

Supplementary material for

New Appearance Models for Image Matting

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The following slides show further results which are not included in the submitted paper.

Important: Note that the supplementary material (PDF slides) are not necessary to understand the submitted paper.

To reduce the size of the document, color images were slightly compressed. Thus small artefacts may be visible.

Please view the slides in full screen mode.

Evaluation Results

Method	SAD	MSE	Gradient
Levin	4733	0.3276	679.3
Levin-mod	4727	0.3173	678.3
Our Rank-adaptive	5583	0.3328	690.9
Our Rank-adaptive-mod	5171	0.2788	633.9

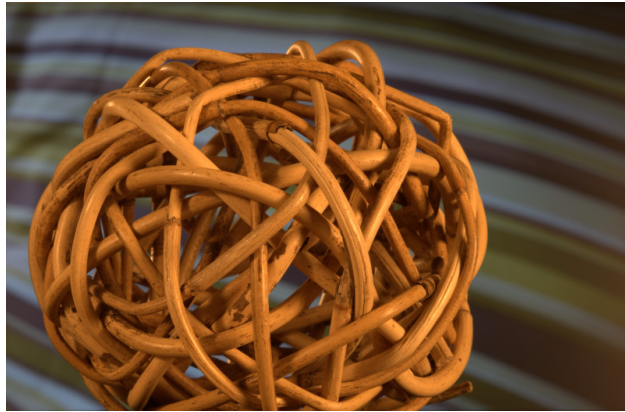
Table 1 from our paper. It shows Mean errors for the estimation of alpha mattes. The test set consists of 27 images of the ground truth dataset of [10].

The following slides show the results of the 4 different methods of table 1.

These are:

- Our new **Rank-adaptive** method.
- Our **Rank-adaptive-mod**: a modification of our algorithm, where we treat all rank 2 patches as rank 3.
- **Levin** [6].
- **Levin-mod**: the algorithm of [6] with our proposed modification of biasing the mattes towards 0 (eqn 16) but only for those connected regions in the trimap which have only 0 or 1 as boundary conditions.

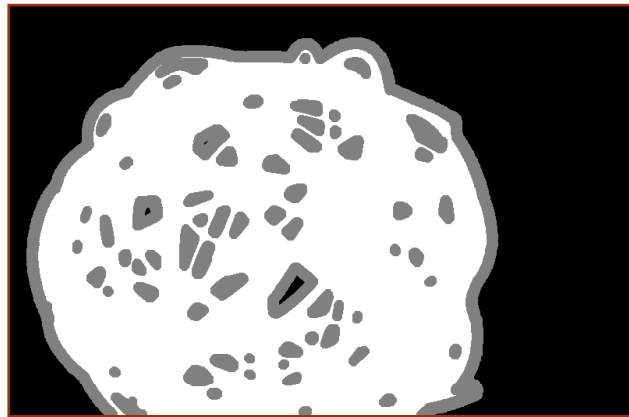
GT01 – 1/2



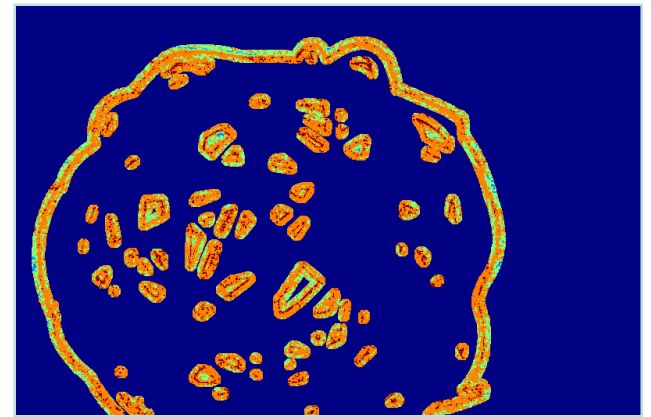
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT01 – 2/2



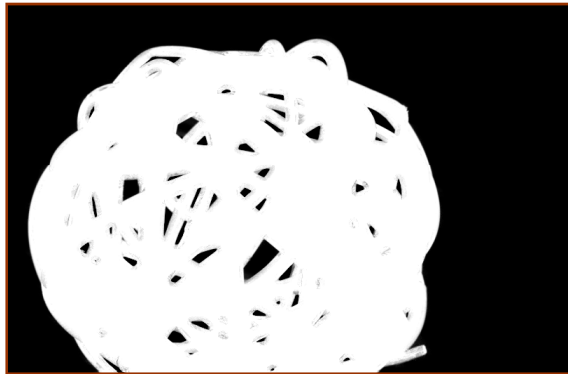
Levin

SAD: 4329, MSE: 0.7120, Gradient: 1631.3



Levin-mod

SAD: 4339, MSE: 0.6222, Gradient: 1618.6301



Rank-adaptive

SAD: 3655, MSE: 0.2455, Gradient: 792.4405



Rank-adaptive-mod

SAD: 3427, MSE: 0.2105, Gradient: 669.7259

The algorithm of Levin [6] cannot deal with holes in the trimap. Levin-mod can capture them slightly better due to its bias towards alpha value of 0, but oversmooths the result. Our proposed algorithm performs well.

GT02 – 1/2



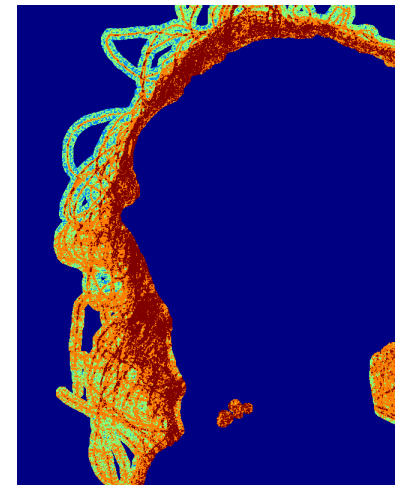
Image



Trimap



Ground truth alpha



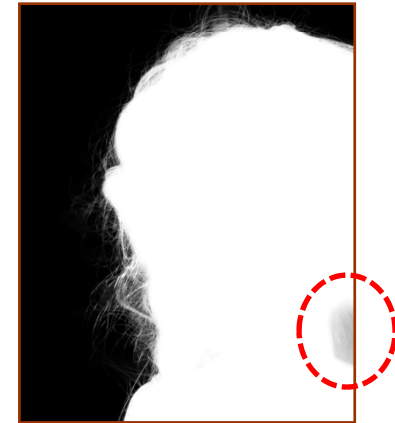
Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT02 – 2/2



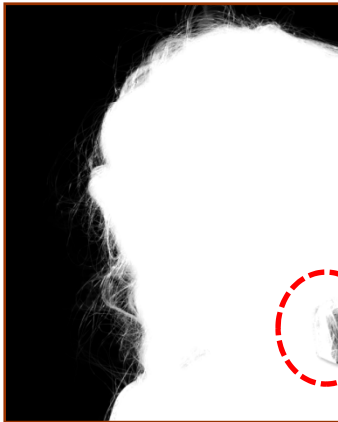
Levin

SAD: 5892, MSE: 0.2565, Gradient: 80.2745



Levin-mod

SAD: 5421, MSE: 0.1728, Gradient: 79.7012



Rank-adaptive

SAD: 5616, MSE: 0.1560, Gradient: 76.1018



Rank-adaptive-mod

SAD: 4984, MSE: 0.1179, Gradient: 76.3712

The alpha matte in the region of the red circle is recovered best by our Rank-adaptive-mod method, followed by our rank-adaptive method, and then Levin-mod and finally Levin [6]. The visual quality is also reflected in the SAD and MSE error.

