Table 1: fitness comparison

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
Cov-1	4	Mean	9.962e-01	9.986e-01	1.004e+00	9.963e-01	1.019e+00	1.032e+00	9.996e-01	1.297e+00	1.006e+00	9.994e-01	**9.9621e-01**
		Std	1.363e-04	3.893e-03	8.788e-03	1.107e-04	1.279e-02	9.307e-02	4.567e-03	1.667e-01	5.382e-03	5.775e-03	**4.3146e-05**
		Best	**9.962e-01**	**9.962e-01**	9.965e-01	**9.962e-01**	9.969e-01	9.992e-01	9.972e-01	**9.962e-01**	9.972e-01	**9.962e-01**	**9.962e-01**
		Worst	**9.964e-01**	1.003e+00	1.017e+00	9.970e-01	1.058e+00	1.042e+00	1.015e+00	1.002e+00	1.020e+00	1.011e+00	9.967e-01
	6	Mean	**5.0701e-01**	5.296e-01	5.425e-01	5.071e-01	5.659e-01	5.580e-01	5.299e-01	7.548e-01	5.450e-01	5.147e-01	5.106e-01
		Std	1.373e-03	2.047e-02	4.923e-02	**5.6889e-04**	3.849e-02	3.789e-02	1.273e-02	1.216e-01	1.742e-02	1.221e-02	5.881e-03
		Best	**5.066e-01**	5.069e-01	5.095e-01	**5.066e-01**	5.260e-01	5.180e-01	5.099e-01	**5.066e-01**	5.160e-01	**5.066e-01**	**5.066e-01**
		Worst	**5.075e-01**	5.642e-01	7.226e-01	5.223e-01	6.077e-01	5.898e-01	5.766e-01	5.373e-01	5.757e-01	7.312e-01	5.215e-01
	8	Mean	**3.0189e-01**	3.407e-01	3.803e-01	3.040e-01	3.901e-01	3.852e-01	3.517e-01	5.361e-01	3.643e-01	3.165e-01	3.186e-01
		Std	**6.2516e-03**	2.992e-02	4.483e-02	1.497e-02	3.963e-02	3.592e-02	2.875e-02	8.936e-02	2.080e-02	3.221e-02	1.209e-02
		Best	**2.992e-01**	3.007e-01	3.081e-01	2.992e-01	3.380e-01	3.197e-01	3.107e-01	2.992e-01	3.276e-01	2.992e-01	**2.992e-01**
		Worst	**3.048e-01**	4.414e-01	4.683e-01	3.142e-01	4.677e-01	4.767e-01	4.706e-01	3.206e-01	4.022e-01	4.147e-01	3.366e-01
	10	Mean	**2.0060e-01**	2.413e-01	2.578e-01	2.084e-01	2.919e-01	2.757e-01	2.475e-01	3.836e-01	2.619e-01	2.253e-01	2.175e-01
		Std	**6.5887e-03**	2.005e-02	3.442e-02	2.278e-02	3.978e-02	2.538e-02	1.396e-02	7.553e-02	1.939e-02	3.242e-02	1.609e-02
		Best	1.961e-01	2.077e-01	2.068e-01	1.962e-01	2.215e-01	2.266e-01	2.154e-01	1.961e-01	2.229e-01	1.966e-01	**1.961e-01**
		Worst	**2.038e-01**	3.111e-01	3.342e-01	2.432e-01	3.795e-01	4.468e-01	2.726e-01	2.691e-01	2.937e-01	3.002e-01	2.462e-01
	12	Mean	1.454e-01	1.889e-01	1.995e-01	**1.4431e-01**	2.208e-01	2.176e-01	1.895e-01	3.028e-01	2.039e-01	1.665e-01	1.629e-01
		Std	1.282e-02	2.080e-02	2.193e-02	**8.3289e-03**	2.951e-02	1.600e-02	1.354e-02	5.442e-02	1.313e-02	3.168e-02	1.627e-02
		Best	1.370e-01	1.464e-01	1.522e-01	1.370e-01	1.853e-01	1.879e-01	1.708e-01	1.374e-01	1.698e-01	1.375e-01	**1.366e-01**
		Worst	**1.515e-01**	2.463e-01	2.364e-01	1.663e-01	2.989e-01	2.970e-01	2.192e-01	2.030e-01	2.201e-01	2.150e-01	1.952e-01
Cov-2	4	Mean	**9.2890e-01**	9.310e-01	9.351e-01	9.291e-01	9.516e-01	9.436e-01	9.333e-01	1.271e+00	9.374e-01	9.314e-01	9.289e-01
		Std	**1.1906e-05**	5.577e-03	8.657e-03	3.540e-04	1.246e-02	8.100e-03	4.821e-03	1.708e-01	6.240e-03	4.185e-03	1.360e-04
		Best	**9.289e-01**	**9.289e-01**	**9.289e-01**	**9.289e-01**	9.317e-01	9.301e-01	9.293e-01	**9.289e-01**	9.316e-01	**9.289e-01**	**9.289e-01**
		Worst	**9.289e-01**	9.509e-01	9.638e-01	9.300e-01	9.711e-01	9.560e-01	9.418e-01	9.383e-01	9.505e-01	9.529e-01	9.293e-01
	6	Mean	**4.7747e-01**	5.154e-01	5.175e-01	4.793e-01	5.296e-01	5.356e-01	4.980e-01	8.084e-01	5.119e-01	4.870e-01	4.809e-01
		Std	**6.8103e-04**	4.302e-02	4.657e-02	4.441e-03	2.400e-02	4.719e-02	1.894e-02	1.237e-01	1.965e-02	2.940e-02	6.413e-03
		Best	**4.772e-01**	4.783e-01	4.786e-01	**4.772e-01**	4.968e-01	4.898e-01	4.794e-01	**4.772e-01**	4.878e-01	**4.772e-01**	**4.772e-01**
		Worst	**4.789e-01**	6.416e-01	5.994e-01	6.417e-01	6.344e-01	7.092e-01	5.235e-01	5.088e-01	5.491e-01	5.822e-01	4.961e-01
	8	Mean	**2.9407e-01**	3.418e-01	3.570e-01	2.959e-01	3.817e-01	3.674e-01	3.245e-01	5.264e-01	3.557e-01	3.003e-01	3.079e-01
		Std	**3.5718e-03**	3.125e-02	4.205e-02	5.840e-03	2.857e-02	3.871e-02	1.817e-02	6.776e-02	2.683e-02	1.266e-02	1.159e-02
		Best	**2.923e-01**	2.959e-01	2.940e-01	2.926e-01	3.187e-01	2.957e-01	3.107e-01	2.924e-01	3.114e-01	2.925e-01	**2.923e-01**
		Worst	**2.990e-01**	3.758e-01	4.241e-01	3.061e-01	4.636e-01	5.278e-01	3.874e-01	3.683e-01	3.979e-01	3.861e-01	3.257e-01
	10	Mean	**1.9933e-01**	2.470e-01	2.595e-01	2.012e-01	2.767e-01	2.744e-01	2.399e-01	3.956e-01	2.592e-01	2.061e-01	2.183e-01
		Std	7.364e-03	2.745e-02	3.378e-02	**6.5278e-03**	2.687e-02	3.369e-02	1.130e-02	4.740e-02	1.549e-02	1.726e-02	1.452e-02
		Best	**1.943e-01**	1.978e-01	2.119e-01	1.953e-01	2.263e-01	2.243e-01	2.087e-01	1.949e-01	2.394e-01	1.947e-01	1.945e-01
		Worst	**2.110e-01**	3.424e-01	3.368e-01	2.297e-01	3.367e-01	3.325e-01	3.194e-01	2.442e-01	2.998e-01	2.756e-01	2.440e-01
	12	Mean	**1.4661e-01**	1.936e-01	2.032e-01	1.506e-01	2.249e-01	2.129e-01	1.898e-01	3.102e-01	2.073e-01	1.631e-01	1.616e-01
		Std	**7.9935e-03**	2.217e-02	2.013e-02	1.238e-02	2.450e-02	2.591e-02	1.479e-02	4.253e-02	1.342e-02	2.412e-02	1.650e-02
		Best	1.395e-01	1.601e-01	1.657e-01	1.397e-01	1.690e-01	1.730e-01	1.624e-01	1.396e-01	1.715e-01	1.398e-01	**1.386e-01**
		Worst	**1.643e-01**	2.463e-01	2.392e-01	1.798e-01	2.734e-01	2.708e-01	2.370e-01	2.301e-01	2.372e-01	2.034e-01	1.869e-01
Cov-3	4	Mean	**6.7904e-01**	6.855e-01	6.861e-01	6.792e-01	6.991e-01	7.450e-01	6.823e-01	1.040e+00	6.872e-01	6.806e-01	6.791e-01
		Std	**0.0000e+00**	2.119e-02	1.062e-02	2.975e-04	9.909e-03	1.351e-01	5.016e-03	1.881e-01	5.559e-03	4.772e-03	1.464e-04
		Best	**6.790e-01**	**6.790e-01**	**6.790e-01**	**6.790e-01**	6.806e-01	6.806e-01	**6.790e-01**	**6.790e-01**	6.818e-01	**6.790e-01**	**6.790e-01**
		Worst	**6.792e-01**	7.098e-01	6.915e-01	6.818e-01	7.128e-01	1.087e+00	7.029e-01	6.812e-01	7.009e-01	1.078e+00	6.796e-01
	6	Mean	**3.3573e-01**	3.591e-01	3.859e-01	3.443e-01	3.995e-01	4.097e-01	3.527e-01	5.990e-01	3.756e-01	3.386e-01	3.390e-01
		Std	**1.0320e-03**	2.035e-02	6.564e-02	3.139e-02	4.052e-02	5.647e-02	1.163e-02	1.164e-01	1.789e-02	1.036e-02	5.480e-03
		Best	**3.353e-01**	3.366e-01	3.377e-01	**3.353e-01**	3.432e-01	3.488e-01	3.377e-01	**3.353e-01**	3.434e-01	**3.353e-01**	**3.353e-01**
		Worst	**3.361e-01**	4.921e-01	4.478e-01	3.381e-01	5.128e-01	6.922e-01	3.672e-01	4.589e-01	4.008e-01	3.615e-01	3.471e-01
	8	Mean	**2.0452e-01**	2.360e-01	2.405e-01	2.092e-01	2.764e-01	2.927e-01	2.305e-01	3.975e-01	2.531e-01	2.178e-01	2.122e-01
		Std	**4.7425e-03**	3.126e-02	2.661e-02	1.672e-02	4.261e-02	6.132e-02	1.178e-02	6.508e-02	1.739e-02	2.618e-02	7.962e-03

The best results are in bold

Table 1 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Best	**2.024e-01**	2.042e-01	2.094e-01	2.025e-01	2.330e-01	2.214e-01	2.163e-01	2.025e-01	2.274e-01	2.025e-01	**2.024e-01**
		Worst	**2.068e-01**	2.943e-01	3.323e-01	2.406e-01	3.681e-01	3.752e-01	2.862e-01	2.494e-01	2.770e-01	2.826e-01	2.315e-01
	10	Mean	**1.3728e-01**	1.674e-01	1.773e-01	1.381e-01	2.137e-01	2.008e-01	1.681e-01	3.056e-01	1.838e-01	1.572e-01	1.432e-01
		Std	**8.1415e-03**	1.842e-02	1.755e-02	9.505e-03	3.051e-02	2.745e-02	1.459e-02	4.553e-02	1.249e-02	2.431e-02	1.056e-02
		Best	1.317e-01	1.402e-01	1.423e-01	1.320e-01	1.585e-01	1.687e-01	1.494e-01	1.318e-01	1.631e-01	1.324e-01	**1.317e-01**
		Worst	**1.445e-01**	2.623e-01	2.523e-01	2.024e-01	2.641e-01	3.026e-01	2.346e-01	1.771e-01	2.068e-01	2.414e-01	1.711e-01
	12	Mean	**9.5978e-02**	1.327e-01	1.417e-01	1.034e-01	1.562e-01	1.587e-01	1.315e-01	2.294e-01	1.465e-01	1.098e-01	1.133e-01
		Std	**5.4264e-03**	1.846e-02	2.184e-02	1.114e-02	1.716e-02	2.009e-02	8.486e-03	3.611e-02	1.132e-02	1.527e-02	1.130e-02
		Best	**9.261e-02**	1.013e-01	1.109e-01	9.270e-02	1.254e-01	1.226e-01	1.169e-01	9.380e-02	1.287e-01	9.421e-02	9.266e-02
		Worst	**9.854e-02**	1.881e-01	2.025e-01	1.339e-01	2.035e-01	2.232e-01	1.409e-01	1.441e-01	1.635e-01	1.816e-01	1.283e-01
Cov-4	4	Mean	**5.0767e-01**	5.135e-01	5.195e-01	5.084e-01	5.380e-01	5.616e-01	5.103e-01	8.149e-01	5.155e-01	5.101e-01	5.078e-01
		Std	**6.9307e-05**	1.112e-02	1.662e-02	1.889e-03	4.686e-02	8.135e-02	1.982e-03	1.265e-01	7.398e-03	6.416e-03	2.815e-04
		Best	**5.076e-01**	**5.076e-01**	5.079e-01	**5.076e-01**	5.114e-01	5.091e-01	5.078e-01	**5.076e-01**	5.078e-01	**5.076e-01**	**5.076e-01**
		Worst	**5.078e-01**	7.703e-01	5.473e-01	7.005e-01	5.728e-01	7.140e-01	5.198e-01	5.147e-01	5.284e-01	5.171e-01	5.086e-01
	6	Mean	2.870e-01	3.186e-01	3.256e-01	2.856e-01	3.147e-01	3.339e-01	2.911e-01	4.938e-01	3.028e-01	2.845e-01	**2.7878e-01**
		Std	6.250e-03	4.504e-02	3.500e-02	6.769e-03	1.507e-02	5.427e-02	1.111e-02	7.805e-02	1.180e-02	1.357e-02	**4.2557e-03**
		Best	**2.755e-01**	2.769e-01	2.785e-01	2.755e-01	2.989e-01	2.821e-01	2.775e-01	2.755e-01	2.821e-01	2.755e-01	**2.755e-01**
		Worst	**2.901e-01**	3.702e-01	3.860e-01	2.949e-01	4.404e-01	4.309e-01	3.269e-01	3.085e-01	3.316e-01	3.165e-01	2.918e-01
	8	Mean	**1.5777e-01**	2.151e-01	1.976e-01	1.739e-01	2.182e-01	2.293e-01	1.815e-01	3.842e-01	2.094e-01	1.692e-01	1.661e-01
		Std	**2.6632e-03**	3.050e-02	3.006e-02	2.728e-02	2.970e-02	3.600e-02	1.344e-02	8.037e-02	1.654e-02	1.963e-02	7.475e-03
		Best	1.562e-01	1.589e-01	1.610e-01	1.565e-01	1.705e-01	1.786e-01	1.632e-01	1.564e-01	1.772e-01	1.564e-01	**1.561e-01**
		Worst	**1.604e-01**	3.239e-01	2.572e-01	2.119e-01	3.109e-01	3.014e-01	2.508e-01	2.032e-01	2.339e-01	2.265e-01	1.732e-01
	10	Mean	**1.0490e-01**	1.565e-01	1.499e-01	1.146e-01	1.683e-01	1.807e-01	1.368e-01	2.840e-01	1.573e-01	1.209e-01	1.188e-01
		Std	**2.3098e-03**	3.212e-02	1.788e-02	1.436e-02	2.716e-02	2.874e-02	1.082e-02	5.175e-02	1.566e-02	1.763e-02	6.863e-03
		Best	**1.024e-01**	1.107e-01	1.156e-01	1.027e-01	1.395e-01	1.203e-01	1.170e-01	1.038e-01	1.155e-01	1.032e-01	1.024e-01
		Worst	**1.219e-01**	2.144e-01	1.978e-01	1.579e-01	2.176e-01	2.173e-01	1.604e-01	1.593e-01	1.960e-01	1.480e-01	1.313e-01
	12	Mean	**7.9070e-02**	1.166e-01	1.190e-01	8.722e-02	1.322e-01	1.344e-01	1.061e-01	2.178e-01	1.180e-01	9.556e-02	8.747e-02
		Std	**5.7919e-03**	2.045e-02	1.976e-02	1.210e-02	1.478e-02	2.136e-02	7.734e-03	3.961e-02	1.339e-02	1.646e-02	9.010e-03
		Best	7.369e-02	9.258e-02	9.086e-02	7.427e-02	1.006e-01	1.004e-01	8.972e-02	7.370e-02	9.346e-02	7.399e-02	**7.318e-02**
		Worst	**8.842e-02**	1.730e-01	1.738e-01	1.214e-01	1.805e-01	1.951e-01	1.212e-01	1.057e-01	1.423e-01	1.084e-01	1.050e-01
Cov-5	4	Mean	**5.8856e-01**	5.898e-01	5.964e-01	5.886e-01	6.068e-01	6.105e-01	5.951e-01	7.695e-01	5.926e-01	5.909e-01	5.886e-01
		Std	**5.9525e-05**	2.061e-03	1.560e-02	1.015e-04	1.660e-02	4.266e-02	5.559e-03	9.568e-02	3.763e-03	4.997e-03	2.007e-04
		Best	**5.885e-01**	**5.885e-01**	5.888e-01	**5.885e-01**	5.922e-01	5.890e-01	5.898e-01	**5.885e-01**	5.889e-01	**5.885e-01**	**5.885e-01**
		Worst	**5.885e-01**	6.033e-01	6.195e-01	5.891e-01	6.396e-01	8.068e-01	6.199e-01	6.035e-01	6.097e-01	6.022e-01	5.904e-01
	6	Mean	**3.2964e-01**	3.407e-01	3.613e-01	3.337e-01	3.854e-01	3.783e-01	3.477e-01	5.082e-01	3.515e-01	3.408e-01	3.340e-01
		Std	**2.2000e-04**	1.057e-02	2.980e-02	1.342e-02	3.182e-02	2.839e-02	7.110e-03	6.472e-02	1.012e-02	1.881e-02	4.938e-03
		Best	**3.295e-01**	3.298e-01	3.309e-01	**3.295e-01**	3.364e-01	3.301e-01	3.380e-01	3.296e-01	3.321e-01	3.296e-01	**3.295e-01**
		Worst	**3.308e-01**	3.707e-01	4.061e-01	3.352e-01	4.370e-01	4.488e-01	3.678e-01	3.696e-01	3.774e-01	3.723e-01	3.433e-01
	8	Mean	**2.0690e-01**	2.253e-01	2.476e-01	2.084e-01	2.635e-01	2.634e-01	2.393e-01	3.454e-01	2.396e-01	2.221e-01	2.146e-01
		Std	**3.8196e-03**	1.738e-02	2.579e-02	6.049e-03	2.535e-02	1.872e-02	1.378e-02	3.457e-02	1.084e-02	2.253e-02	7.759e-03
		Best	**2.043e-01**	2.050e-01	2.137e-01	2.045e-01	2.302e-01	2.314e-01	2.170e-01	2.046e-01	2.104e-01	2.049e-01	**2.043e-01**
		Worst	**2.139e-01**	2.930e-01	3.559e-01	2.219e-01	3.226e-01	3.272e-01	2.655e-01	2.617e-01	2.653e-01	2.789e-01	2.334e-01
	10	Mean	**1.4351e-01**	1.699e-01	1.848e-01	1.455e-01	2.073e-01	2.024e-01	1.778e-01	2.613e-01	1.750e-01	1.507e-01	1.573e-01
		Std	**1.9127e-03**	1.658e-02	2.075e-02	6.751e-03	2.351e-02	2.015e-02	9.494e-03	3.841e-02	8.828e-03	8.718e-03	8.733e-03
		Best	1.415e-01	1.493e-01	1.531e-01	**1.414e-01**	1.594e-01	1.661e-01	1.613e-01	1.416e-01	1.627e-01	1.431e-01	1.414e-01
		Worst	**1.475e-01**	1.987e-01	2.319e-01	1.810e-01	2.862e-01	2.257e-01	1.987e-01	1.780e-01	1.948e-01	1.893e-01	1.733e-01
	12	Mean	1.073e-01	1.319e-01	1.491e-01	**1.0666e-01**	1.588e-01	1.506e-01	1.407e-01	1.969e-01	1.370e-01	1.232e-01	1.236e-01
		Std	5.558e-03	1.255e-02	1.828e-02	**4.3539e-03**	1.788e-02	1.207e-02	7.878e-03	2.089e-02	8.936e-03	1.647e-02	7.682e-03
		Best	1.013e-01	1.053e-01	1.164e-01	1.012e-01	1.184e-01	1.342e-01	1.297e-01	**1.012e-01**	1.235e-01	1.021e-01	1.015e-01
		Worst	**1.120e-01**	1.570e-01	1.709e-01	1.196e-01	1.990e-01	1.722e-01	1.537e-01	1.482e-01	1.509e-01	1.565e-01	1.305e-01
Cov-6	4	Mean	**4.5277e-01**	4.653e-01	4.609e-01	4.629e-01	4.949e-01	5.290e-01	4.580e-01	7.211e-01	4.588e-01	4.655e-01	4.528e-01

