492	0.7869	0.8340	0.8063	0.8221	0.9008	0.8926	0.8551	0.7978	0.8633
Kakadu	3.3533	0.6341	0.6496	0.6400	0.6385	0.7052	0.7107	0.6707	0.6314	0.6883
LZ77Huff	2.8517	0.8978	0.7499	0.7424	0.7914	0.7705	0.8810	0.7541	0.7440	0.7738
LZMA	3.4533	1.1306	0.9297	0.9223	0.9873	0.9591	1.1180	0.9339	0.9193	0.9578
V2F	-	0.8980	0.8981	0.8985	0.9099	0.8917	0.8895	0.8814	0.8877	0.8816

Table 64: Full Dataset $q = 7$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.5560	1.1215	1.1827	1.1430	1.1881	1.0752	1.1193	1.0390	1.0436	1.0775
Huffman Adaptive	0.1037	0.0988	0.0990	0.0994	0.0971	0.0988	0.0977	0.0987	0.0977	0.0978
Zstandard	20.8351	22.5618	25.8747	25.5851	26.1192	24.0178	22.0719	22.6445	22.9115	22.9317
BZIP2	2.6881	3.1876	3.3346	3.3141	3.5572	3.2763	3.0513	3.0349	3.0655	3.0506
CCSDS 123	6.1279	6.3104	6.2943	6.2635	6.3571	6.2541	6.2571	6.2530	6.2853	6.2636
Kakadu	0.9124	1.4456	1.4745	1.4546	1.5051	1.2738	1.3102	1.2842	1.3580	1.2963
LZ77Huff	1.5684	1.5599	1.7769	1.7425	1.7933	1.6912	1.5159	1.5878	1.6303	1.6138
LZMA	21.4775	24.8946	32.9506	32.7547	33.1388	29.7598	24.6629	27.4154	28.0830	27.8083
V2F	-	1.5483	1.8105	1.8045	1.6881	1.7114	1.5958	1.7333	1.7603	1.7199

9 Compression Analysis $q=8$

9.1 Boats2020

Table 65: Boats2020 $q = 8$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.2335	1.0770	1.1619	1.0755	1.0942	1.0064	1.1333	1.0184	0.9996	1.0859
Huffman Adaptive	2.2481	1.3285	1.3707	1.3185	1.3340	1.2562	1.3299	1.2745	1.2806	1.3109
Zstandard	0.9767	0.9559	1.1874	1.1179	1.0865	1.0211	0.9643	1.0295	1.0377	1.0466
BZIP2	0.9681	0.9884	1.2496	1.1824	1.1623	1.0858	0.9909	1.0755	1.0832	1.0962
CCSDS 123	0.9218	1.2920	1.3161	1.2791	1.2957	1.0888	1.1856	1.1413	1.1982	1.1760
Kakadu	0.9694	1.5968	1.6499	1.6091	1.6720	1.3740	1.4485	1.4077	1.4883	1.4311
LZ77Huff	1.2437	1.2339	1.4847	1.4086	1.3724	1.2976	1.2557	1.3014	1.3057	1.3230
LZMA	1.0184	0.9885	1.2061	1.1393	1.1088	1.0485	1.0008	1.0571	1.0616	1.0756
V2F	-	1.2374	1.3565	1.2303	1.2251	1.1572	1.3478	1.1923	1.1552	1.2880

Table 66: Boats2020 $q = 8$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.2335	1.0770	1.1619	1.0755	1.0942	1.0064	1.1333	1.0184	0.9996	1.0859
Huffman Adaptive	1.4787	0.8068	0.8419	0.8123	0.8184	0.7983	0.8447	0.7935	0.7765	0.8207
Zstandard	3.4197	1.1502	0.9757	0.9608	1.0110	0.9891	1.1866	0.9895	0.9639	1.0345
BZIP2	3.4792	1.1253	0.9293	0.9106	0.9477	0.9339	1.1653	0.9514	0.9269	0.9916
CCSDS 123	3.5342	0.8326	0.8817	0.8411	0.8454	0.9289	0.9555	0.8934	0.8353	0.9220
Kakadu	3.3933	0.6727	0.7006	0.6671	0.6543	0.7343	0.7798	0.7225	0.6712	0.7557
LZ77Huff	2.6844	0.8858	0.7797	0.7622	0.7997	0.7777	0.9068	0.7819	0.7656	0.8176
LZMA	3.2574	1.1059	0.9596	0.9419	0.9890	0.9615	1.1380	0.9618	0.9407	1.0049
V2F	-	0.8755	0.8648	0.8781	0.8952	0.8724	0.8521	0.8607	0.8698	0.8533