GT03 – 1/2



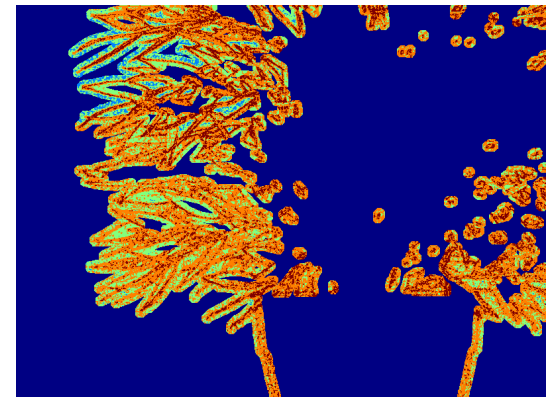
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT03 – 2/2



Levin

SAD: 15452, MSE: 1.8318, Gradient: 5277.7



Levin-mod

SAD: 15553, MSE: 1.8135, Gradient: 5275.8083



Rank-adaptive

SAD: 18061, MSE: 1.8064, Gradient: 4849.4



Rank-adaptive-mod

SAD: 15698, MSE: 1.3809, Gradient: 4.0745

GT04 -1/2



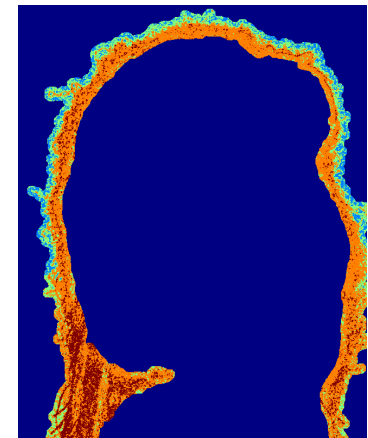
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT04 – 2/2



Levin

SAD: 6198, MSE: 0.4599, Gradient: 254.6598



Levin-mod

SAD: 6198, MSE: 0.4599, Gradient: 254.6598



Rank-adaptive

SAD: 4446, MSE: 0.1103, Gradient: 128.5546



Rank-adaptive-mod

SAD: 4324, MSE: 0.1037, Gradient: 121.2465

GT05 -1/2



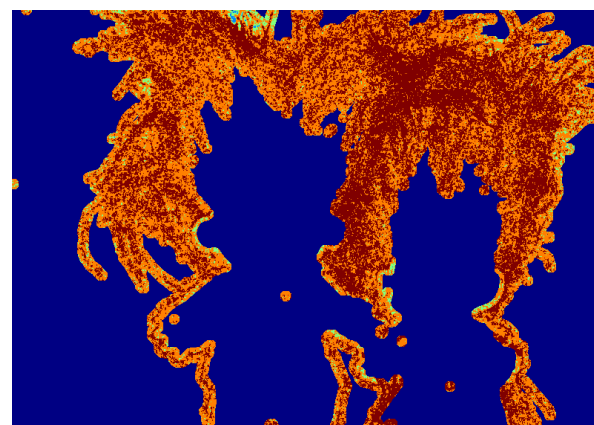
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT05 – 2/2



Levin

SAD: 13892, MSE: 1.0312, Gradient: 532.8973



Levin-mod

SAD: 13902, MSE: 1.0312, Gradient: 532.9042



Rank-adaptive

SAD:10449, MSE: 0.2883, Gradient: 290.8524



Rank-adaptive-mod

SAD:10060, MSE: 0.2668, Gradient: 282.5926

GT06 - 1/2



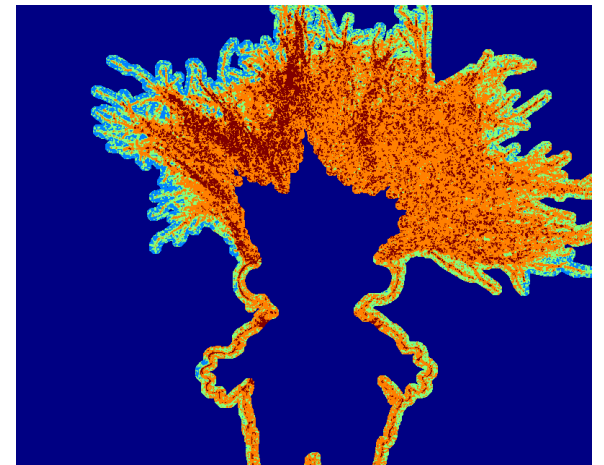
Image



Ground truth alpha

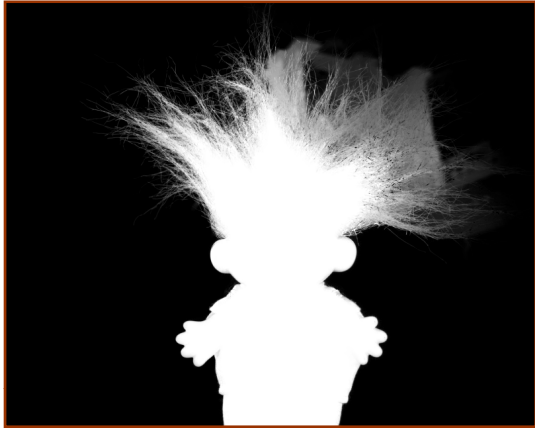


Trimap



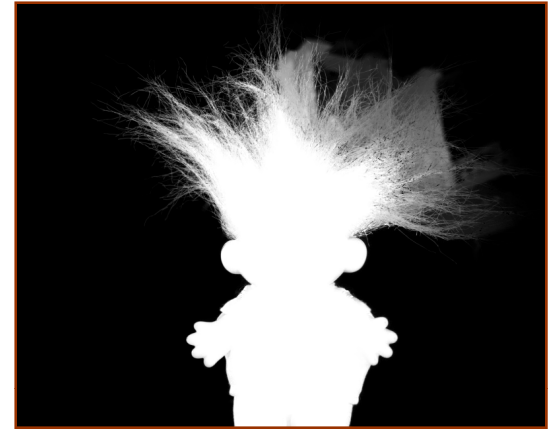
Rank: dark blue - marked. Light blue - 1, green - 2, orange -3, red -4