The best results are in bold

Table 1 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Std	**1.0020e-04**	4.796e-02	8.806e-03	5.418e-02	7.604e-02	1.165e-01	6.867e-03	1.373e-01	3.694e-03	5.460e-02	1.186e-04
		Best	**4.527e-01**	**4.527e-01**	4.528e-01	**4.527e-01**	4.645e-01	4.548e-01	4.529e-01	**4.527e-01**	**4.527e-01**	**4.527e-01**	**4.527e-01**
		Worst	4.530e-01	5.678e-01	6.807e-01	4.539e-01	5.042e-01	7.547e-01	4.702e-01	7.499e-01	4.740e-01	4.703e-01	**4.528e-01**
	6	Mean	**2.3959e-01**	2.649e-01	2.821e-01	2.427e-01	2.993e-01	3.069e-01	2.589e-01	4.443e-01	2.637e-01	2.462e-01	2.438e-01
		Std	**6.4756e-04**	3.810e-02	4.028e-02	1.537e-02	3.740e-02	5.001e-02	1.061e-02	6.893e-02	1.290e-02	1.799e-02	4.339e-03
		Best	**2.394e-01**	2.395e-01	2.425e-01	**2.394e-01**	2.490e-01	2.533e-01	2.445e-01	**2.394e-01**	2.493e-01	**2.394e-01**	**2.394e-01**
		Worst	**2.411e-01**	3.180e-01	3.588e-01	3.236e-01	3.639e-01	3.745e-01	2.685e-01	3.235e-01	2.874e-01	3.238e-01	2.527e-01
	8	Mean	**1.5222e-01**	1.783e-01	1.852e-01	1.558e-01	2.185e-01	2.143e-01	1.846e-01	3.210e-01	1.871e-01	1.689e-01	1.615e-01
		Std	**3.1397e-03**	2.277e-02	2.246e-02	1.211e-02	2.517e-02	2.460e-02	1.141e-02	6.281e-02	1.199e-02	2.352e-02	7.759e-03
		Best	**1.508e-01**	1.592e-01	1.588e-01	1.509e-01	1.814e-01	1.826e-01	1.550e-01	**1.508e-01**	1.614e-01	1.510e-01	1.508e-01
		Worst	**1.541e-01**	2.407e-01	2.478e-01	1.913e-01	2.929e-01	2.888e-01	2.180e-01	1.907e-01	2.059e-01	2.394e-01	1.720e-01
	10	Mean	**1.0909e-01**	1.337e-01	1.451e-01	1.131e-01	1.722e-01	1.663e-01	1.380e-01	2.460e-01	1.423e-01	1.273e-01	1.145e-01
		Std	**5.2115e-03**	1.249e-02	1.737e-02	8.528e-03	1.936e-02	1.810e-02	1.149e-02	4.261e-02	8.740e-03	1.804e-02	9.003e-03
		Best	1.054e-01	1.108e-01	1.117e-01	1.058e-01	1.466e-01	1.327e-01	1.229e-01	1.054e-01	1.176e-01	1.060e-01	**1.053e-01**
		Worst	**1.178e-01**	1.573e-01	2.464e-01	1.511e-01	2.226e-01	2.335e-01	1.583e-01	1.513e-01	1.610e-01	1.648e-01	1.302e-01
	12	Mean	**8.1452e-02**	1.038e-01	1.092e-01	8.287e-02	1.430e-01	1.310e-01	1.129e-01	1.824e-01	1.153e-01	9.658e-02	9.101e-02
		Std	**3.6947e-03**	1.138e-02	1.385e-02	5.835e-03	1.908e-02	1.515e-02	1.015e-02	3.163e-02	7.704e-03	1.355e-02	8.721e-03
		Best	7.778e-02	8.526e-02	9.073e-02	7.833e-02	1.015e-01	1.040e-01	9.419e-02	7.815e-02	9.761e-02	7.886e-02	**7.777e-02**
		Worst	**9.108e-02**	1.311e-01	1.603e-01	1.060e-01	2.032e-01	2.106e-01	1.357e-01	1.107e-01	1.246e-01	1.212e-01	1.032e-01
Cov-7	4	Mean	7.167e-01	7.313e-01	7.222e-01	7.188e-01	7.323e-01	7.255e-01	7.206e-01	1.114e+00	7.261e-01	7.170e-01	**7.1665e-01**
		Std	8.688e-05	5.501e-02	8.018e-03	5.871e-03	9.253e-03	5.423e-03	9.293e-03	1.928e-01	6.603e-03	1.167e-03	**1.2571e-05**
		Best	**7.166e-01**	**7.166e-01**	**7.166e-01**	**7.166e-01**	7.181e-01	7.207e-01	7.169e-01	**7.166e-01**	7.171e-01	**7.166e-01**	**7.166e-01**
		Worst	**7.170e-01**	8.699e-01	7.359e-01	7.926e-01	7.502e-01	7.406e-01	7.427e-01	7.187e-01	7.737e-01	7.338e-01	7.172e-01
	6	Mean	**3.5814e-01**	3.987e-01	4.119e-01	3.672e-01	4.055e-01	4.057e-01	3.745e-01	6.380e-01	3.933e-01	3.595e-01	3.604e-01
		Std	**1.1698e-03**	5.117e-02	4.449e-02	2.593e-02	2.002e-02	4.472e-02	1.078e-02	9.275e-02	1.522e-02	2.363e-03	4.290e-03
		Best	**3.576e-01**	3.579e-01	3.595e-01	**3.576e-01**	3.681e-01	3.629e-01	3.605e-01	**3.576e-01**	3.712e-01	**3.576e-01**	**3.576e-01**
		Worst	**3.609e-01**	5.284e-01	4.541e-01	4.056e-01	4.642e-01	5.435e-01	4.196e-01	4.980e-01	4.426e-01	3.847e-01	3.866e-01
	8	Mean	**2.0944e-01**	2.566e-01	2.607e-01	2.157e-01	2.854e-01	2.809e-01	2.391e-01	4.338e-01	2.761e-01	2.222e-01	2.178e-01
		Std	**2.6102e-03**	3.945e-02	3.732e-02	1.287e-02	3.061e-02	3.506e-02	9.957e-03	8.424e-02	2.616e-02	3.119e-02	1.084e-02
		Best	**2.076e-01**	2.108e-01	2.204e-01	2.080e-01	2.286e-01	2.304e-01	2.176e-01	2.077e-01	2.445e-01	2.077e-01	**2.076e-01**
		Worst	**2.117e-01**	3.132e-01	3.075e-01	2.740e-01	3.333e-01	3.820e-01	2.773e-01	2.735e-01	3.019e-01	2.757e-01	2.406e-01
	10	Mean	**1.4515e-01**	1.902e-01	1.838e-01	1.565e-01	2.204e-01	2.095e-01	1.791e-01	3.225e-01	1.968e-01	1.606e-01	1.560e-01
		Std	**6.5415e-03**	3.112e-02	3.002e-02	2.742e-02	3.166e-02	3.271e-02	1.426e-02	5.473e-02	1.740e-02	2.312e-02	1.155e-02
		Best	1.406e-01	1.470e-01	1.569e-01	1.413e-01	1.754e-01	1.766e-01	1.577e-01	1.408e-01	1.593e-01	1.423e-01	**1.403e-01**
		Worst	**1.499e-01**	2.958e-01	2.556e-01	2.023e-01	2.846e-01	2.836e-01	2.137e-01	1.874e-01	2.295e-01	2.161e-01	1.763e-01
	12	Mean	**1.0621e-01**	1.449e-01	1.483e-01	1.122e-01	1.700e-01	1.703e-01	1.448e-01	2.677e-01	1.606e-01	1.271e-01	1.183e-01
		Std	**7.4344e-03**	2.696e-02	2.135e-02	1.019e-02	2.033e-02	2.917e-02	1.119e-02	4.636e-02	1.040e-02	1.717e-02	1.185e-02
		Best	9.969e-02	1.141e-01	1.249e-01	1.013e-01	1.474e-01	1.243e-01	1.193e-01	1.007e-01	1.314e-01	1.003e-01	**9.958e-02**
		Worst	**1.113e-01**	2.201e-01	1.976e-01	1.387e-01	2.177e-01	2.197e-01	1.591e-01	1.368e-01	1.835e-01	1.591e-01	1.395e-01
Cov-8	4	Mean	**5.5068e-01**	5.519e-01	5.665e-01	5.508e-01	5.706e-01	5.753e-01	5.569e-01	7.650e-01	5.567e-01	5.634e-01	5.507e-01
		Std	**8.0062e-05**	2.973e-03	5.062e-02	4.623e-04	1.286e-02	5.086e-02	5.281e-03	1.435e-01	3.645e-03	5.311e-02	2.743e-04
		Best	**5.507e-01**	**5.507e-01**	**5.507e-01**	**5.507e-01**	5.559e-01	5.591e-01	5.509e-01	**5.507e-01**	5.508e-01	**5.507e-01**	**5.507e-01**
		Worst	**5.507e-01**	5.962e-01	7.172e-01	8.399e-01	5.991e-01	8.466e-01	5.686e-01	5.589e-01	5.670e-01	5.733e-01	5.521e-01
	6	Mean	**2.8340e-01**	2.991e-01	3.175e-01	2.924e-01	3.434e-01	3.535e-01	3.113e-01	5.279e-01	3.109e-01	2.902e-01	2.843e-01
		Std	8.492e-03	1.779e-02	3.768e-02	3.346e-02	3.870e-02	5.805e-02	1.620e-02	9.483e-02	9.620e-03	2.215e-02	**5.3207e-03**
		Best	**2.806e-01**	2.807e-01	2.831e-01	**2.806e-01**	2.992e-01	3.077e-01	2.887e-01	**2.806e-01**	2.947e-01	2.806e-01	**2.806e-01**
		Worst	**2.812e-01**	3.816e-01	3.979e-01	3.893e-01	4.360e-01	4.330e-01	3.240e-01	4.035e-01	3.482e-01	3.893e-01	2.969e-01
	8	Mean	**1.6511e-01**	1.931e-01	2.110e-01	1.722e-01	2.352e-01	2.463e-01	1.998e-01	3.523e-01	2.067e-01	1.821e-01	1.759e-01
		Std	**2.3457e-03**	2.075e-02	2.456e-02	1.580e-02	3.041e-02	3.265e-02	1.297e-02	5.934e-02	1.612e-02	2.936e-02	7.165e-03
		Best	**1.641e-01**	1.663e-01	1.750e-01	1.641e-01	1.949e-01	1.811e-01	1.762e-01	1.641e-01	1.775e-01	1.643e-01	1.641e-01
		Worst	**1.663e-01**	2.728e-01	3.046e-01	2.129e-01	3.349e-01	4.014e-01	2.400e-01	2.037e-01	2.283e-01	2.671e-01	1.993e-01