Table 67: Boats2020 $q = 8$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.2335	1.0770	1.1619	1.0755	1.0942	1.0064	1.1333	1.0184	0.9996	1.0859
Huffman Adaptive	0.1033	0.1008	0.1008	0.0958	0.0983	0.0942	0.0975	0.0967	0.0975	0.0950
Zstandard	20.2992	21.2458	23.5867	22.9933	23.4125	21.9608	20.9042	21.1592	21.2767	21.3767
BZIP2	2.6089	2.7970	3.1876	3.0216	3.1478	2.9861	2.9097	2.8407	2.8558	3.2146
CCSDS 123	6.0333	6.1810	6.2334	6.2299	6.2982	6.1687	6.2177	6.1607	6.1828	6.8738
Kakadu	0.8517	1.3350	1.3642	1.3367	1.3817	1.1717	1.2292	1.1908	1.2492	1.2092
LZ77Huff	1.4651	1.3780	1.7053	1.5519	1.5536	1.4997	1.4461	1.4968	1.4392	1.8676
LZMA	20.5655	23.4011	28.8079	28.3032	28.4365	26.1869	22.9808	24.8867	25.3445	25.5007
V2F	-	1.5600	1.7325	1.7400	1.6442	1.6675	1.5767	1.6858	1.6942	1.6850

9.2 Fields2020

Table 68: Fields2020 $q = 8$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.4032	1.0376	1.0927	1.0598	1.1072	0.9978	1.0306	0.9589	0.9673	0.9928
Huffman Adaptive	1.9999	1.3110	1.3309	1.3114	1.3458	1.2515	1.2721	1.2413	1.2630	1.2570
Zstandard	0.8848	0.8613	1.1609	1.1336	1.0960	1.0067	0.8673	0.9926	1.0227	1.0017
BZIP2	0.8872	0.8845	1.2304	1.2036	1.1799	1.0703	0.8888	1.0355	1.0661	1.0508
CCSDS 123	0.9582	1.3186	1.3086	1.3131	1.3462	1.0949	1.1470	1.1101	1.2043	1.1418
Kakadu	0.9689	1.6476	1.6968	1.6678	1.7495	1.4024	1.4422	1.4190	1.5249	1.4319
LZ77Huff	1.1338	1.1398	1.4619	1.4323	1.3943	1.2898	1.1569	1.2662	1.2945	1.2775
LZMA	0.9456	0.9116	1.1824	1.1568	1.1236	1.0418	0.9165	1.0275	1.0527	1.0373
V2F	-	1.1643	1.2328	1.1910	1.2241	1.1325	1.1712	1.0948	1.0969	1.1326

Table 69: Fields2020 $q = 8$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.4032	1.0376	1.0927	1.0598	1.1072	0.9978	1.0306	0.9589	0.9673	0.9928
Huffman Adaptive	1.7103	0.7903	0.8193	0.8071	0.8223	0.7965	0.8078	0.7708	0.7647	0.7874
Zstandard	3.8812	1.2091	0.9397	0.9339	1.0106	0.9913	1.1890	0.9649	0.9451	0.9890
BZIP2	3.8739	1.1791	0.8867	0.8798	0.9389	0.9329	1.1614	0.9255	0.9071	0.9432
CCSDS 123	3.5577	0.7859	0.8336	0.8062	0.8224	0.9114	0.8966	0.8627	0.8025	0.8676
Kakadu	3.5245	0.6289	0.6427	0.6347	0.6326	0.7112	0.7127	0.6745	0.6335	0.6915
LZ77Huff	3.0268	0.9120	0.7461	0.7391	0.7942	0.7735	0.8902	0.7562	0.7465	0.7753
LZMA	3.6248	1.1407	0.9225	0.9151	0.9855	0.9575	1.1240	0.9318	0.9179	0.9547
V2F	0.2253	0.8935	0.8900	0.8917	0.9050	0.8823	0.8849	0.8789	0.8839	0.8813

Table 70: Fields2020 $q = 8$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.4032	1.0376	1.0927	1.0598	1.1072	0.9978	1.0306	0.9589	0.9673	0.9928
Huffman Adaptive	0.1012	0.0987	0.0997	0.0981	0.0987	0.0982	0.0985	0.0970	0.0972	0.0974
Zstandard	19.3619	20.9475	23.8934	23.6022	24.0835	22.1685	20.4651	20.9252	21.1704	21.1827
BZIP2	2.5095	2.9543	3.0847	3.1765	3.3338	3.0966	2.8911	2.8729	2.9024	2.8552
CCSDS 123	6.0965	6.2628	6.2246	6.2945	6.3173	6.2173	6.2093	6.2142	6.2589	6.2031
Kakadu	0.8483	1.3668	1.3929	1.3753	1.4329	1.1923	1.2213	1.1943	1.2732	1.2062
LZ77Huff	1.5941	1.5110	1.6517	1.6301	1.6184	1.6261	1.4254	1.5383	1.7215	1.5319
LZMA	19.0678	22.0687	29.7004	29.3720	29.5953	26.4913	21.7994	24.3850	25.0729	24.7463
V2F	-	1.5242	1.7709	1.7794	1.6695	1.6853	1.5843	1.7133	1.7348	1.6944