GT06 – 2/2



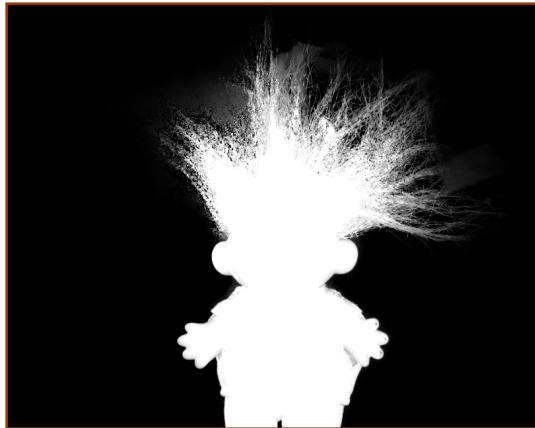
Levin

SAD: 15027, MSE: 0.6512, Gradient: 310.6364



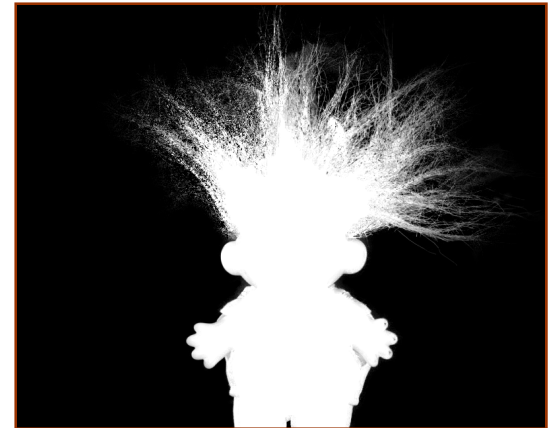
Levin-mod

SAD: 15025, MSE: 0.6499, Gradient: 310.3764



Rank-adaptive

SAD: 22642, MSE: 1.5987, Gradient: 483.0896



Rank-adaptive-mod

SAD: 16945, MSE: 0.9364, Gradient: 404.7323

GT07 - 1/2



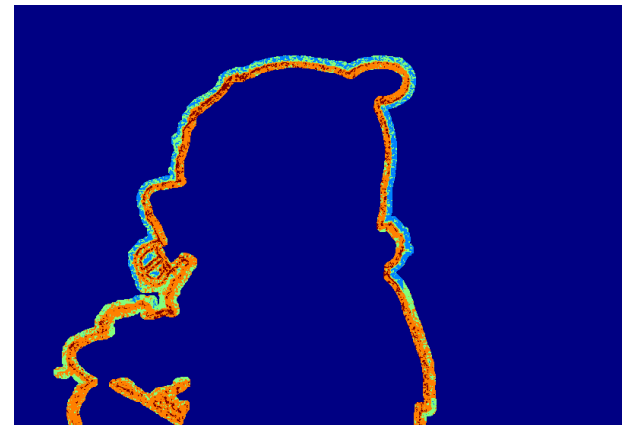
Image



Ground truth alpha

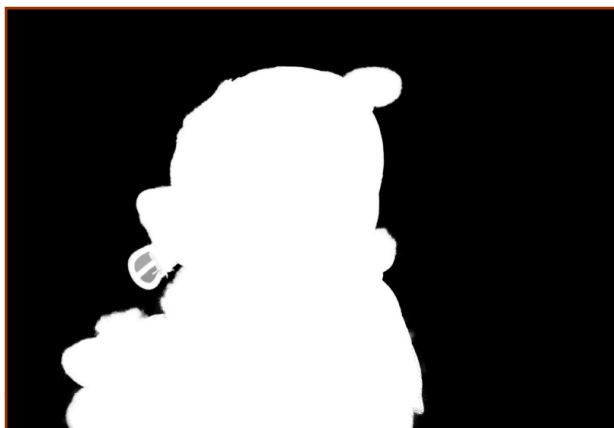


Trimap



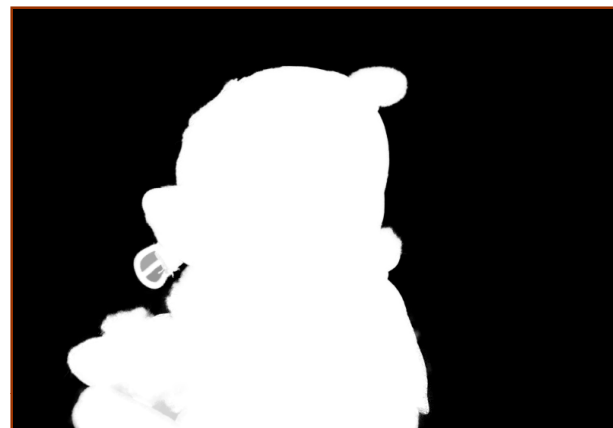
Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT07 – 2/2



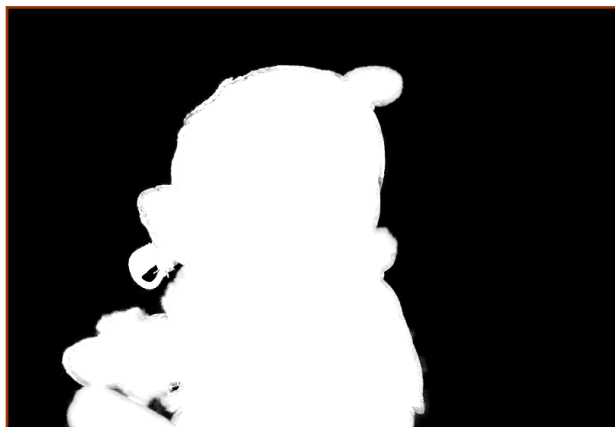
Levin

SAD: 1438, MSE: 0.1556, Gradient: 319.5752



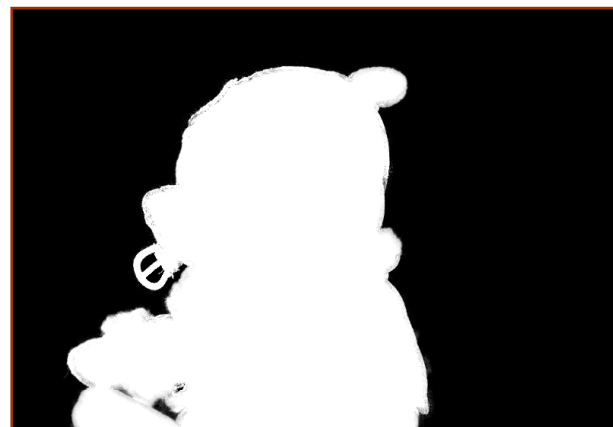
Levin-mod

SAD: 1379, MSE: 0.1294, Gradient: 316.3404



Rank-adaptive

SAD: 1664, MSE: 0.1163, Gradient: 335.2336



Rank-adaptive-mod

SAD: 1482, MSE: 0.0623, Gradient: 273.8216

GT08 – 1/2



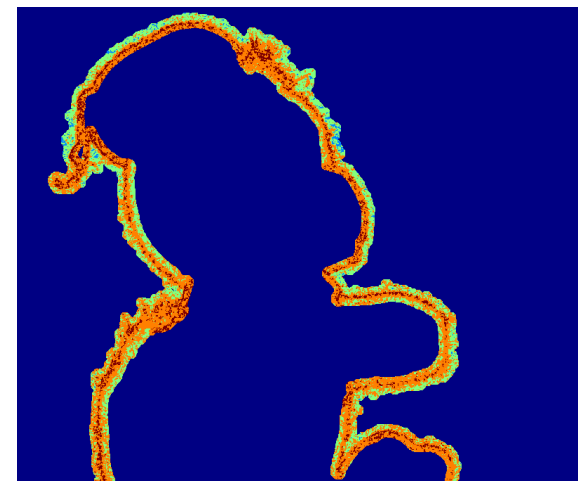
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT08 – 2/2



Levin

SAD: 1827, MSE: 0.0341, Gradient: 103.9653



Levin-mod

SAD: 1827, MSE: 0.0341, Gradient: 103.9653



Rank-adaptive

SAD: 3427, MSE: 0.1889, Gradient: 496.8043



Rank-adaptive-mod

SAD: 3448, MSE: 0.1887, Gradient: 472.9239

GT09 – 1/2



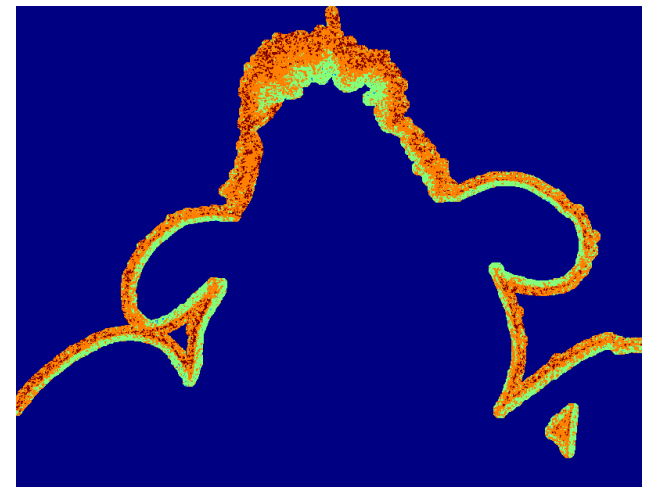
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT09 – 2/2