The best results are in bold

Table 1 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
	10	Mean	**1.1283e-01**	1.387e-01	1.587e-01	1.157e-01	1.838e-01	1.854e-01	1.543e-01	2.616e-01	1.518e-01	1.360e-01	1.258e-01
		Std	**5.8631e-03**	1.327e-02	2.047e-02	1.140e-02	2.832e-02	2.346e-02	1.310e-02	4.511e-02	1.085e-02	1.704e-02	9.315e-03
		Best	**1.100e-01**	1.114e-01	1.212e-01	1.100e-01	1.394e-01	1.499e-01	1.326e-01	1.102e-01	1.175e-01	1.108e-01	1.100e-01
		Worst	**1.227e-01**	1.700e-01	1.836e-01	1.645e-01	2.607e-01	2.333e-01	1.694e-01	1.432e-01	1.718e-01	1.653e-01	1.359e-01
	12	Mean	**8.1821e-02**	1.051e-01	1.201e-01	8.921e-02	1.447e-01	1.383e-01	1.190e-01	1.982e-01	1.153e-01	1.010e-01	9.197e-02
		Std	**1.6561e-03**	1.093e-02	1.691e-02	1.086e-02	2.126e-02	1.708e-02	9.350e-03	3.107e-02	9.838e-03	1.571e-02	9.161e-03
		Best	7.967e-02	8.314e-02	9.471e-02	7.964e-02	1.126e-01	1.120e-01	1.042e-01	7.965e-02	8.973e-02	8.072e-02	**7.944e-02**
		Worst	**9.299e-02**	1.417e-01	1.817e-01	1.138e-01	1.993e-01	1.917e-01	1.546e-01	1.241e-01	1.327e-01	1.432e-01	1.119e-01
Cov-9	4	Mean	6.075e-01	6.091e-01	6.221e-01	6.076e-01	6.326e-01	6.830e-01	6.122e-01	9.191e-01	6.133e-01	6.103e-01	**6.0753e-01**
		Std	2.612e-04	3.783e-03	2.585e-02	3.136e-04	1.487e-02	1.287e-01	2.833e-03	1.441e-01	3.381e-03	5.329e-03	**1.7510e-04**
		Best	**6.075e-01**	**6.075e-01**	6.075e-01	**6.075e-01**	6.089e-01	6.123e-01	6.083e-01	**6.075e-01**	6.084e-01	**6.075e-01**	**6.075e-01**
		Worst	**6.075e-01**	6.207e-01	7.890e-01	6.099e-01	6.624e-01	6.457e-01	6.190e-01	6.174e-01	6.285e-01	6.311e-01	6.080e-01
	6	Mean	**3.5779e-01**	3.743e-01	3.952e-01	3.635e-01	4.390e-01	4.259e-01	3.753e-01	5.760e-01	3.805e-01	3.620e-01	3.599e-01
		Std	**3.0523e-03**	1.636e-02	3.776e-02	1.851e-02	4.759e-02	4.723e-02	7.732e-03	1.034e-01	8.366e-03	7.753e-03	5.134e-03
		Best	**3.563e-01**	3.575e-01	3.579e-01	3.564e-01	3.648e-01	3.653e-01	3.580e-01	**3.563e-01**	3.668e-01	3.564e-01	**3.563e-01**
		Worst	**3.679e-01**	4.061e-01	4.924e-01	4.592e-01	5.177e-01	4.930e-01	3.913e-01	3.712e-01	4.002e-01	4.593e-01	3.736e-01
	8	Mean	**2.1328e-01**	2.452e-01	2.506e-01	2.187e-01	2.910e-01	2.760e-01	2.455e-01	4.116e-01	2.622e-01	2.324e-01	2.231e-01
		Std	**2.1406e-03**	2.715e-02	2.354e-02	1.677e-02	3.377e-02	3.050e-02	1.033e-02	4.729e-02	1.309e-02	2.564e-02	1.130e-02
		Best	**2.117e-01**	2.132e-01	2.181e-01	2.118e-01	2.377e-01	2.391e-01	2.205e-01	2.122e-01	2.224e-01	2.121e-01	**2.117e-01**
		Worst	**2.215e-01**	3.758e-01	3.309e-01	2.255e-01	3.406e-01	3.855e-01	2.756e-01	2.675e-01	2.824e-01	3.078e-01	2.457e-01
	10	Mean	**1.4248e-01**	1.683e-01	1.945e-01	1.466e-01	2.213e-01	2.132e-01	1.790e-01	3.023e-01	1.937e-01	1.582e-01	1.577e-01
		Std	**3.8721e-03**	1.302e-02	2.155e-02	1.038e-02	2.323e-02	2.540e-02	1.654e-02	4.160e-02	1.272e-02	1.819e-02	1.166e-02
		Best	1.399e-01	1.500e-01	1.447e-01	1.396e-01	1.881e-01	1.802e-01	1.563e-01	1.398e-01	1.610e-01	1.404e-01	**1.395e-01**
		Worst	**1.540e-01**	2.064e-01	2.217e-01	1.723e-01	2.743e-01	3.123e-01	2.075e-01	1.847e-01	2.133e-01	2.132e-01	1.833e-01
	12	Mean	**1.0558e-01**	1.376e-01	1.449e-01	1.085e-01	1.803e-01	1.662e-01	1.385e-01	2.381e-01	1.462e-01	1.194e-01	1.211e-01
		Std	**6.7534e-03**	1.569e-02	2.267e-02	8.093e-03	2.349e-02	2.265e-02	7.034e-03	3.666e-02	1.184e-02	1.603e-02	8.900e-03
		Best	1.012e-01	1.114e-01	1.138e-01	1.020e-01	1.379e-01	1.317e-01	1.224e-01	1.013e-01	1.243e-01	1.013e-01	**1.010e-01**
		Worst	**1.191e-01**	1.604e-01	1.886e-01	1.262e-01	2.146e-01	2.113e-01	1.574e-01	1.604e-01	1.626e-01	1.581e-01	1.293e-01
Cov-10	4	Mean	**8.2952e-01**	8.338e-01	8.563e-01	8.299e-01	8.577e-01	8.656e-01	8.338e-01	1.213e+00	8.393e-01	8.327e-01	8.295e-01
		Std	**6.6442e-05**	7.591e-03	6.446e-02	7.051e-04	1.343e-02	8.671e-02	3.376e-03	2.338e-01	5.889e-03	5.771e-03	1.075e-04
		Best	**8.295e-01**	**8.295e-01**	8.295e-01	**8.295e-01**	8.344e-01	8.328e-01	8.301e-01	**8.295e-01**	8.328e-01	**8.295e-01**	**8.295e-01**
		Worst	**8.295e-01**	8.724e-01	1.022e+00	8.363e-01	9.067e-01	8.791e-01	8.532e-01	8.295e-01	8.886e-01	8.613e-01	8.298e-01
	6	Mean	**4.8850e-01**	5.126e-01	5.171e-01	4.889e-01	5.582e-01	5.557e-01	5.024e-01	7.401e-01	5.199e-01	4.937e-01	4.913e-01
		Std	5.979e-03	1.996e-02	3.793e-02	**5.8131e-03**	5.303e-02	6.160e-02	1.107e-02	8.831e-02	1.674e-02	1.185e-02	9.660e-03
		Best	**4.809e-01**	4.829e-01	4.812e-01	4.811e-01	5.071e-01	4.992e-01	4.826e-01	**4.809e-01**	4.933e-01	**4.809e-01**	**4.809e-01**
		Worst	**4.930e-01**	6.172e-01	6.328e-01	5.057e-01	6.777e-01	6.827e-01	5.261e-01	6.327e-01	5.742e-01	6.327e-01	5.060e-01
	8	Mean	**2.6984e-01**	3.359e-01	3.379e-01	2.719e-01	3.784e-01	3.746e-01	3.054e-01	5.389e-01	3.477e-01	2.813e-01	2.814e-01
		Std	1.324e-02	4.324e-02	4.255e-02	**7.8201e-03**	4.589e-02	5.097e-02	1.735e-02	7.865e-02	2.688e-02	3.466e-02	1.463e-02
		Best	**2.656e-01**	2.742e-01	2.748e-01	2.659e-01	3.125e-01	3.129e-01	2.719e-01	**2.656e-01**	2.963e-01	**2.656e-01**	**2.656e-01**
		Worst	**2.691e-01**	3.994e-01	5.687e-01	3.585e-01	4.339e-01	5.355e-01	4.101e-01	2.806e-01	3.959e-01	4.038e-01	3.216e-01
	10	Mean	**1.8161e-01**	2.254e-01	2.293e-01	1.864e-01	2.899e-01	2.768e-01	2.240e-01	4.022e-01	2.544e-01	2.006e-01	1.951e-01
		Std	1.360e-02	2.279e-02	2.616e-02	**1.1581e-02**	3.017e-02	2.675e-02	1.499e-02	6.614e-02	2.397e-02	2.416e-02	2.069e-02
		Best	1.740e-01	1.838e-01	1.941e-01	1.750e-01	2.202e-01	2.230e-01	1.961e-01	1.741e-01	2.126e-01	1.743e-01	**1.739e-01**
		Worst	**1.868e-01**	3.304e-01	3.099e-01	2.157e-01	4.127e-01	3.431e-01	2.647e-01	2.411e-01	2.942e-01	2.565e-01	2.266e-01
	12	Mean	**1.3500e-01**	1.807e-01	1.855e-01	1.411e-01	2.201e-01	2.077e-01	1.785e-01	3.010e-01	1.952e-01	1.590e-01	1.483e-01
		Std	1.126e-02	2.322e-02	1.821e-02	1.344e-02	2.593e-02	2.381e-02	**1.1116e-02**	4.748e-02	1.957e-02	2.606e-02	1.624e-02
		Best	1.274e-01	1.427e-01	1.473e-01	1.277e-01	1.702e-01	1.600e-01	1.513e-01	**1.271e-01**	1.638e-01	1.276e-01	1.276e-01
		Worst	**1.507e-01**	2.328e-01	2.385e-01	1.709e-01	3.013e-01	3.053e-01	2.079e-01	2.126e-01	2.194e-01	1.944e-01	1.753e-01
		$+/-/=$	$\sim$	50/0/0	50/0/0	47/3/0	50/0/0	50/0/0	50/0/0	50/0/0	50/0/0	49/1/0	46/4/0
		Mean Rank	1.16	5.62	7.42	2.46	9.50	9.38	5.62	11.00	7.16	3.88	2.80

The best results are in bold

Table 1 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Rank	1	5	6	2	9	8	5	10	7	3	4

Table 2: PSNR comparaison

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
Cov-1	4	Mean	1.858e+01	1.857e+01	1.855e+01	1.858e+01	1.851e+01	1.848e+01	**1.862e+01**	1.727e+01	1.857e+01	1.859e+01	1.857e+01
		Std	**1.401e-02**	5.603e-02	8.135e-02	1.520e-02	1.252e-01	3.460e-01	5.812e-02	6.849e-01	7.536e-02	5.308e-02	1.404e-02
		Best	1.862e+01	1.864e+01	1.864e+01	1.861e+01	1.873e+01	1.873e+01	1.870e+01	1.861e+01	1.871e+01	**1.873e+01**	1.860e+01
		Worst	**1.856e+01**	1.851e+01	1.840e+01	1.853e+01	1.808e+01	1.827e+01	1.839e+01	1.849e+01	1.838e+01	1.847e+01	**1.856e+01**
	6	Mean	**2.148e+01**	2.134e+01	2.120e+01	2.147e+01	2.098e+01	2.124e+01	2.145e+01	1.986e+01	2.117e+01	2.142e+01	2.145e+01
		Std	**2.758e-02**	1.968e-01	3.794e-01	4.510e-02	3.732e-01	3.096e-01	2.773e-01	8.563e-01	2.749e-01	1.879e-01	1.213e-01
		Best	2.156e+01	2.161e+01	2.150e+01	2.156e+01	2.145e+01	2.171e+01	**2.172e+01**	2.155e+01	2.164e+01	2.164e+01	2.168e+01
		Worst	**2.138e+01**	2.111e+01	1.996e+01	2.116e+01	2.018e+01	2.058e+01	2.087e+01	2.102e+01	2.069e+01	2.025e+01	2.127e+01
	8	Mean	**2.370e+01**	2.331e+01	2.262e+01	2.368e+01	2.253e+01	2.277e+01	2.329e+01	2.131e+01	2.300e+01	2.348e+01	2.353e+01
		Std	**1.290e-01**	3.869e-01	5.340e-01	2.187e-01	4.936e-01	4.839e-01	5.041e-01	9.391e-01	4.455e-01	4.342e-01	2.252e-01
		Best	2.382e+01	2.395e+01	2.378e+01	2.381e+01	2.377e+01	2.375e+01	**2.404e+01**	2.387e+01	2.368e+01	2.388e+01	2.398e+01
		Worst	**2.358e+01**	2.216e+01	2.150e+01	2.356e+01	2.126e+01	2.208e+01	2.215e+01	2.302e+01	2.227e+01	2.227e+01	2.301e+01
	10	Mean	**2.547e+01**	2.475e+01	2.438e+01	2.533e+01	2.379e+01	2.438e+01	2.493e+01	2.296e+01	2.426e+01	2.505e+01	2.517e+01
		Std	**2.245e-01**	4.944e-01	6.130e-01	4.368e-01	7.358e-01	4.011e-01	5.219e-01	9.738e-01	4.298e-01	6.607e-01	4.340e-01
		Best	2.571e+01	2.538e+01	2.556e+01	2.564e+01	2.536e+01	2.545e+01	2.552e+01	2.561e+01	2.533e+01	**2.574e+01**	2.568e+01
		Worst	**2.522e+01**	2.366e+01	2.297e+01	2.451e+01	2.238e+01	2.181e+01	2.356e+01	2.351e+01	2.358e+01	2.378e+01	2.405e+01
	12	Mean	**2.684e+01**	2.591e+01	2.538e+01	2.678e+01	2.496e+01	2.529e+01	2.600e+01	2.404e+01	2.554e+01	2.621e+01	2.637e+01
		Std	3.283e-01	4.315e-01	5.745e-01	**3.165e-01**	6.427e-01	5.000e-01	4.949e-01	8.568e-01	4.176e-01	8.395e-01	5.720e-01
		Best	2.721e+01	2.709e+01	2.659e+01	2.713e+01	2.599e+01	2.636e+01	2.684e+01	2.703e+01	2.646e+01	**2.730e+01**	2.723e+01
		Worst	**2.642e+01**	2.453e+01	2.420e+01	2.611e+01	2.357e+01	2.351e+01	2.443e+01	2.489e+01	2.473e+01	2.538e+01	2.555e+01
Cov-2	4	Mean	1.924e+01	1.924e+01	1.920e+01	1.924e+01	1.920e+01	**1.931e+01**	1.929e+01	1.795e+01	1.917e+01	1.924e+01	1.924e+01
		Std	**2.894e-02**	5.997e-02	1.369e-01	5.264e-02	2.239e-01	1.536e-01	9.636e-02	1.092e+00	1.349e-01	7.111e-02	2.961e-02
		Best	1.928e+01	1.943e+01	1.947e+01	1.932e+01	**1.954e+01**	1.951e+01	1.944e+01	1.938e+01	1.940e+01	1.946e+01	1.928e+01
		Worst	**1.919e+01**	1.901e+01	1.886e+01	1.909e+01	1.875e+01	1.879e+01	1.903e+01	1.916e+01	1.888e+01	1.899e+01	**1.919e+01**
	6	Mean	2.237e+01	2.204e+01	2.195e+01	2.230e+01	2.166e+01	2.196e+01	**2.242e+01**	1.991e+01	2.193e+01	2.223e+01	2.230e+01
		Std	**4.782e-02**	3.940e-01	3.921e-01	1.524e-01	4.226e-01	5.261e-01	2.954e-01	9.551e-01	4.333e-01	2.942e-01	1.934e-01
		Best	2.249e+01	2.252e+01	2.260e+01	2.254e+01	2.253e+01	2.272e+01	2.285e+01	2.243e+01	**2.291e+01**	2.252e+01	2.254e+01
		Worst	**2.222e+01**	2.147e+01	2.077e+01	2.098e+01	2.061e+01	2.055e+01	2.206e+01	2.174e+01	2.120e+01	2.098e+01	2.194e+01
	8	Mean	2.441e+01	2.387e+01	2.351e+01	2.437e+01	2.306e+01	2.372e+01	**2.457e+01**	2.207e+01	2.355e+01	2.439e+01	2.426e+01
		Std	**1.624e-01**	4.214e-01	5.380e-01	1.943e-01	5.218e-01	6.267e-01	4.842e-01	9.192e-01	6.527e-01	3.250e-01	3.187e-01
		Best	2.479e+01	2.461e+01	2.446e+01	2.476e+01	2.469e+01	2.457e+01	**2.512e+01**	2.478e+01	2.489e+01	2.482e+01	2.461e+01
		Worst	**2.412e+01**	2.262e+01	2.250e+01	2.394e+01	2.150e+01	2.227e+01	2.346e+01	2.346e+01	2.270e+01	2.320e+01	2.358e+01
	10	Mean	**2.625e+01**	2.553e+01	2.497e+01	2.617e+01	2.462e+01	2.499e+01	2.575e+01	2.333e+01	2.526e+01	2.605e+01	2.580e+01
		Std	**2.017e-01**	5.851e-01	6.363e-01	2.520e-01	6.275e-01	6.294e-01	3.416e-01	7.952e-01	5.625e-01	4.572e-01	4.899e-01
		Best	2.668e+01	2.621e+01	2.623e+01	2.648e+01	2.627e+01	2.611e+01	2.668e+01	2.668e+01	2.618e+01	2.674e+01	**2.675e+01**
		Worst	**2.581e+01**	2.388e+01	2.328e+01	2.568e+01	2.341e+01	2.383e+01	2.433e+01	2.519e+01	2.365e+01	2.393e+01	2.512e+01
	12	Mean	**2.772e+01**	2.654e+01	2.610e+01	2.755e+01	2.562e+01	2.608e+01	2.673e+01	2.447e+01	2.619e+01	2.716e+01	2.719e+01
		Std	**3.553e-01**	6.756e-01	5.767e-01	4.216e-01	6.709e-01	6.104e-01	4.792e-01	9.392e-01	5.630e-01	8.150e-01	6.593e-01
		Best	2.812e+01	2.780e+01	2.753e+01	2.807e+01	2.718e+01	2.749e+01	2.784e+01	2.814e+01	2.739e+01	**2.818e+01**	2.817e+01
		Worst	**2.706e+01**	2.536e+01	2.530e+01	2.655e+01	2.438e+01	2.467e+01	2.546e+01	2.571e+01	2.496e+01	2.516e+01	2.599e+01
Cov-3	4	Mean	2.015e+01	2.015e+01	2.010e+01	2.015e+01	2.014e+01	1.999e+01	**2.020e+01**	1.863e+01	2.015e+01	2.018e+01	2.015e+01
		Std	**1.571e-02**	7.606e-02	9.323e-02	2.231e-02	1.740e-01	7.383e-01	8.726e-02	9.446e-01	1.265e-01	5.530e-02	1.977e-02
		Best	2.018e+01	2.031e+01	2.020e+01	2.018e+01	2.041e+01	2.041e+01	**2.044e+01**	2.018e+01	2.041e+01	2.030e+01	2.020e+01
		Worst	**2.013e+01**	2.002e+01	1.998e+01	2.005e+01	1.973e+01	1.815e+01	2.003e+01	**2.013e+01**	1.982e+01	1.820e+01	**2.013e+01**