9.3 Full Dataset

Table 71: Full Dataset $q = 8$ Compressed Bit Rate (bpppc)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.3914	1.0403	1.0976	1.0609	1.1063	0.9984	1.0377	0.9630	0.9696	0.9993
Huffman Adaptive	2.0172	1.3122	1.3337	1.3119	1.3450	1.2518	1.2762	1.2436	1.2642	1.2608
Zstandard	0.8912	0.8679	1.1627	1.1325	1.0953	1.0077	0.8741	0.9952	1.0237	1.0048
BZIP2	0.8928	0.8917	1.2318	1.2021	1.1787	1.0713	0.8959	1.0382	1.0673	1.0539
CCSDS 123	0.9557	1.3167	1.3091	1.3108	1.3427	1.0945	1.1497	1.1122	1.2039	1.1442
Kakadu	0.9690	1.6440	1.6935	1.6637	1.7441	1.4004	1.4426	1.4182	1.5224	1.4318
LZ77Huff	1.1415	1.1464	1.4635	1.4307	1.3928	1.2904	1.1638	1.2686	1.2953	1.2807
LZMA	0.9506	0.9170	1.1841	1.1556	1.1226	1.0423	0.9224	1.0295	1.0534	1.0400
V2F	-	1.1694	1.2415	1.1938	1.2242	1.1342	1.1835	1.1016	1.1010	1.1434

Table 72: Full Dataset $q = 8$ Compression Efficiency 1byte Entropy

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.3914	1.0403	1.0976	1.0609	1.1063	0.9984	1.0377	0.9630	0.9696	0.9993
Huffman Adaptive	1.6941	0.7914	0.8209	0.8074	0.8220	0.7967	0.8104	0.7723	0.7655	0.7898
Zstandard	3.8490	1.2050	0.9422	0.9358	1.0106	0.9911	1.1889	0.9666	0.9464	0.9922
BZIP2	3.8464	1.1754	0.8897	0.8819	0.9395	0.9329	1.1617	0.9273	0.9085	0.9466
CCSDS 123	3.5561	0.7892	0.8370	0.8087	0.8240	0.9126	0.9007	0.8649	0.8048	0.8714
Kakadu	3.5154	0.6319	0.6468	0.6369	0.6341	0.7128	0.7174	0.6779	0.6362	0.6960
LZ77Huff	3.0029	0.9102	0.7484	0.7407	0.7946	0.7738	0.8913	0.7580	0.7478	0.7782
LZMA	3.5992	1.1383	0.9251	0.9170	0.9857	0.9578	1.1249	0.9339	0.9195	0.9582
V2F	-	0.8923	0.8882	0.8907	0.9043	0.8816	0.8826	0.8776	0.8829	0.8794

Table 73: Full Dataset $q = 8$ Compression Time (seconds)

Codec	original	W	NW	N	JLS	JG	IJ	FGJI	FGJ	EFGI
Entropy	3.3914	1.0403	1.0976	1.0609	1.1063	0.9984	1.0377	0.9630	0.9696	0.9993
Huffman Adaptive	0.1013	0.0988	0.0998	0.0980	0.0987	0.0979	0.0984	0.0970	0.0973	0.0972
Zstandard	19.4273	20.9683	23.8720	23.5597	24.0367	22.1540	20.4957	20.9415	21.1778	21.1963
BZIP2	2.5165	2.9433	3.0918	3.1657	3.3208	3.0889	2.8924	2.8706	2.8991	2.8803
CCSDS 123	6.0921	6.2571	6.2252	6.2900	6.3159	6.2139	6.2099	6.2105	6.2536	6.2499
Kakadu	0.8485	1.3646	1.3909	1.3726	1.4294	1.1908	1.2219	1.1941	1.2715	1.2064
LZ77Huff	1.5851	1.5017	1.6554	1.6246	1.6139	1.6173	1.4269	1.5354	1.7018	1.5553
LZMA	19.1723	22.1617	29.6382	29.2974	29.5145	26.4700	21.8818	24.4200	25.0918	24.7989
V2F	-	1.5267	1.7682	1.7767	1.6677	1.6841	1.5838	1.7114	1.7320	1.6937