Levin

SAD: 2309, MSE: 0.0944, Gradient: 194.4412



Levin-mod

SAD: 2298, MSE: 0.0878, Gradient: 194.2562



Rank-adaptive

SAD: 2402, MSE: 0.0610, Gradient: 193.5894



Rank-adaptive-mod

SAD: 2305, MSE: 0.0574, Gradient: 195.2060

GT10 – 1/2



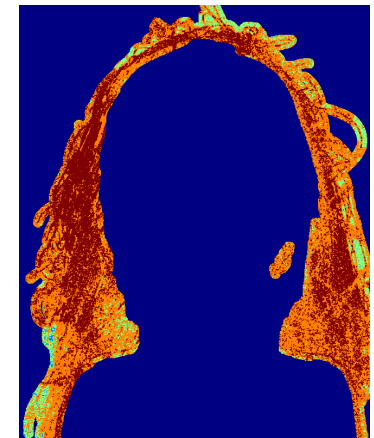
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT10 – 2/2



Levin

SAD: 12514, MSE: 0.6191, Gradient: 208.4518



Levin-mod

SAD: 12524, MSE: 0.6191, Gradient: 208.4518



Rank-adaptive

SAD: 12981, MSE: 0.5302, Gradient: 210.5813



Rank-adaptive-mod

SAD: 12921, MSE: 0.5302, Gradient: 209.8088

GT11 – 1/2



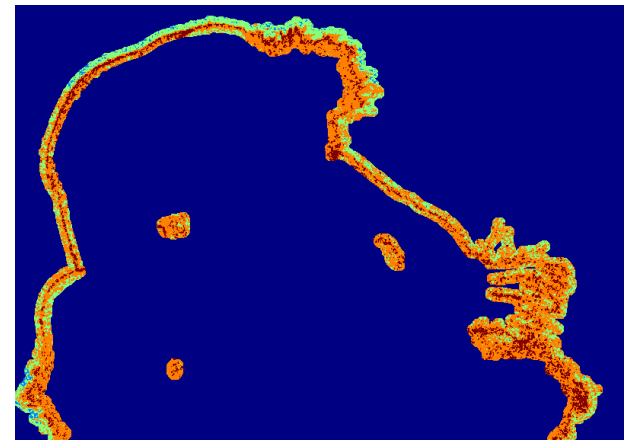
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT11 – 2/2



Levin

SAD: 2875, MSE: 0.1902, Gradient: 322.4954



Levin-mod

SAD: 2873, MSE: 0.1877, Gradient: 322.4238



Rank-adaptive

SAD: 3398, MSE: 0.1468, Gradient: 297.5391



Rank-adaptive-mod

SAD: 3301, MSE: 0.1376, Gradient: 280.0521

GT12 – 1/2



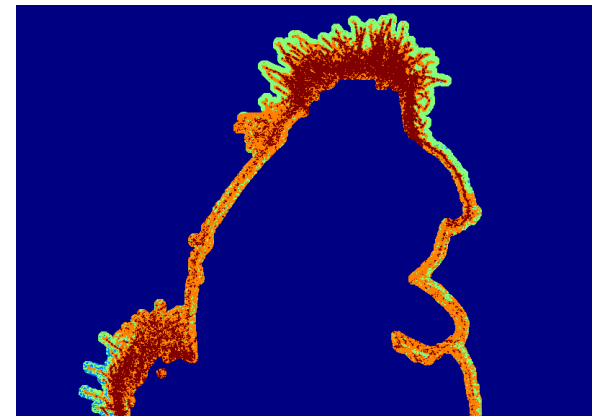
Image



Ground truth alpha

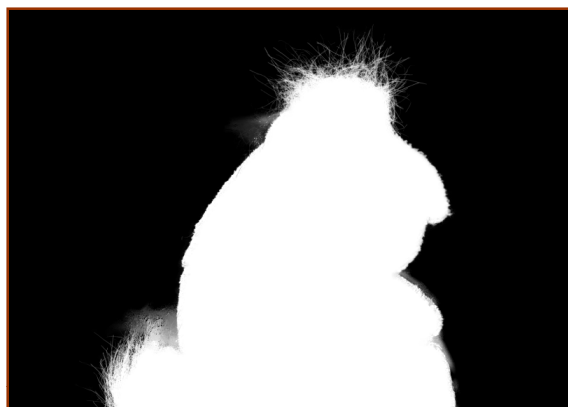


Trimap



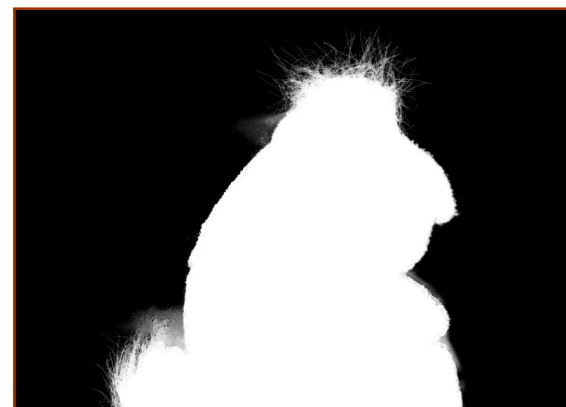
Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT12 – 2/2



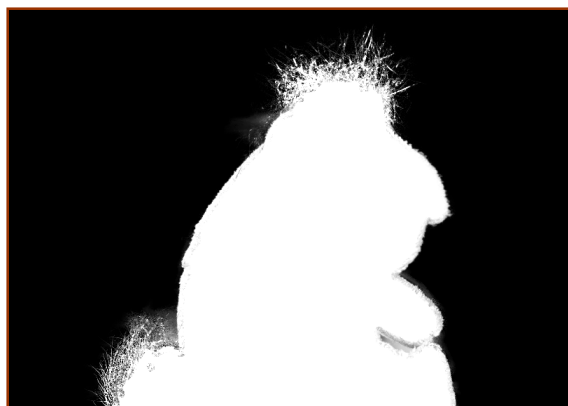
Levin

SAD: 4917, MSE: 0.3117, Gradient: 434.5631



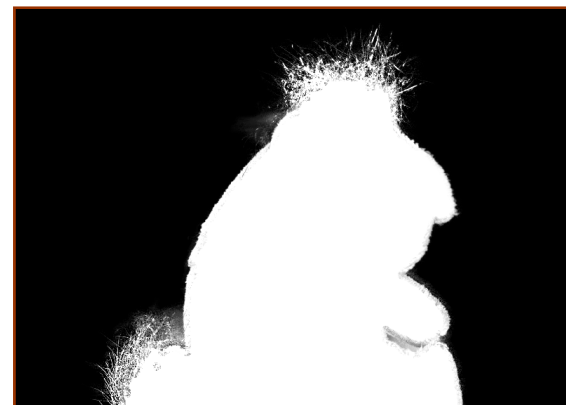
Levin-mod

SAD: 4917, MSE: 0.3117, Gradient: 434.5631



Rank-adaptive

SAD: 6426, MSE: 0.5026, Gradient: 541.0924



Rank-adaptive-mod

SAD: 6445, MSE: 0.5044, Gradient: 531.9972

GT13 – 1/2



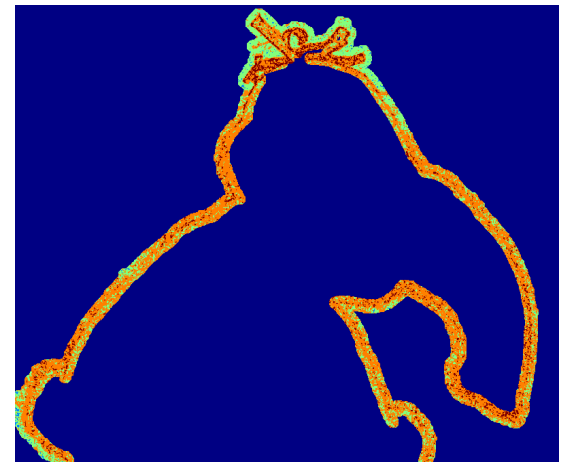
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT13 – 2/2