The best results are in bold

Table 2 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
	6	Mean	**2.315e+01**	2.289e+01	2.256e+01	2.304e+01	2.253e+01	2.254e+01	2.313e+01	2.087e+01	2.278e+01	2.313e+01	2.311e+01
		Std	**3.032e-02**	2.454e-01	6.238e-01	2.910e-01	4.494e-01	5.377e-01	1.597e-01	9.659e-01	3.135e-01	1.512e-01	9.946e-02
		Best	2.320e+01	2.319e+01	2.326e+01	2.319e+01	2.306e+01	2.334e+01	**2.335e+01**	2.318e+01	2.299e+01	2.322e+01	2.323e+01
		Worst	**2.307e+01**	2.186e+01	2.192e+01	2.306e+01	2.155e+01	2.025e+01	2.270e+01	2.206e+01	2.218e+01	2.270e+01	2.295e+01
	8	Mean	**2.497e+01**	2.444e+01	2.432e+01	2.491e+01	2.387e+01	2.400e+01	2.485e+01	2.276e+01	2.426e+01	2.484e+01	2.483e+01
		Std	**9.936e-02**	4.376e-01	4.213e-01	1.648e-01	4.935e-01	8.053e-01	2.130e-01	8.619e-01	3.795e-01	3.315e-01	2.122e-01
		Best	2.506e+01	2.497e+01	2.492e+01	2.502e+01	2.479e+01	2.504e+01	**2.521e+01**	2.509e+01	2.483e+01	2.520e+01	2.511e+01
		Worst	**2.487e+01**	2.351e+01	2.301e+01	2.443e+01	2.320e+01	2.266e+01	2.369e+01	2.402e+01	2.366e+01	2.384e+01	2.433e+01
	10	Mean	**2.633e+01**	2.557e+01	2.546e+01	2.631e+01	2.497e+01	2.556e+01	2.586e+01	2.367e+01	2.539e+01	2.610e+01	2.622e+01
		Std	2.129e-01	4.191e-01	3.550e-01	**1.764e-01**	4.949e-01	6.000e-01	3.564e-01	7.064e-01	4.007e-01	4.178e-01	2.926e-01
		Best	2.657e+01	2.631e+01	2.644e+01	2.655e+01	2.634e+01	2.650e+01	2.640e+01	2.640e+01	2.613e+01	**2.675e+01**	2.659e+01
		Worst	**2.605e+01**	2.444e+01	2.413e+01	2.509e+01	2.367e+01	2.404e+01	2.440e+01	2.570e+01	2.469e+01	2.490e+01	2.568e+01
	12	Mean	**2.743e+01**	2.647e+01	2.619e+01	2.735e+01	2.620e+01	2.641e+01	2.679e+01	2.496e+01	2.618e+01	2.732e+01	2.694e+01
		Std	**1.506e-01**	4.419e-01	5.016e-01	3.576e-01	4.042e-01	3.820e-01	3.345e-01	6.635e-01	4.204e-01	4.902e-01	3.640e-01
		Best	2.755e+01	2.740e+01	2.688e+01	2.781e+01	2.751e+01	2.771e+01	2.802e+01	2.841e+01	2.710e+01	**2.880e+01**	2.761e+01
		Worst	**2.725e+01**	2.559e+01	2.465e+01	2.685e+01	2.530e+01	2.532e+01	2.634e+01	2.635e+01	2.524e+01	2.571e+01	2.629e+01
Cov-4	4	Mean	2.128e+01	2.112e+01	2.121e+01	2.124e+01	2.106e+01	2.084e+01	**2.138e+01**	1.901e+01	2.119e+01	2.128e+01	2.126e+01
		Std	**6.849e-02**	3.318e-01	3.941e-01	2.052e-01	6.592e-01	9.762e-01	1.872e-01	1.198e+00	3.731e-01	1.300e-01	7.347e-02
		Best	2.135e+01	2.181e+01	2.180e+01	2.161e+01	**2.196e+01**	2.165e+01	2.159e+01	2.143e+01	2.188e+01	2.154e+01	2.135e+01
		Worst	2.114e+01	1.808e+01	2.022e+01	1.958e+01	1.972e+01	1.919e+01	2.095e+01	2.069e+01	2.061e+01	2.069e+01	**2.116e+01**
	6	Mean	**2.426e+01**	2.355e+01	2.359e+01	2.413e+01	2.307e+01	2.296e+01	2.368e+01	2.176e+01	2.360e+01	2.372e+01	2.346e+01
		Std	5.027e-01	9.743e-01	7.337e-01	6.332e-01	7.502e-01	9.169e-01	5.933e-01	1.163e+00	7.202e-01	4.364e-01	**2.025e-01**
		Best	2.472e+01	**2.492e+01**	2.457e+01	2.480e+01	2.383e+01	2.466e+01	2.468e+01	2.463e+01	2.464e+01	2.466e+01	2.374e+01
		Worst	**2.342e+01**	2.257e+01	2.187e+01	2.327e+01	2.077e+01	2.102e+01	2.286e+01	2.290e+01	2.200e+01	2.283e+01	2.280e+01
	8	Mean	**2.631e+01**	2.555e+01	2.536e+01	2.600e+01	2.478e+01	2.473e+01	2.560e+01	2.285e+01	2.510e+01	2.601e+01	2.597e+01
		Std	**1.985e-01**	8.279e-01	9.026e-01	8.095e-01	7.973e-01	8.638e-01	5.580e-01	1.418e+00	6.001e-01	5.752e-01	3.075e-01
		Best	2.666e+01	2.661e+01	2.643e+01	**2.716e+01**	2.634e+01	2.615e+01	2.665e+01	2.654e+01	2.649e+01	2.665e+01	2.677e+01
		Worst	**2.567e+01**	2.364e+01	2.224e+01	2.467e+01	2.320e+01	2.272e+01	2.423e+01	2.517e+01	2.315e+01	2.381e+01	2.561e+01
	10	Mean	**2.846e+01**	2.663e+01	2.650e+01	2.801e+01	2.615e+01	2.572e+01	2.708e+01	2.407e+01	2.668e+01	2.769e+01	2.783e+01
		Std	**2.583e-01**	9.593e-01	7.923e-01	6.941e-01	1.058e+00	9.946e-01	7.438e-01	1.232e+00	6.797e-01	7.337e-01	3.948e-01
		Best	2.870e+01	2.834e+01	2.820e+01	**2.882e+01**	2.694e+01	2.759e+01	2.803e+01	2.877e+01	2.831e+01	2.865e+01	2.855e+01
		Worst	**2.734e+01**	2.419e+01	2.433e+01	2.576e+01	2.377e+01	2.407e+01	2.626e+01	2.619e+01	2.481e+01	2.678e+01	2.657e+01
	12	Mean	**2.991e+01**	2.796e+01	2.750e+01	2.939e+01	2.731e+01	2.735e+01	2.849e+01	2.508e+01	2.802e+01	2.890e+01	2.920e+01
		Std	**3.501e-01**	8.650e-01	1.010e+00	7.156e-01	6.031e-01	8.982e-01	6.060e-01	1.058e+00	7.010e-01	8.992e-01	7.246e-01
		Best	**3.057e+01**	2.928e+01	2.945e+01	3.038e+01	2.870e+01	2.918e+01	2.954e+01	3.043e+01	2.967e+01	3.024e+01	3.028e+01
		Worst	**2.928e+01**	2.532e+01	2.586e+01	2.781e+01	2.572e+01	2.429e+01	2.752e+01	2.781e+01	2.626e+01	2.776e+01	2.785e+01
Cov-5	4	Mean	1.797e+01	1.796e+01	1.796e+01	1.799e+01	1.797e+01	1.773e+01	1.783e+01	1.696e+01	**1.806e+01**	1.792e+01	1.797e+01
		Std	**7.613e-02**	2.106e-01	2.653e-01	9.215e-02	4.705e-01	5.981e-01	3.477e-01	1.138e+00	1.813e-01	2.159e-01	1.078e-01
		Best	1.804e+01	1.858e+01	1.861e+01	1.817e+01	**1.893e+01**	1.872e+01	1.872e+01	1.880e+01	1.857e+01	1.839e+01	1.830e+01
		Worst	**1.790e+01**	1.758e+01	1.730e+01	1.779e+01	1.656e+01	1.632e+01	1.740e+01	1.769e+01	1.712e+01	1.761e+01	1.778e+01
	6	Mean	**2.236e+01**	2.206e+01	2.166e+01	2.226e+01	2.123e+01	2.113e+01	2.180e+01	1.973e+01	2.192e+01	2.208e+01	2.226e+01
		Std	**4.041e-02**	2.937e-01	5.893e-01	3.893e-01	9.532e-01	9.780e-01	4.038e-01	1.039e+00	3.503e-01	5.439e-01	1.874e-01
		Best	2.244e+01	2.244e+01	2.235e+01	**2.246e+01**	2.221e+01	2.236e+01	2.243e+01	2.245e+01	2.244e+01	2.246e+01	2.245e+01
		Worst	**2.231e+01**	2.099e+01	2.069e+01	2.216e+01	1.985e+01	1.814e+01	2.100e+01	2.086e+01	2.065e+01	2.107e+01	2.172e+01
	8	Mean	**2.466e+01**	2.420e+01	2.372e+01	2.453e+01	2.319e+01	2.314e+01	2.397e+01	2.182e+01	2.389e+01	2.414e+01	2.446e+01
		Std	**1.482e-01**	4.047e-01	5.628e-01	3.210e-01	6.701e-01	6.821e-01	4.260e-01	7.555e-01	4.334e-01	7.393e-01	2.650e-01
		Best	**2.481e+01**	2.478e+01	2.443e+01	2.481e+01	2.403e+01	2.420e+01	2.452e+01	2.481e+01	2.441e+01	2.480e+01	2.479e+01
		Worst	**2.420e+01**	2.204e+01	2.185e+01	2.378e+01	2.165e+01	2.073e+01	2.246e+01	2.305e+01	2.324e+01	2.253e+01	2.357e+01
	10	Mean	**2.651e+01**	2.559e+01	2.507e+01	2.632e+01	2.440e+01	2.452e+01	2.531e+01	2.339e+01	2.533e+01	2.610e+01	2.601e+01
		Std	**2.254e-01**	3.990e-01	6.897e-01	3.639e-01	7.223e-01	6.689e-01	3.876e-01	8.132e-01	3.928e-01	4.019e-01	4.384e-01
		Best	**2.673e+01**	2.640e+01	2.638e+01	2.665e+01	2.581e+01	2.573e+01	2.585e+01	2.672e+01	2.602e+01	2.667e+01	2.661e+01

The best results are in bold

Table 2 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Worst	**2.602e+01**	2.408e+01	2.392e+01	2.489e+01	2.246e+01	2.336e+01	2.450e+01	2.490e+01	2.448e+01	2.460e+01	2.535e+01
	12	Mean	**2.770e+01**	2.673e+01	2.610e+01	2.766e+01	2.558e+01	2.602e+01	2.638e+01	2.456e+01	2.647e+01	2.690e+01	2.695e+01
		Std	3.527e-01	6.104e-01	6.901e-01	**2.709e-01**	5.604e-01	5.171e-01	4.175e-01	6.518e-01	4.299e-01	6.865e-01	4.215e-01
		Best	2.824e+01	2.790e+01	2.698e+01	2.801e+01	2.720e+01	2.687e+01	2.710e+01	2.811e+01	2.722e+01	2.820e+01	**2.825e+01**
		Worst	**2.750e+01**	2.545e+01	2.537e+01	2.681e+01	2.450e+01	2.533e+01	2.556e+01	2.629e+01	2.572e+01	2.553e+01	2.646e+01
Cov-6	4	Mean	2.039e+01	2.030e+01	2.034e+01	2.033e+01	2.012e+01	1.995e+01	**2.041e+01**	1.860e+01	2.035e+01	2.034e+01	2.039e+01
		Std	**1.674e-02**	3.703e-01	9.503e-02	3.871e-01	5.484e-01	8.200e-01	1.328e-01	8.302e-01	9.805e-02	3.925e-01	1.891e-02
		Best	2.042e+01	2.048e+01	2.045e+01	2.044e+01	**2.053e+01**	2.053e+01	2.052e+01	2.047e+01	2.046e+01	2.046e+01	2.044e+01
		Worst	2.034e+01	1.929e+01	1.871e+01	2.036e+01	1.993e+01	1.834e+01	2.017e+01	1.828e+01	2.019e+01	2.013e+01	**2.037e+01**
	6	Mean	**2.314e+01**	2.280e+01	2.244e+01	2.310e+01	2.233e+01	2.241e+01	2.290e+01	2.086e+01	2.279e+01	2.304e+01	2.308e+01
		Std	**2.169e-02**	5.161e-01	5.810e-01	2.136e-01	4.861e-01	5.043e-01	1.730e-01	7.263e-01	2.468e-01	2.752e-01	8.594e-02
		Best	2.317e+01	2.319e+01	2.311e+01	2.318e+01	2.307e+01	2.311e+01	2.315e+01	**2.320e+01**	2.319e+01	2.319e+01	2.316e+01
		Worst	**2.304e+01**	2.194e+01	2.146e+01	2.198e+01	2.140e+01	2.138e+01	2.253e+01	2.194e+01	2.234e+01	2.199e+01	2.280e+01
	8	Mean	**2.503e+01**	2.441e+01	2.417e+01	2.494e+01	2.381e+01	2.393e+01	2.429e+01	2.233e+01	2.422e+01	2.475e+01	2.480e+01
		Std	**1.049e-01**	5.005e-01	4.972e-01	2.343e-01	5.582e-01	5.229e-01	2.991e-01	8.641e-01	3.208e-01	4.630e-01	2.100e-01
		Best	2.521e+01	2.535e+01	2.493e+01	2.528e+01	2.470e+01	2.472e+01	2.499e+01	2.540e+01	2.487e+01	**2.568e+01**	2.513e+01
		Worst	**2.488e+01**	2.309e+01	2.283e+01	2.412e+01	2.267e+01	2.264e+01	2.380e+01	2.398e+01	2.342e+01	2.341e+01	2.434e+01
	10	Mean	2.630e+01	2.566e+01	2.516e+01	**2.652e+01**	2.486e+01	2.512e+01	2.550e+01	2.354e+01	2.548e+01	2.596e+01	2.610e+01
		Std	**1.955e-01**	4.657e-01	4.938e-01	3.918e-01	5.811e-01	6.006e-01	5.639e-01	1.052e+00	4.917e-01	5.850e-01	3.188e-01
		Best	2.657e+01	2.661e+01	2.616e+01	2.692e+01	2.671e+01	2.610e+01	2.686e+01	2.665e+01	2.642e+01	**2.733e+01**	2.656e+01
		Worst	**2.578e+01**	2.464e+01	2.261e+01	2.518e+01	2.386e+01	2.407e+01	2.475e+01	2.505e+01	2.436e+01	2.489e+01	2.529e+01
	12	Mean	2.731e+01	2.645e+01	2.634e+01	**2.756e+01**	2.580e+01	2.629e+01	2.630e+01	2.476e+01	2.619e+01	2.721e+01	2.693e+01
		Std	**3.055e-01**	4.961e-01	6.089e-01	4.191e-01	6.821e-01	6.159e-01	4.730e-01	7.297e-01	6.006e-01	5.586e-01	3.707e-01
		Best	2.911e+01	2.786e+01	2.825e+01	**2.926e+01**	2.727e+01	2.763e+01	2.800e+01	2.855e+01	2.787e+01	2.903e+01	2.848e+01
		Worst	2.646e+01	2.558e+01	2.515e+01	**2.666e+01**	2.373e+01	2.429e+01	2.554e+01	2.616e+01	2.573e+01	2.603e+01	2.631e+01
Cov-7	4	Mean	1.966e+01	1.961e+01	1.968e+01	1.967e+01	1.964e+01	1.968e+01	1.967e+01	1.787e+01	1.962e+01	**1.970e+01**	1.966e+01
		Std	4.868e-02	3.110e-01	1.295e-01	1.246e-01	1.961e-01	2.010e-01	9.535e-02	1.258e+00	2.116e-01	**3.901e-02**	4.283e-02
		Best	1.974e+01	2.003e+01	1.986e+01	1.989e+01	2.010e+01	1.992e+01	1.989e+01	1.978e+01	**2.020e+01**	1.976e+01	1.973e+01
		Worst	**1.960e+01**	1.944e+01	1.928e+01	1.919e+01	1.916e+01	1.943e+01	1.949e+01	1.952e+01	1.917e+01	1.952e+01	1.958e+01
	6	Mean	2.337e+01	2.293e+01	2.259e+01	2.325e+01	2.272e+01	2.279e+01	2.333e+01	2.058e+01	2.296e+01	**2.342e+01**	2.334e+01
		Std	**4.527e-02**	5.587e-01	5.894e-01	3.321e-01	3.974e-01	5.820e-01	2.007e-01	1.040e+00	2.637e-01	7.078e-02	7.977e-02
		Best	2.349e+01	2.348e+01	2.335e+01	2.354e+01	**2.375e+01**	2.359e+01	2.359e+01	2.353e+01	2.338e+01	2.353e+01	2.343e+01
		Worst	**2.327e+01**	2.093e+01	2.205e+01	2.298e+01	2.196e+01	2.088e+01	2.253e+01	2.161e+01	2.163e+01	2.286e+01	2.293e+01
	8	Mean	**2.589e+01**	2.493e+01	2.473e+01	2.574e+01	2.435e+01	2.457e+01	2.553e+01	2.254e+01	2.448e+01	2.562e+01	2.564e+01
		Std	**1.139e-01**	6.708e-01	6.489e-01	3.127e-01	5.949e-01	6.313e-01	3.308e-01	1.160e+00	6.377e-01	5.650e-01	3.128e-01
		Best	2.605e+01	2.608e+01	2.552e+01	2.606e+01	2.544e+01	2.603e+01	2.603e+01	2.595e+01	2.555e+01	**2.610e+01**	2.601e+01
		Worst	**2.568e+01**	2.383e+01	2.355e+01	2.450e+01	2.325e+01	2.306e+01	2.443e+01	2.422e+01	2.369e+01	2.452e+01	2.483e+01
	10	Mean	**2.766e+01**	2.627e+01	2.647e+01	2.723e+01	2.565e+01	2.589e+01	2.670e+01	2.397e+01	2.626e+01	2.707e+01	2.724e+01
		Std	**3.689e-01**	7.370e-01	7.482e-01	7.244e-01	7.640e-01	6.851e-01	5.174e-01	1.082e+00	5.946e-01	7.079e-01	4.755e-01
		Best	**2.814e+01**	2.739e+01	2.734e+01	2.798e+01	2.686e+01	2.697e+01	2.778e+01	2.806e+01	2.731e+01	2.808e+01	2.805e+01
		Worst	**2.717e+01**	2.418e+01	2.486e+01	2.666e+01	2.394e+01	2.413e+01	2.609e+01	2.624e+01	2.479e+01	2.552e+01	2.636e+01
	12	Mean	**2.922e+01**	2.757e+01	2.743e+01	2.886e+01	2.674e+01	2.691e+01	2.766e+01	2.479e+01	2.721e+01	2.818e+01	2.865e+01
		Std	**3.760e-01**	8.402e-01	7.926e-01	5.031e-01	6.113e-01	7.983e-01	5.802e-01	8.051e-01	6.116e-01	7.426e-01	6.036e-01
		Best	**2.965e+01**	2.873e+01	2.817e+01	2.955e+01	2.762e+01	2.837e+01	2.927e+01	2.962e+01	2.868e+01	2.950e+01	2.963e+01
		Worst	**2.854e+01**	2.576e+01	2.595e+01	2.736e+01	2.523e+01	2.552e+01	2.697e+01	2.762e+01	2.637e+01	2.695e+01	2.718e+01
Cov-8	4	Mean	**1.872e+01**	1.866e+01	1.846e+01	1.867e+01	1.850e+01	1.832e+01	1.844e+01	1.741e+01	1.866e+01	1.851e+01	1.868e+01
		Std	**6.011e-02**	1.200e-01	6.109e-01	1.120e-01	5.723e-01	6.495e-01	2.440e-01	1.563e+00	2.368e-01	5.303e-01	8.296e-02
		Best	1.877e+01	**1.960e+01**	1.895e+01	1.895e+01	1.925e+01	1.920e+01	1.891e+01	1.885e+01	1.922e+01	1.896e+01	1.895e+01
		Worst	1.855e+01	1.807e+01	1.631e+01	1.594e+01	1.722e+01	1.575e+01	1.791e+01	**1.855e+01**	1.811e+01	1.749e+01	1.846e+01
	6	Mean	2.277e+01	2.239e+01	2.206e+01	2.260e+01	2.163e+01	2.157e+01	2.218e+01	1.969e+01	2.229e+01	2.267e+01	**2.278e+01**
		Std	1.427e-01	5.255e-01	7.974e-01	5.658e-01	8.399e-01	9.822e-01	7.807e-01	1.511e+00	3.172e-01	3.360e-01	**1.001e-01**

The best results are in bold

Table 2 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Best	2.285e+01	2.283e+01	2.280e+01	2.286e+01	2.257e+01	2.256e+01	**2.289e+01**	2.285e+01	2.270e+01	2.287e+01	2.288e+01
		Worst	**2.278e+01**	1.996e+01	2.032e+01	2.085e+01	1.983e+01	1.957e+01	2.114e+01	2.146e+01	2.171e+01	2.093e+01	2.244e+01
	8	Mean	**2.499e+01**	2.440e+01	2.400e+01	2.485e+01	2.354e+01	2.343e+01	2.434e+01	2.178e+01	2.407e+01	2.468e+01	2.479e+01
		Std	**9.110e-02**	3.640e-01	4.895e-01	2.964e-01	5.421e-01	6.399e-01	2.691e-01	1.209e+00	3.769e-01	5.735e-01	1.587e-01
		Best	2.506e+01	2.497e+01	2.485e+01	2.507e+01	2.460e+01	2.464e+01	2.493e+01	**2.507e+01**	2.491e+01	2.505e+01	2.503e+01
		Worst	**2.492e+01**	2.301e+01	2.234e+01	2.400e+01	2.203e+01	2.151e+01	2.372e+01	2.434e+01	2.364e+01	2.323e+01	2.407e+01
	10	Mean	**2.661e+01**	2.577e+01	2.511e+01	2.652e+01	2.473e+01	2.481e+01	2.541e+01	2.336e+01	2.548e+01	2.600e+01	2.614e+01
		Std	**1.256e-01**	3.828e-01	6.291e-01	2.986e-01	6.614e-01	4.999e-01	3.766e-01	9.134e-01	3.506e-01	4.405e-01	3.398e-01
		Best	2.678e+01	2.655e+01	2.627e+01	**2.682e+01**	2.610e+01	2.596e+01	2.603e+01	2.676e+01	2.647e+01	2.676e+01	2.674e+01
		Worst	**2.645e+01**	2.469e+01	2.444e+01	2.536e+01	2.330e+01	2.320e+01	2.497e+01	2.548e+01	2.454e+01	2.496e+01	2.579e+01
	12	Mean	**2.793e+01**	2.689e+01	2.626e+01	2.776e+01	2.589e+01	2.598e+01	2.660e+01	2.461e+01	2.662e+01	2.732e+01	2.753e+01
		Std	**1.790e-01**	5.279e-01	6.195e-01	3.629e-01	6.455e-01	4.553e-01	3.807e-01	7.362e-01	3.758e-01	6.217e-01	3.905e-01
		Best	2.824e+01	2.808e+01	2.713e+01	2.821e+01	2.699e+01	2.681e+01	2.715e+01	**2.824e+01**	2.759e+01	2.821e+01	2.806e+01
		Worst	**2.741e+01**	2.596e+01	2.447e+01	2.667e+01	2.429e+01	2.471e+01	2.564e+01	2.633e+01	2.586e+01	2.600e+01	2.628e+01
Cov-9	4	Mean	1.999e+01	1.998e+01	1.988e+01	1.998e+01	1.983e+01	1.959e+01	1.994e+01	1.854e+01	1.995e+01	1.996e+01	**1.999e+01**
		Std	**1.383e-02**	6.099e-02	2.051e-01	2.435e-02	1.679e-01	7.280e-01	3.954e-02	8.219e-01	5.789e-02	4.987e-02	1.408e-02
		Best	2.002e+01	2.004e+01	2.003e+01	2.006e+01	2.008e+01	2.009e+01	2.000e+01	2.002e+01	**2.009e+01**	2.006e+01	2.002e+01
		Worst	**1.998e+01**	1.985e+01	1.878e+01	1.992e+01	1.957e+01	1.967e+01	1.982e+01	1.989e+01	1.973e+01	1.983e+01	1.994e+01
	6	Mean	**2.327e+01**	2.282e+01	2.258e+01	2.310e+01	2.206e+01	2.211e+01	2.276e+01	2.085e+01	2.280e+01	2.317e+01	2.322e+01
		Std	**1.039e-01**	4.600e-01	6.967e-01	3.578e-01	6.041e-01	6.037e-01	4.039e-01	9.600e-01	3.350e-01	2.298e-01	1.766e-01
		Best	2.339e+01	2.333e+01	2.334e+01	2.336e+01	2.331e+01	2.337e+01	2.337e+01	**2.341e+01**	2.330e+01	2.339e+01	2.334e+01
		Worst	2.263e+01	2.203e+01	2.103e+01	2.163e+01	2.098e+01	2.131e+01	2.215e+01	2.260e+01	2.206e+01	2.167e+01	**2.280e+01**
	8	Mean	**2.539e+01**	2.486e+01	2.472e+01	2.531e+01	2.409e+01	2.447e+01	2.503e+01	2.245e+01	2.463e+01	2.516e+01	2.526e+01
		Std	**2.031e-01**	6.793e-01	4.367e-01	4.027e-01	5.807e-01	5.096e-01	3.404e-01	6.339e-01	3.696e-01	5.231e-01	2.692e-01
		Best	2.565e+01	2.554e+01	2.541e+01	2.561e+01	2.511e+01	2.529e+01	2.530e+01	2.564e+01	2.531e+01	**2.568e+01**	2.567e+01
		Worst	**2.509e+01**	2.241e+01	2.280e+01	2.469e+01	2.308e+01	2.280e+01	2.421e+01	2.435e+01	2.386e+01	2.369e+01	2.436e+01
	10	Mean	**2.727e+01**	2.644e+01	2.579e+01	2.709e+01	2.538e+01	2.561e+01	2.635e+01	2.389e+01	2.597e+01	2.679e+01	2.676e+01
		Std	**2.146e-01**	3.631e-01	4.974e-01	3.848e-01	4.454e-01	5.300e-01	4.544e-01	7.806e-01	4.163e-01	4.970e-01	3.730e-01
		Best	**2.752e+01**	2.696e+01	2.687e+01	2.746e+01	2.646e+01	2.673e+01	2.713e+01	2.739e+01	2.693e+01	2.744e+01	2.746e+01
		Worst	**2.661e+01**	2.530e+01	2.481e+01	2.633e+01	2.402e+01	2.362e+01	2.560e+01	2.620e+01	2.491e+01	2.538e+01	2.608e+01
	12	Mean	**2.855e+01**	2.735e+01	2.710e+01	2.835e+01	2.628e+01	2.668e+01	2.752e+01	2.504e+01	2.718e+01	2.799e+01	2.800e+01
		Std	**2.808e-01**	5.874e-01	7.624e-01	3.396e-01	6.473e-01	6.391e-01	3.464e-01	7.808e-01	4.367e-01	6.207e-01	4.100e-01
		Best	2.887e+01	2.814e+01	2.801e+01	2.877e+01	2.716e+01	2.754e+01	2.811e+01	2.893e+01	2.770e+01	2.889e+01	**2.900e+01**
		Worst	**2.792e+01**	2.665e+01	2.569e+01	2.758e+01	2.518e+01	2.535e+01	2.666e+01	2.661e+01	2.641e+01	2.672e+01	2.757e+01
Cov-10	4	Mean	1.946e+01	1.945e+01	1.929e+01	1.946e+01	1.929e+01	1.941e+01	**1.951e+01**	1.817e+01	1.942e+01	1.949e+01	1.946e+01
		Std	**1.514e-02**	9.693e-02	2.926e-01	2.792e-02	1.755e-01	3.808e-01	7.026e-02	9.914e-01	1.171e-01	7.206e-02	1.921e-02
		Best	1.949e+01	1.955e+01	1.951e+01	1.951e+01	1.958e+01	**1.965e+01**	1.965e+01	1.950e+01	1.960e+01	1.957e+01	1.951e+01
		Worst	**1.943e+01**	1.904e+01	1.837e+01	1.940e+01	1.884e+01	1.885e+01	1.931e+01	1.939e+01	1.900e+01	1.900e+01	**1.943e+01**
	6	Mean	2.197e+01	2.183e+01	2.169e+01	2.196e+01	2.144e+01	2.170e+01	**2.204e+01**	2.041e+01	2.176e+01	2.199e+01	2.190e+01
		Std	1.090e-01	2.476e-01	3.184e-01	**8.438e-02**	4.988e-01	4.959e-01	1.215e-01	7.008e-01	2.980e-01	1.418e-01	1.218e-01
		Best	2.209e+01	2.215e+01	2.212e+01	2.210e+01	2.212e+01	2.221e+01	**2.226e+01**	2.210e+01	2.213e+01	2.212e+01	2.218e+01
		Worst	**2.188e+01**	2.075e+01	2.088e+01	2.174e+01	2.064e+01	2.076e+01	2.151e+01	2.099e+01	2.132e+01	2.092e+01	2.159e+01
	8	Mean	**2.438e+01**	2.367e+01	2.351e+01	2.436e+01	2.317e+01	2.338e+01	2.421e+01	2.177e+01	2.356e+01	2.431e+01	2.422e+01
		Std	2.177e-01	4.349e-01	5.889e-01	**1.253e-01**	5.314e-01	4.918e-01	4.360e-01	6.536e-01	4.810e-01	4.092e-01	2.216e-01
		Best	2.457e+01	2.445e+01	2.426e+01	2.450e+01	2.420e+01	2.444e+01	**2.470e+01**	2.450e+01	2.435e+01	2.468e+01	2.463e+01
		Worst	**2.432e+01**	2.326e+01	2.112e+01	2.336e+01	2.201e+01	2.184e+01	2.342e+01	2.405e+01	2.242e+01	2.291e+01	2.343e+01
	10	Mean	**2.603e+01**	2.548e+01	2.505e+01	2.594e+01	2.433e+01	2.467e+01	2.569e+01	2.319e+01	2.488e+01	2.573e+01	2.582e+01
		Std	3.762e-01	4.773e-01	5.265e-01	**2.557e-01**	5.527e-01	4.562e-01	4.043e-01	7.757e-01	6.182e-01	5.290e-01	5.382e-01
		Best	2.632e+01	2.608e+01	2.564e+01	2.633e+01	2.529e+01	2.594e+01	**2.664e+01**	2.637e+01	2.619e+01	2.651e+01	2.626e+01
		Worst	**2.590e+01**	2.407e+01	2.365e+01	2.545e+01	2.222e+01	2.305e+01	2.451e+01	2.481e+01	2.400e+01	2.461e+01	2.463e+01
	12	Mean	**2.769e+01**	2.637e+01	2.602e+01	2.743e+01	2.539e+01	2.590e+01	2.660e+01	2.442e+01	2.602e+01	2.685e+01	2.721e+01

The best results are in bold

Table 2 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Std	**2.867e-01**	5.903e-01	5.004e-01	3.712e-01	4.892e-01	6.880e-01	5.105e-01	8.552e-01	5.530e-01	7.931e-01	5.588e-01
		Best	**2.806e+01**	2.742e+01	2.718e+01	2.801e+01	2.677e+01	2.693e+01	2.749e+01	2.801e+01	2.690e+01	2.780e+01	2.804e+01
		Worst	**2.650e+01**	2.502e+01	2.476e+01	2.632e+01	2.396e+01	2.452e+01	2.548e+01	2.486e+01	2.519e+01	2.613e+01	2.589e+01
		$+/-/=$	$\sim$	49/1/0	49/1/0	43/7/0	50/0/0	48/2/0	40/10/0	50/0/0	49/1/0	43/7/0	44/6/0
		Mean Rank	1.70	5.90	7.68	2.70	9.44	8.64	4.76	11.00	7.02	3.70	3.46
		Rank	1	6	8	2	10	9	5	11	7	4	3