Levin

SAD: 2267, MSE: 0.0896, Gradient: 432.3376



Levin-mod

SAD: 2267, MSE: 0.0896, Gradient: 432.3376



Rank-adaptive

SAD: 3337, MSE: 0.1483, Gradient: 659.9896



Rank-adaptive-mod

SAD: 3292, MSE: 0.1453, Gradient: 658.0873

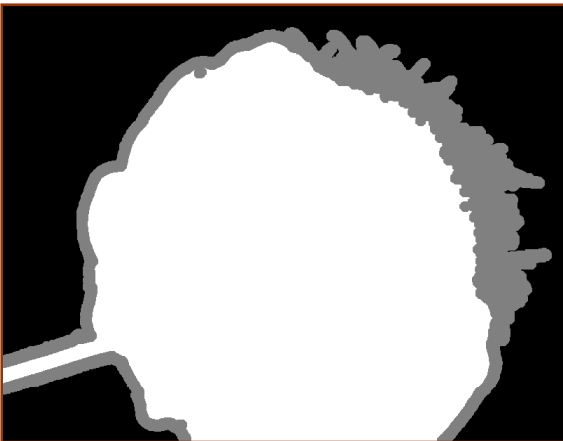
GT14 – 1/2



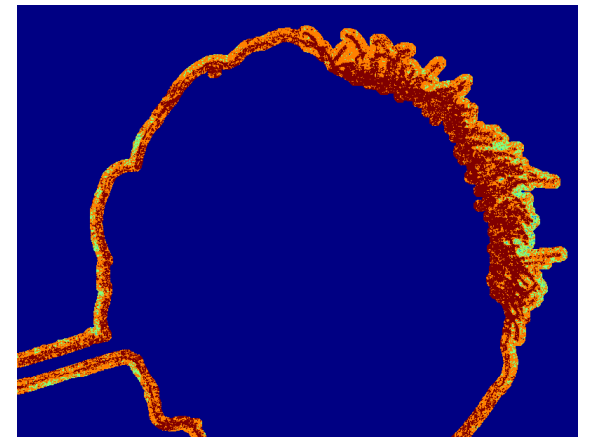
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT14 – 2/2



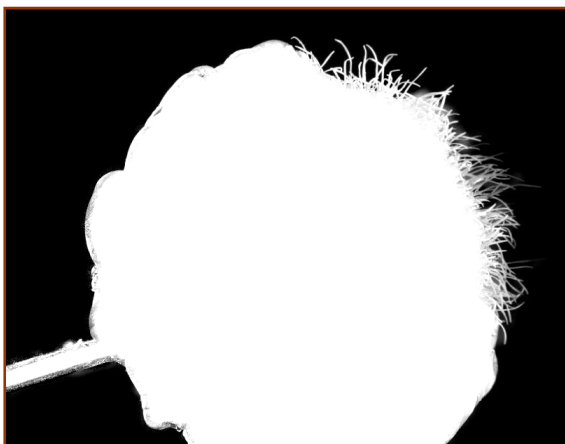
Levin

SAD: 4168, MSE: 0.1986, Gradient: 810.9



Levin-mod

SAD: 4168, MSE: 0.1986, Gradient: 810.9



Rank-adaptive

SAD: 5592, MSE: 0.3439, Gradient: 1015



Rank-adaptive-mod

SAD: 5038, MSE: 0.2906 Gradient: 873.5

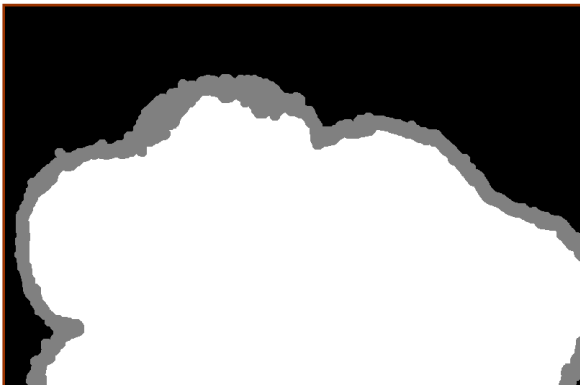
GT15 – 1/2



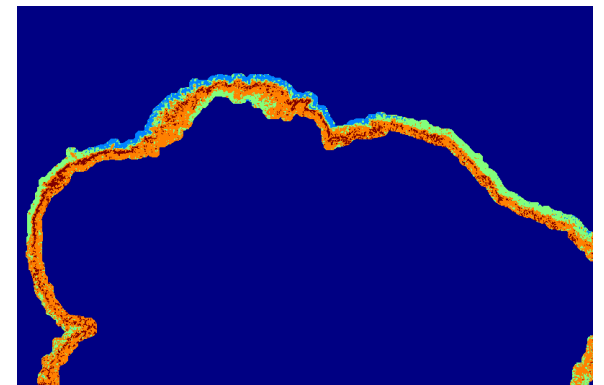
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT15 – 2/2



Levin

SAD: 1258, MSE: 0.0435, Gradient: 134.3722



Levin-mod

SAD: 1258, MSE: 0.0435, Gradient: 134.3722



Rank-adaptive

SAD: 1646, MSE: 0.0607, Gradient: 156.8013



Rank-adaptive-mod

SAD: 1739, MSE: 0.0646, Gradient: 164.0623

GT16 – 1/2



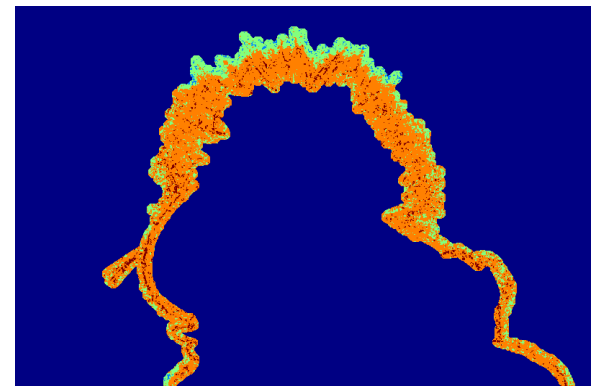
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT16 – 2/2