Table 3: SSIM comparaison

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
Cov-1	4	Mean	**6.282e-01**	6.268e-01	6.255e-01	6.281e-01	6.220e-01	6.191e-01	6.225e-01	5.786e-01	6.225e-01	6.256e-01	6.280e-01
		Std	8.448e-04	2.455e-03	3.972e-03	8.205e-04	7.778e-03	1.584e-02	4.030e-03	3.803e-02	5.538e-03	3.216e-03	**8.183e-04**
		Best	6.294e-01	6.302e-01	6.315e-01	6.298e-01	**6.380e-01**	6.367e-01	6.337e-01	6.309e-01	6.328e-01	6.283e-01	6.296e-01
		Worst	6.257e-01	6.181e-01	6.207e-01	6.265e-01	6.078e-01	6.065e-01	6.106e-01	6.251e-01	6.123e-01	6.151e-01	**6.270e-01**
	6	Mean	**7.353e-01**	7.290e-01	7.245e-01	7.350e-01	7.206e-01	7.209e-01	7.282e-01	6.746e-01	7.250e-01	7.331e-01	7.350e-01
		Std	**9.406e-04**	7.255e-03	1.325e-02	1.013e-03	1.130e-02	8.305e-03	5.305e-03	2.594e-02	7.847e-03	4.694e-03	1.924e-03
		Best	7.370e-01	7.369e-01	7.368e-01	7.371e-01	7.333e-01	7.320e-01	7.346e-01	7.374e-01	7.374e-01	**7.381e-01**	7.365e-01
		Worst	**7.345e-01**	7.149e-01	6.693e-01	7.288e-01	6.997e-01	6.965e-01	7.178e-01	7.285e-01	7.050e-01	6.855e-01	7.259e-01
	8	Mean	**7.958e-01**	7.825e-01	7.655e-01	7.954e-01	7.694e-01	7.691e-01	7.792e-01	7.316e-01	7.755e-01	7.922e-01	7.904e-01
		Std	**3.417e-03**	1.087e-02	1.496e-02	4.905e-03	1.294e-02	1.112e-02	9.799e-03	2.484e-02	9.629e-03	8.737e-03	5.356e-03
		Best	7.984e-01	7.973e-01	7.935e-01	7.980e-01	7.868e-01	7.930e-01	7.967e-01	**7.986e-01**	7.859e-01	7.978e-01	7.981e-01
		Worst	**7.932e-01**	7.435e-01	7.390e-01	7.875e-01	7.435e-01	7.424e-01	7.321e-01	7.887e-01	7.601e-01	7.580e-01	7.741e-01
	10	Mean	**8.378e-01**	8.190e-01	8.089e-01	8.363e-01	8.029e-01	8.084e-01	8.182e-01	7.698e-01	8.120e-01	8.295e-01	8.306e-01
		Std	**3.700e-03**	9.800e-03	1.690e-02	5.931e-03	1.337e-02	9.101e-03	7.135e-03	2.252e-02	9.984e-03	1.243e-02	7.863e-03
		Best	8.406e-01	8.339e-01	8.381e-01	8.407e-01	8.273e-01	8.273e-01	8.324e-01	8.409e-01	8.290e-01	**8.409e-01**	8.408e-01
		Worst	**8.352e-01**	7.864e-01	7.752e-01	8.207e-01	7.723e-01	7.563e-01	7.974e-01	8.044e-01	7.937e-01	8.083e-01	8.154e-01
	12	Mean	8.674e-01	8.438e-01	8.334e-01	**8.677e-01**	8.327e-01	8.327e-01	8.441e-01	8.007e-01	8.380e-01	8.598e-01	8.566e-01
		Std	6.702e-03	1.158e-02	1.134e-02	**3.926e-03**	1.212e-02	8.292e-03	6.789e-03	1.954e-02	1.103e-02	1.347e-02	9.886e-03
		Best	**8.733e-01**	8.689e-01	8.625e-01	8.729e-01	8.603e-01	8.525e-01	8.530e-01	8.705e-01	8.566e-01	8.721e-01	8.730e-01
		Worst	**8.622e-01**	8.017e-01	8.098e-01	8.564e-01	8.004e-01	7.976e-01	8.256e-01	8.408e-01	8.267e-01	8.382e-01	8.316e-01
Cov-2	4	Mean	6.260e-01	6.255e-01	6.251e-01	**6.263e-01**	6.225e-01	6.230e-01	6.243e-01	5.975e-01	6.244e-01	6.257e-01	6.260e-01
		Std	**1.118e-03**	2.957e-03	5.108e-03	2.146e-03	1.200e-02	7.427e-03	4.596e-03	3.145e-02	6.824e-03	3.311e-03	1.151e-03
		Best	6.275e-01	6.297e-01	6.335e-01	6.308e-01	**6.429e-01**	6.366e-01	6.307e-01	6.308e-01	6.328e-01	6.366e-01	6.300e-01
		Worst	**6.237e-01**	6.177e-01	6.172e-01	6.223e-01	5.993e-01	6.068e-01	6.165e-01	6.202e-01	6.093e-01	6.195e-01	**6.237e-01**
	6	Mean	**7.238e-01**	7.141e-01	7.153e-01	7.228e-01	7.103e-01	7.099e-01	7.188e-01	6.544e-01	7.170e-01	7.211e-01	7.227e-01
		Std	**1.473e-03**	1.337e-02	1.210e-02	3.549e-03	1.391e-02	1.372e-02	6.573e-03	3.249e-02	1.024e-02	7.382e-03	2.643e-03
		Best	7.261e-01	7.310e-01	7.298e-01	7.289e-01	7.314e-01	7.312e-01	**7.356e-01**	7.260e-01	7.328e-01	7.333e-01	7.342e-01
		Worst	**7.208e-01**	6.665e-01	6.812e-01	6.862e-01	6.795e-01	6.854e-01	6.890e-01	7.114e-01	6.910e-01	6.860e-01	7.088e-01
	8	Mean	**7.838e-01**	7.693e-01	7.591e-01	7.834e-01	7.542e-01	7.549e-01	7.718e-01	7.134e-01	7.655e-01	7.825e-01	7.772e-01
		Std	**2.646e-03**	1.569e-02	1.620e-02	4.126e-03	1.662e-02	1.551e-02	9.817e-03	3.160e-02	1.352e-02	7.685e-03	9.018e-03
		Best	7.882e-01	7.910e-01	7.844e-01	7.894e-01	7.901e-01	7.863e-01	7.907e-01	7.897e-01	**8.039e-01**	7.861e-01	7.928e-01
		Worst	**7.806e-01**	7.502e-01	7.413e-01	7.741e-01	7.365e-01	7.008e-01	7.481e-01	7.618e-01	7.293e-01	7.529e-01	7.642e-01
	10	Mean	8.260e-01	8.079e-01	7.936e-01	**8.261e-01**	7.933e-01	7.909e-01	8.067e-01	7.491e-01	8.001e-01	8.231e-01	8.155e-01
		Std	5.000e-03	1.537e-02	1.668e-02	**4.456e-03**	1.532e-02	1.671e-02	9.077e-03	1.806e-02	1.397e-02	8.399e-03	1.062e-02
		Best	8.332e-01	8.335e-01	8.208e-01	8.347e-01	8.189e-01	8.154e-01	8.238e-01	8.306e-01	8.349e-01	8.300e-01	**8.351e-01**
		Worst	**8.168e-01**	7.556e-01	7.616e-01	8.149e-01	7.564e-01	7.589e-01	7.745e-01	7.928e-01	7.716e-01	7.918e-01	7.965e-01
	12	Mean	**8.584e-01**	8.302e-01	8.202e-01	8.546e-01	8.106e-01	8.171e-01	8.317e-01	7.756e-01	8.224e-01	8.471e-01	8.468e-01
		Std	**6.300e-03**	1.610e-02	1.536e-02	8.388e-03	1.674e-02	1.686e-02	1.072e-02	2.024e-02	1.466e-02	1.578e-02	1.466e-02

The best results are in bold

Table 3 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Best	8.662e-01	8.575e-01	8.561e-01	8.646e-01	8.495e-01	8.496e-01	8.509e-01	**8.667e-01**	8.531e-01	8.632e-01	8.659e-01
		Worst	8.319e-01	7.920e-01	8.025e-01	**8.330e-01**	7.821e-01	7.775e-01	8.090e-01	8.237e-01	7.967e-01	8.189e-01	8.170e-01
Cov-3	4	Mean	5.385e-01	5.362e-01	5.356e-01	5.383e-01	5.344e-01	5.360e-01	5.368e-01	5.097e-01	5.358e-01	5.377e-01	**5.387e-01**
		Std	1.067e-03	8.021e-03	3.285e-03	1.709e-03	9.031e-03	1.444e-02	3.938e-03	5.171e-02	6.175e-03	2.195e-03	**8.827e-04**
		Best	5.404e-01	5.435e-01	5.457e-01	5.430e-01	5.546e-01	5.525e-01	5.432e-01	5.424e-01	5.508e-01	**5.927e-01**	5.404e-01
		Worst	**5.370e-01**	5.287e-01	5.257e-01	5.361e-01	5.215e-01	5.196e-01	5.296e-01	**5.370e-01**	5.193e-01	5.313e-01	5.340e-01
	6	Mean	5.981e-01	5.946e-01	5.881e-01	5.990e-01	5.995e-01	**6.029e-01**	5.913e-01	5.582e-01	5.914e-01	5.979e-01	5.976e-01
		Std	**1.001e-03**	5.925e-03	1.022e-02	2.372e-03	2.705e-02	2.605e-02	6.665e-03	2.615e-02	1.109e-02	2.823e-03	2.800e-03
		Best	6.009e-01	6.038e-01	6.011e-01	6.017e-01	6.118e-01	**7.280e-01**	6.106e-01	6.678e-01	6.093e-01	6.041e-01	6.018e-01
		Worst	**5.969e-01**	5.479e-01	5.688e-01	5.963e-01	5.640e-01	5.789e-01	5.833e-01	5.936e-01	5.733e-01	5.927e-01	5.919e-01
	8	Mean	6.405e-01	6.290e-01	6.269e-01	6.501e-01	6.419e-01	**6.569e-01**	6.283e-01	6.033e-01	6.284e-01	6.494e-01	6.391e-01
		Std	**3.389e-03**	1.139e-02	9.580e-03	2.952e-02	2.916e-02	4.751e-02	7.176e-03	5.481e-02	1.069e-02	3.192e-02	5.698e-03
		Best	6.437e-01	6.426e-01	6.419e-01	6.465e-01	8.050e-01	**8.105e-01**	6.442e-01	6.509e-01	6.437e-01	6.900e-01	6.497e-01
		Worst	**6.392e-01**	6.056e-01	5.936e-01	6.359e-01	6.116e-01	6.059e-01	6.148e-01	6.199e-01	6.097e-01	6.134e-01	6.342e-01
	10	Mean	6.686e-01	6.568e-01	6.469e-01	6.726e-01	6.767e-01	**7.039e-01**	6.621e-01	6.413e-01	6.563e-01	7.010e-01	6.666e-01
		Std	**4.418e-03**	9.020e-03	8.388e-03	6.508e-03	5.165e-02	6.937e-02	3.474e-02	6.700e-02	3.381e-02	5.986e-02	5.936e-03
		Best	6.752e-01	6.686e-01	6.724e-01	8.047e-01	**8.645e-01**	8.322e-01	6.746e-01	7.785e-01	8.534e-01	8.245e-01	6.767e-01
		Worst	**6.623e-01**	6.212e-01	6.265e-01	6.609e-01	6.352e-01	6.360e-01	6.396e-01	6.509e-01	6.381e-01	6.505e-01	6.465e-01
	12	Mean	6.938e-01	6.723e-01	6.649e-01	7.129e-01	7.225e-01	**7.293e-01**	6.823e-01	6.760e-01	6.793e-01	7.283e-01	6.825e-01
		Std	**4.994e-03**	9.829e-03	1.079e-02	4.913e-02	5.965e-02	6.066e-02	3.828e-02	7.796e-02	4.797e-02	6.284e-02	8.421e-03
		Best	6.975e-01	7.099e-01	6.838e-01	8.258e-01	8.802e-01	8.853e-01	8.686e-01	8.902e-01	8.586e-01	**9.032e-01**	6.969e-01
		Worst	**6.887e-01**	6.421e-01	6.361e-01	6.860e-01	6.524e-01	6.525e-01	6.649e-01	6.723e-01	6.398e-01	6.842e-01	6.666e-01
Cov-4	4	Mean	7.063e-01	7.016e-01	7.057e-01	7.050e-01	6.988e-01	6.914e-01	**7.072e-01**	6.419e-01	7.053e-01	7.064e-01	7.059e-01
		Std	**1.891e-03**	9.480e-03	1.071e-02	6.433e-03	1.614e-02	2.958e-02	5.086e-03	4.549e-02	1.191e-02	4.056e-03	2.116e-03
		Best	7.087e-01	7.191e-01	**7.294e-01**	7.150e-01	7.259e-01	7.204e-01	7.175e-01	7.094e-01	7.248e-01	7.218e-01	7.087e-01
		Worst	**7.030e-01**	5.912e-01	6.769e-01	6.684e-01	6.621e-01	6.383e-01	6.883e-01	6.873e-01	6.789e-01	6.870e-01	7.023e-01
	6	Mean	**7.839e-01**	7.656e-01	7.656e-01	7.815e-01	7.611e-01	7.532e-01	7.716e-01	7.179e-01	7.696e-01	7.729e-01	7.675e-01
		Std	8.948e-03	2.484e-02	2.015e-02	1.308e-02	1.654e-02	2.764e-02	1.235e-02	3.402e-02	1.697e-02	9.794e-03	**7.630e-03**
		Best	7.945e-01	7.991e-01	7.907e-01	7.956e-01	7.809e-01	**8.007e-01**	7.951e-01	7.919e-01	7.981e-01	7.913e-01	7.840e-01
		Worst	**7.684e-01**	7.400e-01	7.373e-01	7.632e-01	6.923e-01	7.025e-01	7.438e-01	7.482e-01	7.173e-01	7.515e-01	7.537e-01
	8	Mean	**8.313e-01**	8.153e-01	8.114e-01	8.244e-01	7.958e-01	7.914e-01	8.147e-01	7.447e-01	8.083e-01	8.234e-01	8.249e-01
		Std	**4.714e-03**	1.695e-02	2.034e-02	1.610e-02	2.231e-02	2.142e-02	1.180e-02	3.546e-02	1.543e-02	1.324e-02	6.824e-03
		Best	8.387e-01	8.408e-01	8.307e-01	8.455e-01	8.290e-01	8.297e-01	8.405e-01	8.400e-01	8.412e-01	8.380e-01	**8.502e-01**
		Worst	**8.155e-01**	7.584e-01	7.496e-01	7.984e-01	7.587e-01	7.492e-01	7.857e-01	8.075e-01	7.759e-01	7.821e-01	8.105e-01
	10	Mean	**8.742e-01**	8.377e-01	8.322e-01	8.660e-01	8.278e-01	8.156e-01	8.485e-01	7.814e-01	8.409e-01	8.579e-01	8.625e-01
		Std	**4.878e-03**	2.110e-02	1.875e-02	1.375e-02	2.295e-02	2.396e-02	1.561e-02	3.193e-02	1.425e-02	1.671e-02	9.458e-03
		Best	8.791e-01	8.706e-01	8.690e-01	**8.833e-01**	8.491e-01	8.627e-01	8.708e-01	8.821e-01	8.683e-01	8.770e-01	8.790e-01
		Worst	**8.501e-01**	7.880e-01	7.940e-01	8.156e-01	7.701e-01	7.748e-01	8.257e-01	8.371e-01	7.968e-01	8.383e-01	8.387e-01
	12	Mean	**9.004e-01**	8.644e-01	8.527e-01	8.903e-01	8.508e-01	8.499e-01	8.740e-01	8.064e-01	8.665e-01	8.809e-01	8.873e-01
		Std	**5.889e-03**	1.755e-02	2.078e-02	1.397e-02	1.247e-02	1.916e-02	1.230e-02	2.691e-02	1.462e-02	1.727e-02	1.361e-02
		Best	**9.109e-01**	8.862e-01	8.894e-01	9.094e-01	8.749e-01	8.831e-01	8.934e-01	9.104e-01	8.976e-01	9.056e-01	9.064e-01
		Worst	**8.878e-01**	8.080e-01	8.193e-01	8.604e-01	8.109e-01	7.844e-01	8.514e-01	8.675e-01	8.307e-01	8.651e-01	8.567e-01
Cov-5	4	Mean	6.541e-01	6.531e-01	6.548e-01	6.543e-01	**6.571e-01**	6.482e-01	6.496e-01	6.462e-01	6.570e-01	6.514e-01	6.539e-01
		Std	**1.973e-03**	5.053e-03	6.393e-03	1.993e-03	1.223e-02	1.508e-02	1.152e-02	4.215e-02	6.543e-03	5.838e-03	2.650e-03
		Best	6.570e-01	6.707e-01	6.693e-01	6.582e-01	**6.782e-01**	6.767e-01	6.762e-01	6.750e-01	6.660e-01	6.646e-01	6.613e-01
		Worst	**6.515e-01**	6.466e-01	6.411e-01	6.493e-01	6.281e-01	6.224e-01	6.361e-01	6.486e-01	6.313e-01	6.393e-01	6.475e-01
	6	Mean	**7.469e-01**	7.435e-01	7.395e-01	7.457e-01	7.275e-01	7.288e-01	7.351e-01	7.036e-01	7.446e-01	7.422e-01	7.455e-01
		Std	**2.008e-03**	6.239e-03	1.227e-02	6.604e-03	1.905e-02	2.138e-02	1.293e-02	3.025e-02	1.001e-02	9.624e-03	5.144e-03
		Best	7.514e-01	7.555e-01	7.497e-01	7.532e-01	7.579e-01	7.599e-01	7.547e-01	7.566e-01	**7.696e-01**	7.650e-01	7.552e-01
		Worst	7.435e-01	7.272e-01	7.220e-01	**7.440e-01**	6.803e-01	6.553e-01	7.123e-01	7.162e-01	7.171e-01	7.297e-01	7.354e-01
	8	Mean	**7.965e-01**	7.865e-01	7.776e-01	7.960e-01	7.736e-01	7.677e-01	7.801e-01	7.506e-01	7.849e-01	7.884e-01	7.936e-01