Levin

SAD: 2319, MSE: 0.0863, Gradient: 214.1152



Levin-mod

SAD: 2319, MSE: 0.0863, Gradient: 214.1152



Rank-adaptive

SAD: 3151, MSE: 0.1240, Gradient: 204.6502



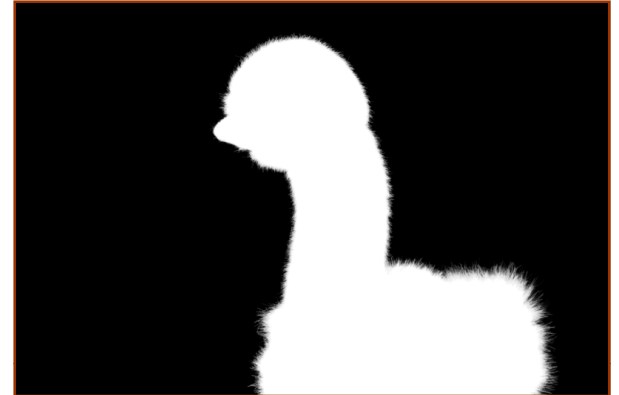
Rank-adaptive-mod

SAD: 2988, MSE: 0.1120, Gradient: 196.1383

GT17 – 1/2



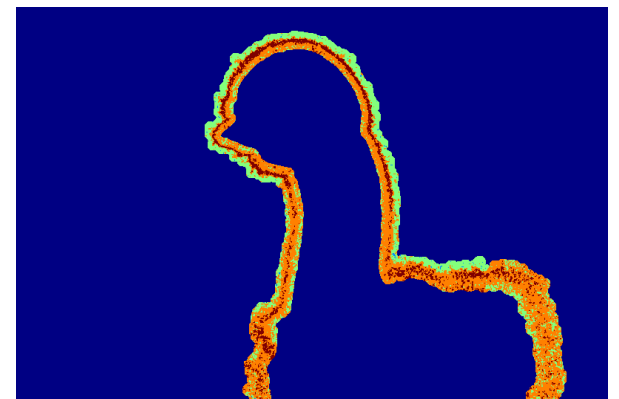
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT17 – 2/2



Levin

SAD: 1196, MSE: 0.0294, Gradient: 22.5346



Levin-mod

SAD: 1196, MSE: 0.0294, Gradient: 22.5346



Rank-adaptive

SAD: 2073, MSE: 0.0902, Gradient: 60.8060



Rank-adaptive-mod

SAD: 2186, MSE: 0.1057, Gradient: 70.4693

GT18 - 1/2



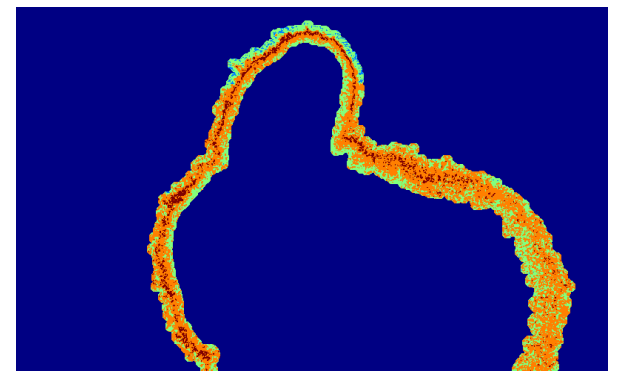
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT18 – 2/2



Levin

SAD: 2345, MSE: 0.0871, Gradient: 103.9184



Levin-mod

SAD: 2345, MSE: 0.0871, Gradient: 103.9184



Rank-adaptive

SAD:3133, MSE: 0.1720, Gradient: 182.8326



Rank-adaptive-mod

SAD: 3073, MSE: 0.1440, Gradient: 156.5506

GT19 -1/2



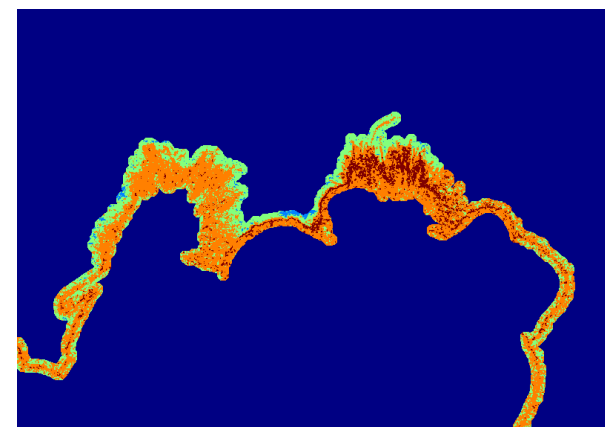
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT19 – 2/2



Levin

SAD: 1877, MSE: 0.0424, Gradient: 99.1370



Levin-mod

SAD: 1877, MSE: 0.0424, Gradient: 99.1370



Rank-adaptive

SAD: 3478, MSE: 0.1821, Gradient: 315.3143



Rank-adaptive-mod

SAD: 3248, MSE: 0.1575, Gradient: 308.2727

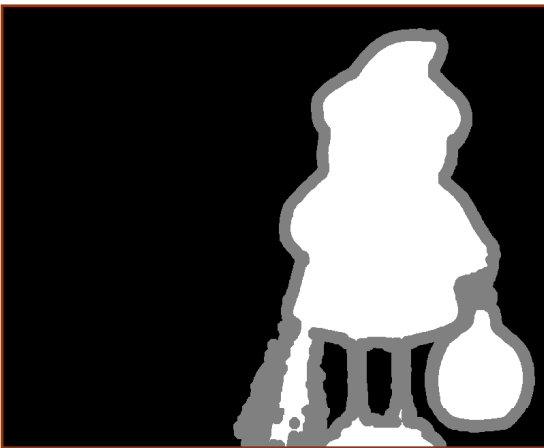
GT20 - 1/2



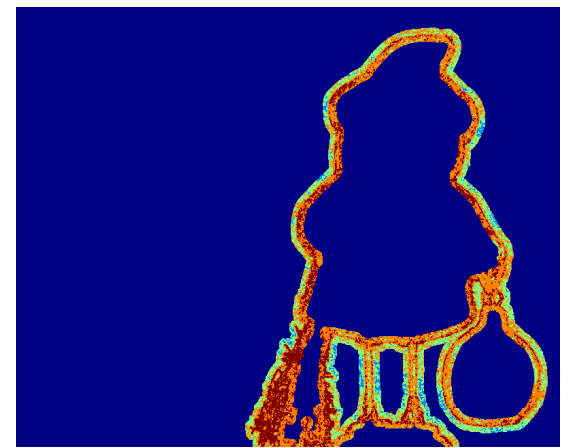
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT20 – 2/2



Levin

SAD: 2220, MSE: 0.1123, Gradient: 486.3261



Levin-mod

SAD: 2222, MSE: 0.1123, Gradient: 486.4262



Rank-adaptive

SAD: 3684, MSE: 0.2383, Gradient: 808.5329



Rank-adaptive-mod

SAD: 3628, MSE: 0.2185, Gradient: 773.5010

GT21 – 1/2



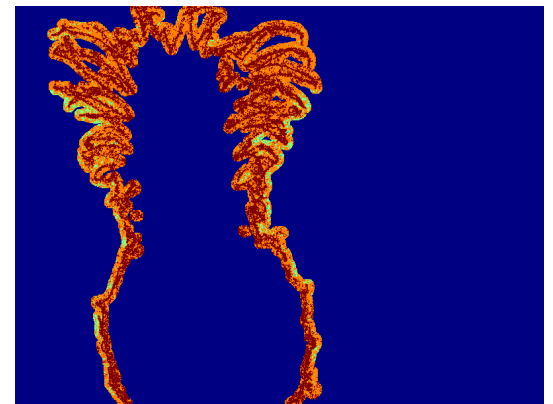
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT21 – 2/2