The best results are in bold

Table 3 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Std	**3.665e-03**	1.153e-02	1.101e-02	6.256e-03	1.668e-02	1.662e-02	1.145e-02	1.927e-02	1.082e-02	1.363e-02	5.460e-03
		Best	8.044e-01	8.006e-01	7.952e-01	8.015e-01	8.017e-01	8.030e-01	7.985e-01	8.028e-01	**8.077e-01**	7.998e-01	8.003e-01
		Worst	**7.878e-01**	7.579e-01	7.436e-01	7.817e-01	7.405e-01	7.223e-01	7.633e-01	7.733e-01	7.598e-01	7.519e-01	7.734e-01
	10	Mean	**8.303e-01**	8.129e-01	8.067e-01	8.259e-01	7.960e-01	7.924e-01	8.064e-01	7.794e-01	8.127e-01	8.211e-01	8.205e-01
		Std	**5.392e-03**	9.631e-03	1.358e-02	6.797e-03	1.314e-02	1.767e-02	1.246e-02	2.162e-02	1.186e-02	7.278e-03	1.077e-02
		Best	8.368e-01	8.327e-01	8.267e-01	8.350e-01	8.284e-01	8.243e-01	8.255e-01	8.351e-01	8.357e-01	**8.387e-01**	8.356e-01
		Worst	**8.202e-01**	7.947e-01	7.692e-01	7.958e-01	7.498e-01	7.729e-01	7.902e-01	8.047e-01	7.865e-01	7.892e-01	8.070e-01
	12	Mean	**8.550e-01**	8.361e-01	8.241e-01	8.543e-01	8.179e-01	8.216e-01	8.297e-01	8.061e-01	8.344e-01	8.390e-01	8.405e-01
		Std	6.145e-03	1.362e-02	1.256e-02	**5.831e-03**	1.547e-02	1.224e-02	1.198e-02	2.056e-02	1.297e-02	1.384e-02	1.162e-02
		Best	**8.652e-01**	8.571e-01	8.459e-01	8.608e-01	8.471e-01	8.432e-01	8.513e-01	8.633e-01	8.636e-01	8.611e-01	8.643e-01
		Worst	**8.478e-01**	8.135e-01	8.062e-01	8.331e-01	7.904e-01	7.958e-01	8.025e-01	8.250e-01	8.093e-01	8.091e-01	8.240e-01
Cov-6	4	Mean	**7.024e-01**	7.008e-01	7.020e-01	7.010e-01	6.946e-01	6.865e-01	6.993e-01	6.639e-01	7.006e-01	7.001e-01	7.022e-01
		Std	**1.060e-03**	7.639e-03	3.127e-03	9.804e-03	1.502e-02	1.973e-02	3.434e-03	2.847e-02	4.267e-03	9.506e-03	1.322e-03
		Best	7.042e-01	7.055e-01	7.055e-01	7.049e-01	**7.136e-01**	7.121e-01	7.072e-01	7.045e-01	7.099e-01	7.052e-01	7.042e-01
		Worst	**7.010e-01**	6.571e-01	6.611e-01	6.987e-01	6.680e-01	6.463e-01	6.862e-01	6.496e-01	6.844e-01	6.893e-01	7.005e-01
	6	Mean	7.615e-01	7.525e-01	7.482e-01	**7.616e-01**	7.459e-01	7.464e-01	7.538e-01	7.190e-01	7.554e-01	7.592e-01	7.587e-01
		Std	**2.396e-03**	1.476e-02	1.375e-02	5.650e-03	1.827e-02	1.243e-02	1.285e-02	2.843e-02	1.268e-02	6.434e-03	4.963e-03
		Best	7.634e-01	7.686e-01	7.666e-01	7.647e-01	**7.807e-01**	7.705e-01	7.752e-01	7.690e-01	7.777e-01	7.753e-01	7.679e-01
		Worst	**7.592e-01**	7.017e-01	7.256e-01	7.325e-01	7.104e-01	7.157e-01	7.321e-01	7.309e-01	7.253e-01	7.323e-01	7.553e-01
	8	Mean	**8.045e-01**	7.927e-01	7.869e-01	8.037e-01	7.801e-01	7.839e-01	7.853e-01	7.618e-01	7.860e-01	7.988e-01	8.021e-01
		Std	**2.294e-03**	1.579e-02	1.250e-02	4.723e-03	1.844e-02	1.760e-02	1.167e-02	3.386e-02	1.391e-02	1.033e-02	6.257e-03
		Best	8.120e-01	8.109e-01	8.128e-01	8.259e-01	8.247e-01	**8.300e-01**	8.122e-01	8.277e-01	8.089e-01	8.283e-01	8.116e-01
		Worst	**8.022e-01**	7.466e-01	7.603e-01	7.879e-01	7.506e-01	7.432e-01	7.699e-01	7.733e-01	7.616e-01	7.722e-01	7.869e-01
	10	Mean	8.338e-01	8.209e-01	8.083e-01	**8.391e-01**	8.028e-01	8.082e-01	8.133e-01	7.800e-01	8.182e-01	8.265e-01	8.301e-01
		Std	**6.211e-03**	1.437e-02	1.159e-02	1.033e-02	1.863e-02	1.599e-02	1.349e-02	3.154e-02	1.773e-02	1.548e-02	7.643e-03
		Best	8.396e-01	8.408e-01	8.320e-01	8.506e-01	8.559e-01	8.443e-01	8.479e-01	8.409e-01	8.412e-01	**8.563e-01**	8.427e-01
		Worst	**8.220e-01**	7.819e-01	7.531e-01	8.102e-01	7.637e-01	7.701e-01	7.933e-01	8.113e-01	7.825e-01	8.011e-01	8.116e-01
	12	Mean	8.574e-01	8.383e-01	8.341e-01	**8.608e-01**	8.242e-01	8.351e-01	8.350e-01	8.034e-01	8.328e-01	8.534e-01	8.498e-01
		Std	**5.738e-03**	1.309e-02	1.326e-02	7.705e-03	2.167e-02	1.566e-02	1.556e-02	2.246e-02	1.689e-02	1.269e-02	9.404e-03
		Best	8.899e-01	8.703e-01	8.764e-01	**8.916e-01**	8.590e-01	8.644e-01	8.827e-01	8.743e-01	8.662e-01	8.875e-01	8.770e-01
		Worst	**8.407e-01**	8.106e-01	8.088e-01	8.401e-01	7.780e-01	7.893e-01	8.097e-01	8.354e-01	8.140e-01	8.225e-01	8.325e-01
Cov-7	4	Mean	7.070e-01	7.045e-01	**7.086e-01**	7.067e-01	7.053e-01	7.023e-01	7.069e-01	6.776e-01	7.063e-01	7.076e-01	7.068e-01
		Std	**1.110e-03**	1.200e-02	5.936e-03	4.408e-03	1.016e-02	7.976e-03	5.504e-03	3.875e-02	8.483e-03	1.849e-03	1.545e-03
		Best	7.102e-01	**7.298e-01**	7.186e-01	7.135e-01	7.277e-01	7.183e-01	7.248e-01	7.094e-01	7.249e-01	7.131e-01	7.116e-01
		Worst	7.026e-01	6.993e-01	6.970e-01	6.767e-01	6.897e-01	6.940e-01	6.978e-01	7.033e-01	6.957e-01	7.016e-01	**7.045e-01**
	6	Mean	**7.778e-01**	7.681e-01	7.649e-01	7.751e-01	7.669e-01	7.641e-01	7.720e-01	7.296e-01	7.682e-01	7.767e-01	7.766e-01
		Std	**1.368e-03**	1.346e-02	1.254e-02	7.219e-03	1.063e-02	1.356e-02	6.638e-03	2.086e-02	1.097e-02	2.228e-03	3.069e-03
		Best	7.806e-01	7.859e-01	7.808e-01	7.830e-01	7.829e-01	7.804e-01	7.829e-01	7.804e-01	**7.911e-01**	7.804e-01	7.857e-01
		Worst	**7.731e-01**	7.299e-01	7.487e-01	7.644e-01	7.469e-01	7.187e-01	7.628e-01	7.382e-01	7.342e-01	7.602e-01	7.655e-01
	8	Mean	**8.236e-01**	8.085e-01	8.076e-01	8.213e-01	8.022e-01	7.981e-01	8.132e-01	7.667e-01	8.088e-01	8.187e-01	8.217e-01
		Std	**2.601e-03**	1.335e-02	1.346e-02	5.974e-03	1.471e-02	1.808e-02	7.042e-03	2.354e-02	1.416e-02	9.347e-03	6.070e-03
		Best	8.266e-01	8.314e-01	8.286e-01	8.285e-01	8.263e-01	8.334e-01	**8.355e-01**	8.271e-01	8.344e-01	8.285e-01	8.347e-01
		Worst	**8.192e-01**	7.844e-01	7.852e-01	8.035e-01	7.721e-01	7.690e-01	7.817e-01	7.966e-01	7.843e-01	8.057e-01	8.013e-01
	10	Mean	**8.548e-01**	8.389e-01	8.374e-01	8.507e-01	8.254e-01	8.250e-01	8.383e-01	7.916e-01	8.315e-01	8.487e-01	8.493e-01
		Std	**5.898e-03**	1.104e-02	1.396e-02	1.122e-02	1.525e-02	2.042e-02	1.013e-02	1.993e-02	1.285e-02	1.066e-02	8.033e-03
		Best	8.605e-01	8.586e-01	8.549e-01	8.613e-01	8.672e-01	8.477e-01	8.644e-01	8.593e-01	**8.689e-01**	8.602e-01	8.605e-01
		Worst	**8.478e-01**	7.911e-01	8.076e-01	8.195e-01	7.951e-01	7.956e-01	8.210e-01	8.247e-01	8.012e-01	8.268e-01	8.214e-01
	12	Mean	**8.774e-01**	8.544e-01	8.513e-01	8.740e-01	8.482e-01	8.437e-01	8.534e-01	8.056e-01	8.521e-01	8.657e-01	8.715e-01
		Std	**6.412e-03**	1.250e-02	1.108e-02	7.353e-03	1.273e-02	1.668e-02	1.093e-02	2.202e-02	1.221e-02	1.026e-02	9.240e-03
		Best	8.846e-01	8.857e-01	8.703e-01	8.830e-01	8.598e-01	8.727e-01	8.775e-01	8.827e-01	8.707e-01	8.834e-01	**8.900e-01**
		Worst	8.650e-01	8.179e-01	8.269e-01	8.615e-01	8.184e-01	8.178e-01	8.334e-01	**8.674e-01**	8.291e-01	8.386e-01	8.531e-01

The best results are in bold

Table 3 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
Cov-8	4	Mean	6.463e-01	6.453e-01	6.399e-01	6.460e-01	6.377e-01	6.338e-01	6.373e-01	6.069e-01	**6.473e-01**	6.395e-01	6.458e-01
		Std	**1.325e-03**	3.246e-03	2.100e-02	2.469e-03	1.773e-02	2.255e-02	8.844e-03	5.985e-02	6.907e-03	1.894e-02	1.853e-03
		Best	6.483e-01	**6.757e-01**	6.517e-01	6.522e-01	6.615e-01	6.575e-01	6.575e-01	6.504e-01	6.562e-01	6.486e-01	6.517e-01
		Worst	**6.430e-01**	6.135e-01	5.635e-01	5.517e-01	5.970e-01	5.414e-01	6.135e-01	6.425e-01	6.224e-01	6.087e-01	6.394e-01
	6	Mean	7.595e-01	7.511e-01	7.457e-01	7.557e-01	7.323e-01	7.277e-01	7.387e-01	6.810e-01	7.454e-01	7.579e-01	**7.596e-01**
		Std	7.061e-03	1.499e-02	2.128e-02	1.418e-02	2.295e-02	2.788e-02	1.487e-02	4.260e-02	1.365e-02	9.415e-03	**3.996e-03**
		Best	7.642e-01	7.643e-01	7.674e-01	7.646e-01	7.634e-01	7.482e-01	7.686e-01	7.662e-01	**7.732e-01**	7.697e-01	7.665e-01
		Worst	**7.600e-01**	6.957e-01	7.037e-01	7.125e-01	6.940e-01	6.749e-01	7.139e-01	7.390e-01	7.288e-01	7.118e-01	7.510e-01
	8	Mean	**8.091e-01**	7.940e-01	7.862e-01	8.049e-01	7.830e-01	7.701e-01	7.910e-01	7.352e-01	7.898e-01	8.029e-01	8.043e-01
		Std	**2.504e-03**	1.211e-02	1.317e-02	7.668e-03	1.751e-02	1.810e-02	1.139e-02	3.407e-02	1.394e-02	1.346e-02	6.912e-03
		Best	8.130e-01	8.119e-01	8.092e-01	8.144e-01	8.001e-01	8.119e-01	8.012e-01	8.122e-01	8.123e-01	8.124e-01	**8.152e-01**
		Worst	**8.062e-01**	7.534e-01	7.506e-01	7.858e-01	7.364e-01	7.305e-01	7.663e-01	7.783e-01	7.727e-01	7.566e-01	7.840e-01
	10	Mean	**8.442e-01**	8.294e-01	8.125e-01	8.432e-01	8.054e-01	8.030e-01	8.180e-01	7.681e-01	8.225e-01	8.321e-01	8.363e-01
		Std	**5.333e-03**	9.121e-03	1.379e-02	6.242e-03	1.443e-02	1.530e-02	9.597e-03	1.859e-02	1.115e-02	1.045e-02	7.417e-03
		Best	8.479e-01	8.452e-01	8.412e-01	8.481e-01	8.291e-01	8.332e-01	8.412e-01	8.454e-01	8.378e-01	8.468e-01	**8.490e-01**
		Worst	**8.363e-01**	8.061e-01	7.895e-01	8.159e-01	7.600e-01	7.710e-01	8.004e-01	8.243e-01	7.974e-01	8.095e-01	8.233e-01
	12	Mean	**8.737e-01**	8.506e-01	8.367e-01	8.690e-01	8.284e-01	8.309e-01	8.428e-01	7.949e-01	8.449e-01	8.582e-01	8.637e-01
		Std	**2.138e-03**	1.029e-02	1.568e-02	7.523e-03	1.399e-02	1.164e-02	9.554e-03	1.618e-02	1.111e-02	1.308e-02	9.609e-03
		Best	8.783e-01	8.713e-01	8.667e-01	8.759e-01	8.546e-01	8.536e-01	8.577e-01	**8.783e-01**	8.680e-01	8.748e-01	8.775e-01
		Worst	**8.664e-01**	8.272e-01	7.883e-01	8.405e-01	7.979e-01	7.993e-01	8.160e-01	8.413e-01	8.249e-01	8.336e-01	8.452e-01
Cov-9	4	Mean	6.739e-01	6.739e-01	6.732e-01	6.743e-01	6.704e-01	6.635e-01	6.717e-01	6.532e-01	6.739e-01	6.724e-01	**6.745e-01**
		Std	7.430e-04	1.230e-03	4.017e-03	7.048e-04	6.028e-03	2.145e-02	2.976e-03	4.096e-02	2.894e-03	2.487e-03	**6.009e-04**
		Best	6.748e-01	6.761e-01	6.763e-01	6.758e-01	**6.850e-01**	6.824e-01	6.776e-01	6.758e-01	6.798e-01	6.819e-01	6.750e-01
		Worst	**6.734e-01**	6.710e-01	6.505e-01	6.726e-01	6.589e-01	6.555e-01	6.667e-01	6.720e-01	6.697e-01	6.663e-01	6.724e-01
	6	Mean	**7.712e-01**	7.545e-01	7.494e-01	7.661e-01	7.338e-01	7.287e-01	7.398e-01	7.097e-01	7.501e-01	7.667e-01	7.683e-01
		Std	**5.822e-03**	1.755e-02	1.991e-02	9.631e-03	1.568e-02	2.117e-02	1.643e-02	3.356e-02	1.483e-02	8.399e-03	1.001e-02
		Best	7.755e-01	**7.804e-01**	7.769e-01	7.756e-01	7.799e-01	7.766e-01	7.785e-01	7.751e-01	7.762e-01	7.803e-01	7.753e-01
		Worst	**7.600e-01**	7.215e-01	7.059e-01	7.250e-01	7.046e-01	6.905e-01	7.202e-01	7.562e-01	7.290e-01	7.239e-01	7.478e-01
	8	Mean	**8.088e-01**	7.959e-01	7.946e-01	8.079e-01	7.819e-01	7.863e-01	7.938e-01	7.454e-01	7.952e-01	8.015e-01	8.056e-01
		Std	**4.731e-03**	1.480e-02	1.111e-02	1.006e-02	1.316e-02	1.711e-02	1.007e-02	2.855e-02	1.230e-02	1.089e-02	7.369e-03
		Best	8.146e-01	8.160e-01	8.092e-01	8.151e-01	8.130e-01	**8.274e-01**	8.188e-01	8.154e-01	8.254e-01	8.135e-01	8.153e-01
		Worst	**8.022e-01**	7.331e-01	7.503e-01	7.917e-01	7.487e-01	7.477e-01	7.656e-01	7.905e-01	7.733e-01	7.691e-01	7.901e-01
	10	Mean	**8.454e-01**	8.313e-01	8.183e-01	8.420e-01	8.079e-01	8.094e-01	8.253e-01	7.735e-01	8.214e-01	8.350e-01	8.371e-01
		Std	**3.478e-03**	1.173e-02	1.146e-02	6.186e-03	1.491e-02	1.597e-02	1.291e-02	2.059e-02	1.116e-02	1.106e-02	7.547e-03
		Best	**8.501e-01**	8.472e-01	8.433e-01	8.494e-01	8.457e-01	8.422e-01	8.478e-01	8.479e-01	8.352e-01	8.500e-01	8.490e-01
		Worst	**8.329e-01**	7.950e-01	7.960e-01	8.294e-01	7.757e-01	7.726e-01	7.982e-01	8.266e-01	7.961e-01	8.129e-01	8.205e-01
	12	Mean	**8.714e-01**	8.495e-01	8.423e-01	8.694e-01	8.287e-01	8.312e-01	8.476e-01	8.041e-01	8.476e-01	8.626e-01	8.586e-01
		Std	**6.237e-03**	1.496e-02	1.621e-02	6.952e-03	1.551e-02	1.656e-02	1.048e-02	2.088e-02	1.055e-02	9.494e-03	1.037e-02
		Best	8.806e-01	8.674e-01	8.630e-01	8.764e-01	8.558e-01	8.616e-01	8.718e-01	8.785e-01	8.635e-01	8.773e-01	**8.814e-01**
		Worst	**8.569e-01**	8.260e-01	8.168e-01	8.456e-01	7.929e-01	7.972e-01	8.249e-01	8.285e-01	8.258e-01	8.355e-01	8.423e-01
Cov-10	4	Mean	6.350e-01	6.339e-01	6.317e-01	**6.350e-01**	6.311e-01	6.281e-01	6.314e-01	6.025e-01	6.324e-01	6.335e-01	6.347e-01
		Std	**9.853e-04**	4.661e-03	9.247e-03	1.590e-03	7.452e-03	9.642e-03	4.334e-03	2.786e-02	5.779e-03	3.076e-03	9.861e-04
		Best	6.360e-01	6.392e-01	6.393e-01	6.392e-01	6.429e-01	**6.444e-01**	6.388e-01	6.373e-01	6.425e-01	6.415e-01	6.360e-01
		Worst	6.332e-01	6.197e-01	6.037e-01	6.324e-01	6.161e-01	6.131e-01	6.216e-01	**6.334e-01**	6.155e-01	6.209e-01	6.332e-01
	6	Mean	7.306e-01	7.083e-01	7.198e-01	7.279e-01	7.112e-01	6.982e-01	7.108e-01	6.669e-01	7.174e-01	7.265e-01	**7.474e-01**
		Std	3.408e-02	3.303e-02	3.736e-02	3.197e-02	3.281e-02	3.165e-02	3.521e-02	3.272e-02	3.531e-02	3.570e-02	**2.661e-02**
		Best	7.670e-01	7.654e-01	7.706e-01	7.677e-01	**7.958e-01**	7.669e-01	7.683e-01	7.725e-01	7.661e-01	7.774e-01	7.702e-01
		Worst	**6.944e-01**	6.778e-01	6.614e-01	6.925e-01	6.611e-01	6.591e-01	6.718e-01	6.759e-01	6.711e-01	6.755e-01	6.891e-01
	8	Mean	**8.109e-01**	7.751e-01	7.871e-01	8.083e-01	7.785e-01	7.753e-01	7.937e-01	7.266e-01	7.836e-01	8.086e-01	8.059e-01
		Std	**3.727e-03**	3.168e-02	1.893e-02	4.887e-03	1.757e-02	2.605e-02	1.278e-02	4.285e-02	1.875e-02	9.012e-03	5.940e-03
		Best	**8.155e-01**	8.138e-01	8.048e-01	8.142e-01	8.069e-01	7.983e-01	8.147e-01	8.144e-01	8.058e-01	8.148e-01	8.147e-01