Levin

SAD: 8776, MSE: 0.8598, Gradient: 3077.6



Levin-mod

SAD: 8785, MSE: 0.8577, Gradient: 3077.1721



Rank-adaptive

SAD: 10178, MSE: 1.0582, Gradient: 3252.4



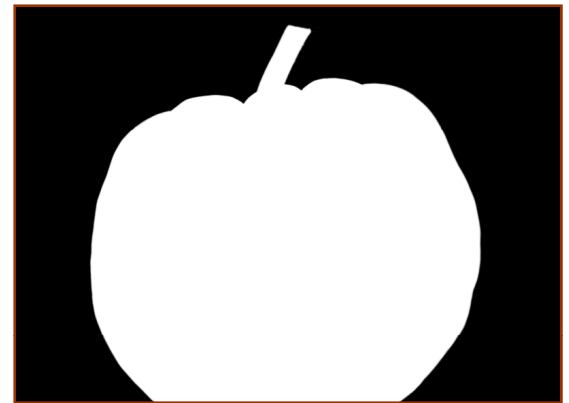
Rank-adaptive-mod

SAD: 9939, MSE: 1.0099, Gradient: 3189.2

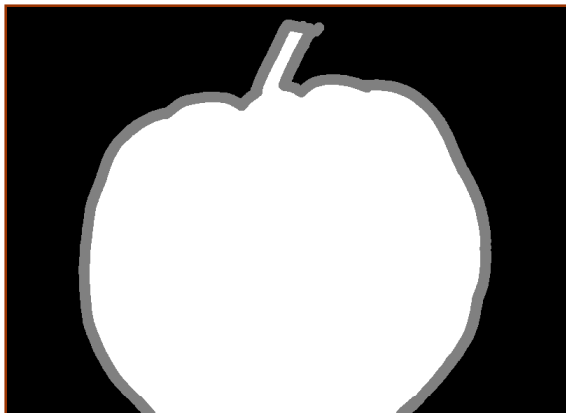
GT22 -1/2



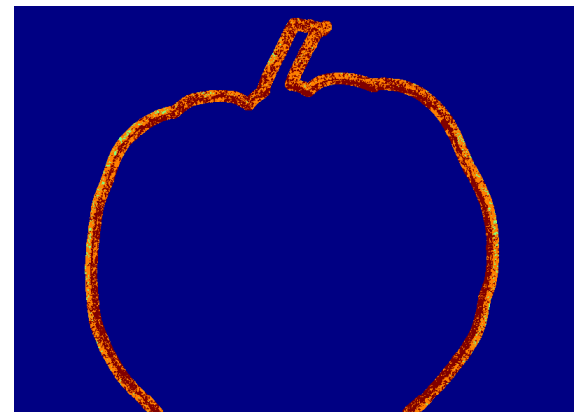
Image



Ground truth alpha

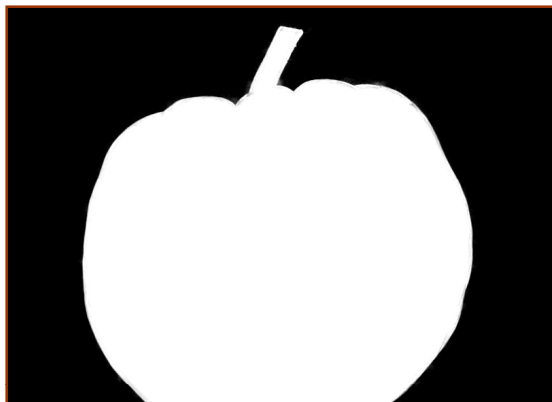


Trimap



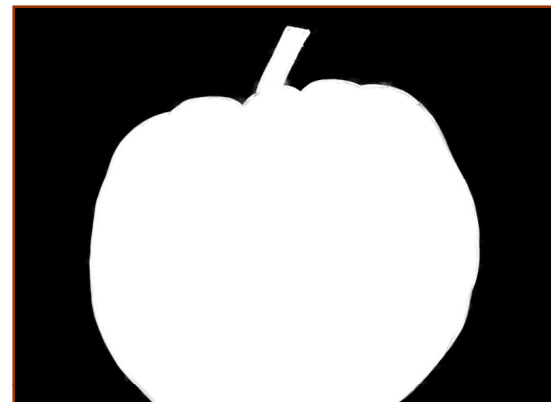
Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT22 – 2/2



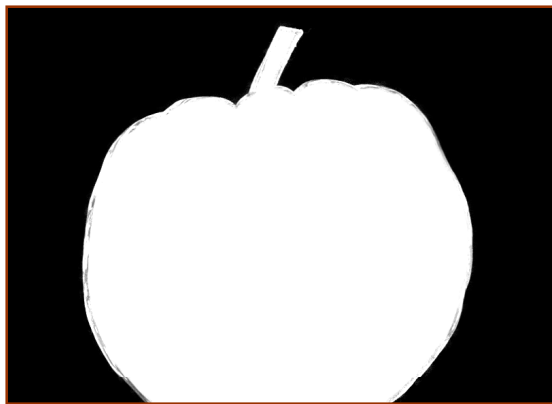
Levin

SAD: 733, MSE: 0.0191, Gradient: 130.1626



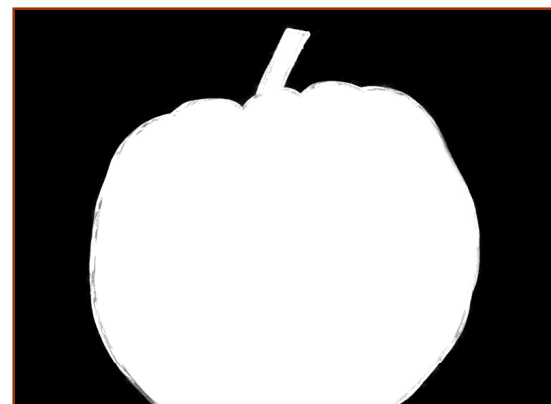
Levin-mod

SAD: 733, MSE: 0.0191, Gradient: 130.1626



Rank-adaptive

SAD: 1414, MSE: 0.0699, Gradient: 318.9652



Rank-adaptive-mod

SAD: 1416, MSE: 0.0699, Gradient: 318.6150

GT23 –1/2



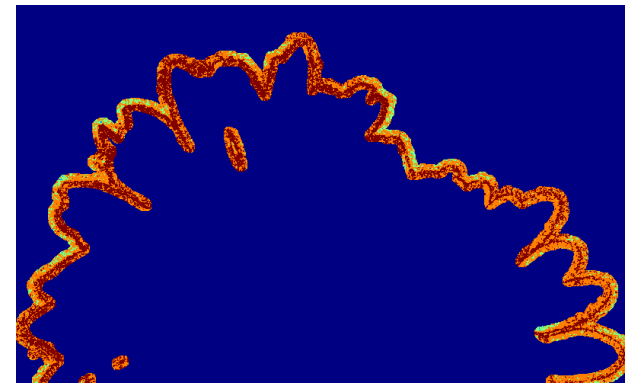
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT23 – 2/2



Levin

SAD: 1106, MSE: 0.0523, Gradient: 226.2745



Levin-mod

SAD: 1109, MSE: 0.0520, Gradient: 226.2535



Rank-adaptive

SAD: 1176, MSE: 0.0348, Gradient: 227.9468



Rank-adaptive-mod

SAD: 1178, MSE: 0.0342, Gradient: 221.2065

GT24 – 1/2



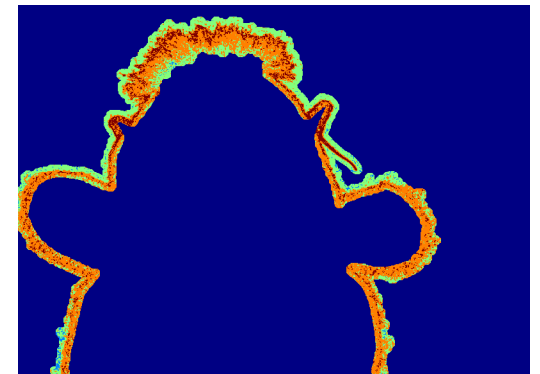
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT24 – 2/2



Levin

SAD: 1533, MSE: 0.0355, Gradient: 100.2738



Levin-mod

SAD: 1533, MSE: 0.0355, Gradient: 100.2738



Rank-adaptive

SAD: 2187, MSE: 0.0628, Gradient: 253.4592



Rank-adaptive-mod

SAD: 1977, MSE: 0.0561, Gradient: 250.5931

GT25 - 1/2



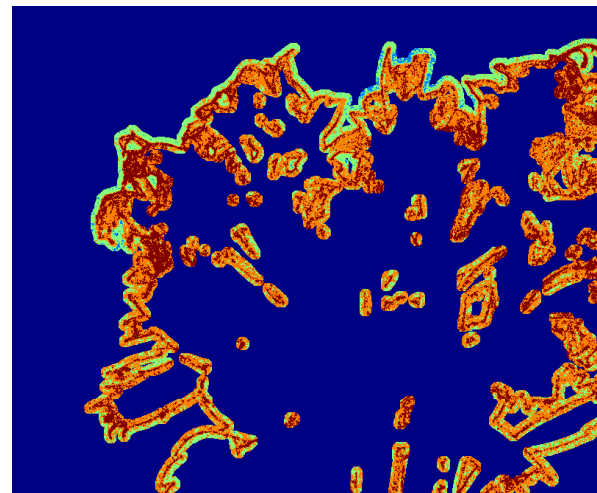
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue - 1, green - 2, orange -3, red -4

GT25 – 2/2



Levin

SAD: 7817, MSE: 0.7811, Gradient: 2573.4



Levin-mod

SAD: 7841, MSE: 0.7346, Gradient: 2566.9860



Rank-adaptive

SAD: 9054, MSE: 0.5130, Gradient: 2085



Rank-adaptive-mod

SAD: 8832, MSE: 0.4689, Gradient: 1885.7

GT26 - 1/2



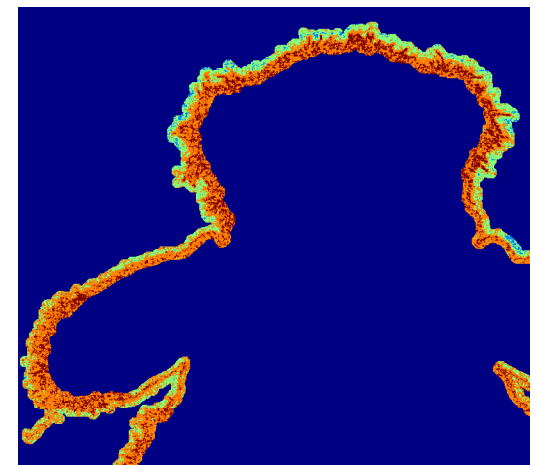
Image



Ground truth alpha

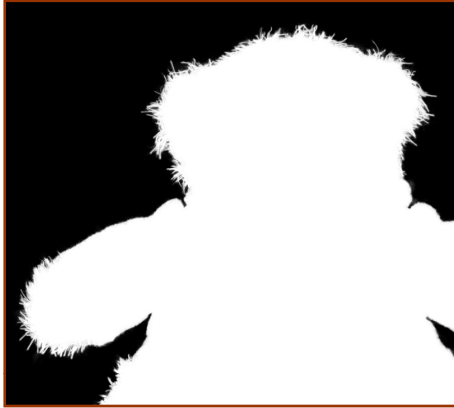


Trimap



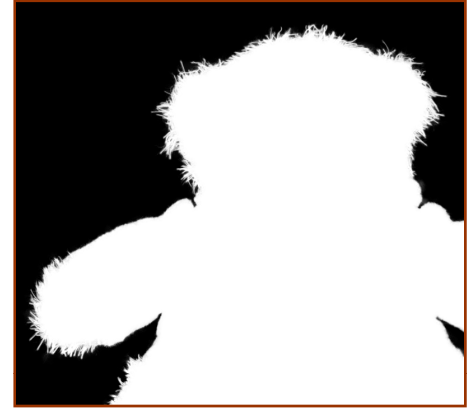
Rank: dark blue - marked. Light blue – 1, green – 2, orange -3, red -4

GT26 – 2/2



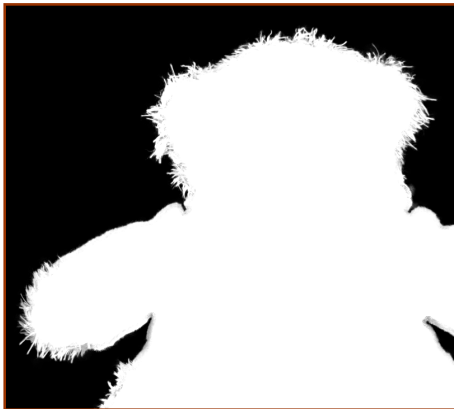
Levin

SAD: 1931, MSE: 0.0302, Gradient: 110.4470



Levin-mod

SAD: 1931, MSE: 0.0302, Gradient: 110.4470



Rank-adaptive

SAD: 2895, MSE: 0.0796, Gradient: 207.6656



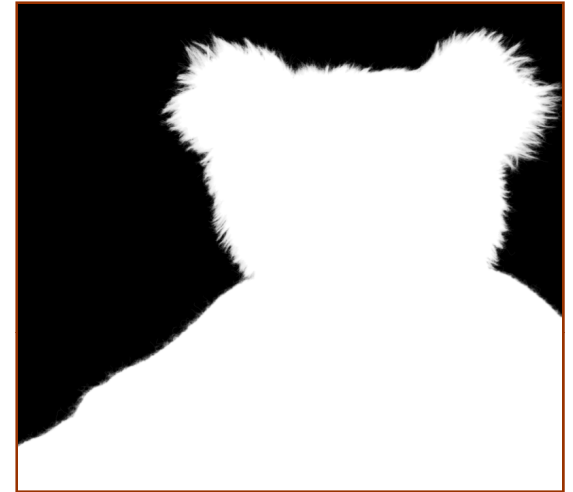
Rank-adaptive-mod

SAD: 2997, MSE: 0.0839, Gradient: 221.7502

GT27 -1/2



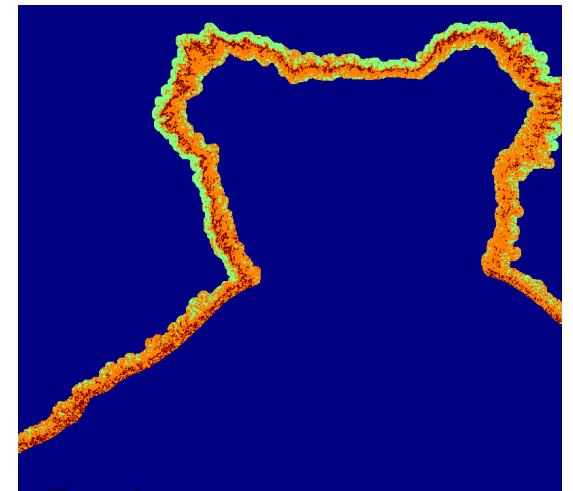
Image



Ground truth alpha



Trimap



Rank: dark blue - marked. Light blue - 1, green - 2, orange -3, red -4

GT27 – 2/2



Levin

SAD: 1789, MSE: 0.0290, Gradient: 149.5625



Levin-mod

SAD: 1789, MSE: 0.0290, Gradient: 149.5625



Rank-adaptive

SAD: 2585, MSE: 0.0574, Gradient: 211.2270



Rank-adaptive-mod

SAD: 2769, MSE: 0.0694, Gradient: 236.9182