The best results are in bold

Table 3 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Worst	**8.086e-01**	7.260e-01	6.896e-01	7.847e-01	7.395e-01	7.215e-01	7.300e-01	7.994e-01	7.238e-01	7.367e-01	8.003e-01
	10	Mean	**8.446e-01**	8.252e-01	8.226e-01	8.435e-01	8.105e-01	8.118e-01	8.230e-01	7.528e-01	8.125e-01	8.416e-01	8.384e-01
		Std	5.209e-03	1.335e-02	1.155e-02	**4.861e-03**	1.486e-02	1.543e-02	9.181e-03	4.048e-02	1.650e-02	9.582e-03	1.060e-02
		Best	8.530e-01	8.406e-01	8.411e-01	**8.562e-01**	8.321e-01	8.493e-01	8.472e-01	8.526e-01	8.405e-01	8.512e-01	8.499e-01
		Worst	**8.386e-01**	7.465e-01	7.666e-01	8.276e-01	7.704e-01	7.894e-01	8.011e-01	8.078e-01	7.376e-01	8.226e-01	8.117e-01
	12	Mean	**8.592e-01**	8.407e-01	8.391e-01	8.573e-01	8.314e-01	8.391e-01	8.417e-01	7.995e-01	8.382e-01	8.586e-01	8.546e-01
		Std	**3.950e-03**	1.120e-02	1.001e-02	6.351e-03	1.066e-02	1.316e-02	9.299e-03	2.677e-02	1.606e-02	1.047e-02	8.360e-03
		Best	8.752e-01	8.622e-01	8.640e-01	**8.840e-01**	8.572e-01	8.737e-01	8.632e-01	8.777e-01	8.567e-01	8.755e-01	8.640e-01
		Worst	**8.519e-01**	8.027e-01	8.147e-01	8.497e-01	8.069e-01	8.074e-01	8.226e-01	8.377e-01	8.173e-01	8.430e-01	8.398e-01
		$+/-/=$	$\sim$	49/1/0	48/2/0	37/13/0	45/5/0	46/4/0	49/1/0	50/0/0	48/2/0	45/5/0	45/5/0
		Mean Rank	1.76	5.94	7.30	2.50	8.60	8.74	6.48	10.96	6.52	3.80	3.40
		Rank	1	5	8	2	9	10	6	11	7	4	3

Table 4: FSIM comparaison

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
Cov-1	4	Mean	6.829e-01	6.829e-01	6.820e-01	**6.830e-01**	6.787e-01	6.791e-01	6.811e-01	6.580e-01	6.803e-01	6.826e-01	6.827e-01
		Std	**7.966e-04**	1.480e-03	2.159e-03	9.419e-04	4.147e-03	1.133e-02	2.035e-03	1.586e-02	3.951e-03	1.144e-03	8.449e-04
		Best	6.839e-01	6.850e-01	6.851e-01	6.847e-01	**6.897e-01**	6.874e-01	6.855e-01	6.847e-01	6.862e-01	6.849e-01	6.844e-01
		Worst	6.816e-01	6.750e-01	6.798e-01	6.809e-01	6.695e-01	6.715e-01	6.760e-01	6.803e-01	6.766e-01	6.769e-01	**6.819e-01**
	6	Mean	7.717e-01	7.678e-01	7.623e-01	7.716e-01	7.605e-01	7.652e-01	7.710e-01	7.265e-01	7.634e-01	7.695e-01	**7.722e-01**
		Std	**1.151e-03**	6.256e-03	1.182e-02	2.018e-03	1.227e-02	1.053e-02	6.730e-03	2.107e-02	7.173e-03	5.017e-03	3.213e-03
		Best	7.736e-01	**7.826e-01**	7.747e-01	7.764e-01	7.746e-01	7.770e-01	7.822e-01	7.775e-01	7.784e-01	7.758e-01	7.734e-01
		Worst	**7.689e-01**	7.538e-01	7.131e-01	7.611e-01	7.455e-01	7.402e-01	7.592e-01	7.593e-01	7.432e-01	7.280e-01	7.618e-01
	8	Mean	**8.330e-01**	8.213e-01	7.993e-01	8.325e-01	8.043e-01	8.061e-01	8.200e-01	7.710e-01	8.147e-01	8.281e-01	8.284e-01
		Std	**3.788e-03**	1.124e-02	1.668e-02	5.787e-03	1.518e-02	1.305e-02	1.103e-02	2.343e-02	1.017e-02	9.804e-03	5.196e-03
		Best	8.364e-01	8.347e-01	8.324e-01	8.359e-01	8.302e-01	8.315e-01	**8.379e-01**	8.367e-01	8.276e-01	8.356e-01	8.363e-01
		Worst	**8.294e-01**	7.758e-01	7.703e-01	8.248e-01	7.798e-01	7.787e-01	7.730e-01	8.249e-01	7.969e-01	7.948e-01	8.144e-01
	10	Mean	**8.777e-01**	8.566e-01	8.444e-01	8.743e-01	8.371e-01	8.468e-01	8.597e-01	8.124e-01	8.470e-01	8.674e-01	8.684e-01
		Std	**5.134e-03**	1.191e-02	1.864e-02	1.085e-02	1.576e-02	9.552e-03	1.056e-02	2.019e-02	1.080e-02	1.596e-02	1.055e-02
		Best	8.830e-01	8.726e-01	8.797e-01	8.827e-01	8.662e-01	8.727e-01	8.756e-01	8.818e-01	8.707e-01	**8.831e-01**	8.817e-01
		Worst	**8.726e-01**	8.180e-01	8.066e-01	8.526e-01	8.026e-01	7.843e-01	8.326e-01	8.361e-01	8.315e-01	8.355e-01	8.529e-01
	12	Mean	**9.063e-01**	8.803e-01	8.679e-01	9.054e-01	8.633e-01	8.691e-01	8.837e-01	8.368e-01	8.734e-01	8.946e-01	8.934e-01
		Std	7.105e-03	1.187e-02	1.302e-02	**5.665e-03**	1.381e-02	8.786e-03	8.938e-03	2.116e-02	8.994e-03	1.695e-02	1.142e-02
		Best	9.125e-01	9.083e-01	8.986e-01	9.115e-01	8.858e-01	8.839e-01	8.992e-01	9.098e-01	8.923e-01	9.120e-01	**9.131e-01**
		Worst	**8.997e-01**	8.346e-01	8.410e-01	8.934e-01	8.296e-01	8.304e-01	8.531e-01	8.697e-01	8.625e-01	8.729e-01	8.703e-01
Cov-2	4	Mean	6.788e-01	6.784e-01	6.780e-01	6.788e-01	6.771e-01	6.777e-01	6.778e-01	6.639e-01	6.774e-01	6.786e-01	**6.789e-01**
		Std	6.862e-04	1.325e-03	2.235e-03	1.073e-03	6.264e-03	3.582e-03	2.816e-03	2.052e-02	4.021e-03	1.995e-03	**6.472e-04**
		Best	6.797e-01	6.819e-01	6.818e-01	6.803e-01	**6.903e-01**	6.830e-01	6.823e-01	6.813e-01	6.854e-01	6.851e-01	6.797e-01
		Worst	6.775e-01	6.681e-01	6.741e-01	6.767e-01	6.680e-01	6.709e-01	6.734e-01	6.768e-01	6.695e-01	6.735e-01	**6.775e-01**
	6	Mean	**7.551e-01**	7.492e-01	7.483e-01	7.542e-01	7.444e-01	7.468e-01	7.533e-01	7.044e-01	7.496e-01	7.526e-01	7.540e-01
		Std	**1.611e-03**	9.028e-03	1.017e-02	3.902e-03	1.299e-02	1.310e-02	6.126e-03	2.215e-02	9.968e-03	7.042e-03	3.104e-03
		Best	7.587e-01	**7.717e-01**	7.630e-01	7.613e-01	7.693e-01	7.672e-01	7.679e-01	7.579e-01	7.654e-01	7.637e-01	7.659e-01
		Worst	**7.522e-01**	7.287e-01	7.174e-01	7.224e-01	7.220e-01	7.217e-01	7.254e-01	7.421e-01	7.290e-01	7.198e-01	7.436e-01
	8	Mean	**8.109e-01**	7.996e-01	7.876e-01	8.108e-01	7.812e-01	7.862e-01	8.046e-01	7.536e-01	7.958e-01	8.103e-01	8.059e-01
		Std	**3.173e-03**	1.530e-02	1.513e-02	4.576e-03	1.522e-02	1.560e-02	1.060e-02	2.782e-02	1.160e-02	8.431e-03	7.879e-03
		Best	8.173e-01	8.242e-01	8.139e-01	8.197e-01	8.200e-01	8.135e-01	8.219e-01	8.194e-01	**8.270e-01**	8.148e-01	8.256e-01
		Worst	**8.059e-01**	7.792e-01	7.694e-01	8.000e-01	7.597e-01	7.330e-01	7.782e-01	7.955e-01	7.699e-01	7.753e-01	7.925e-01

The best results are in bold

Table 4 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
	10	Mean	**8.551e-01**	8.371e-01	8.195e-01	8.549e-01	8.191e-01	8.204e-01	8.379e-01	7.822e-01	8.309e-01	8.512e-01	8.437e-01
		Std	**5.594e-03**	1.640e-02	1.654e-02	5.633e-03	1.652e-02	1.654e-02	1.037e-02	1.915e-02	1.305e-02	9.984e-03	1.060e-02
		Best	8.634e-01	8.668e-01	8.504e-01	**8.671e-01**	8.518e-01	8.456e-01	8.578e-01	8.627e-01	8.600e-01	8.603e-01	8.638e-01
		Worst	8.418e-01	7.931e-01	7.927e-01	**8.427e-01**	7.813e-01	7.866e-01	8.109e-01	8.254e-01	7.965e-01	8.127e-01	8.258e-01
	12	Mean	**8.883e-01**	8.596e-01	8.464e-01	8.840e-01	8.368e-01	8.450e-01	8.613e-01	8.054e-01	8.506e-01	8.756e-01	8.756e-01
		Std	**7.028e-03**	1.625e-02	1.676e-02	9.547e-03	1.850e-02	1.680e-02	1.064e-02	2.075e-02	1.475e-02	1.769e-02	1.566e-02
		Best	8.974e-01	8.865e-01	8.857e-01	8.972e-01	8.774e-01	8.792e-01	8.807e-01	8.979e-01	8.777e-01	8.948e-01	**8.981e-01**
		Worst	**8.629e-01**	8.282e-01	8.239e-01	8.608e-01	8.079e-01	8.101e-01	8.320e-01	8.514e-01	8.234e-01	8.469e-01	8.426e-01
Cov-3	4	Mean	7.343e-01	7.324e-01	7.319e-01	7.339e-01	7.313e-01	7.246e-01	7.323e-01	7.102e-01	7.322e-01	7.337e-01	**7.346e-01**
		Std	1.133e-03	5.776e-03	3.450e-03	2.092e-03	9.097e-03	1.139e-02	4.081e-03	2.406e-02	5.900e-03	1.837e-03	**1.036e-03**
		Best	7.357e-01	7.438e-01	7.395e-01	7.379e-01	**7.507e-01**	7.491e-01	7.393e-01	7.375e-01	7.439e-01	7.353e-01	7.364e-01
		Worst	7.325e-01	7.250e-01	7.239e-01	7.306e-01	7.177e-01	6.931e-01	7.263e-01	**7.331e-01**	7.172e-01	7.008e-01	7.292e-01
	6	Mean	**8.031e-01**	7.971e-01	7.893e-01	8.011e-01	7.907e-01	7.846e-01	7.962e-01	7.595e-01	7.948e-01	8.028e-01	8.022e-01
		Std	**1.066e-03**	8.548e-03	1.629e-02	7.677e-03	1.594e-02	1.472e-02	7.032e-03	2.878e-02	1.263e-02	3.124e-03	3.250e-03
		Best	8.077e-01	8.109e-01	8.058e-01	8.080e-01	8.165e-01	8.060e-01	8.161e-01	8.078e-01	**8.174e-01**	8.093e-01	8.075e-01
		Worst	**8.004e-01**	7.508e-01	7.661e-01	7.998e-01	7.525e-01	7.387e-01	7.892e-01	7.740e-01	7.702e-01	7.961e-01	7.945e-01
	8	Mean	**8.501e-01**	8.358e-01	8.328e-01	8.489e-01	8.253e-01	8.202e-01	8.400e-01	7.941e-01	8.336e-01	8.453e-01	8.481e-01
		Std	**3.922e-03**	1.289e-02	1.084e-02	6.953e-03	2.069e-02	1.974e-02	7.941e-03	2.327e-02	1.075e-02	8.492e-03	7.243e-03
		Best	8.539e-01	8.564e-01	8.509e-01	8.568e-01	**8.675e-01**	8.493e-01	8.583e-01	8.593e-01	8.539e-01	8.617e-01	8.601e-01
		Worst	**8.465e-01**	8.094e-01	7.887e-01	8.327e-01	8.059e-01	8.007e-01	8.214e-01	8.245e-01	8.154e-01	8.109e-01	8.430e-01
	10	Mean	**8.848e-01**	8.673e-01	8.554e-01	8.845e-01	8.482e-01	8.540e-01	8.689e-01	8.138e-01	8.601e-01	8.732e-01	8.810e-01
		Std	6.182e-03	1.220e-02	1.036e-02	**5.788e-03**	1.837e-02	1.532e-02	1.134e-02	1.940e-02	1.147e-02	1.477e-02	8.661e-03
		Best	**8.924e-01**	8.846e-01	8.849e-01	8.923e-01	8.823e-01	8.730e-01	8.914e-01	8.916e-01	8.875e-01	8.909e-01	8.904e-01
		Worst	**8.738e-01**	8.326e-01	8.268e-01	8.531e-01	8.257e-01	8.217e-01	8.511e-01	8.638e-01	8.391e-01	8.342e-01	8.580e-01
	12	Mean	**9.135e-01**	8.841e-01	8.748e-01	9.074e-01	8.738e-01	8.739e-01	8.873e-01	8.400e-01	8.771e-01	9.044e-01	8.987e-01
		Std	**6.338e-03**	1.252e-02	1.395e-02	8.250e-03	1.109e-02	1.364e-02	7.461e-03	1.860e-02	8.958e-03	1.141e-02	1.072e-02
		Best	9.189e-01	9.075e-01	9.023e-01	9.172e-01	8.954e-01	9.054e-01	9.031e-01	9.191e-01	9.068e-01	**9.193e-01**	9.185e-01
		Worst	**9.083e-01**	8.521e-01	8.395e-01	8.843e-01	8.396e-01	8.389e-01	8.782e-01	8.837e-01	8.448e-01	8.712e-01	8.813e-01
Cov-4	4	Mean	7.455e-01	7.430e-01	7.451e-01	7.453e-01	7.391e-01	7.344e-01	**7.462e-01**	7.000e-01	7.455e-01	7.456e-01	7.456e-01
		Std	**1.195e-03**	4.754e-03	4.963e-03	2.434e-03	1.170e-02	2.179e-02	2.727e-03	2.469e-02	5.701e-03	3.200e-03	1.242e-03
		Best	7.476e-01	**7.574e-01**	7.541e-01	7.486e-01	7.549e-01	7.544e-01	7.516e-01	7.476e-01	7.547e-01	7.542e-01	7.473e-01
		Worst	**7.437e-01**	6.940e-01	7.314e-01	7.025e-01	7.207e-01	6.883e-01	7.341e-01	7.382e-01	7.312e-01	7.368e-01	7.433e-01
	6	Mean	**8.190e-01**	8.056e-01	8.023e-01	8.164e-01	7.944e-01	7.855e-01	8.036e-01	7.585e-01	8.036e-01	8.048e-01	7.999e-01
		Std	1.224e-02	2.027e-02	1.814e-02	1.375e-02	1.352e-02	2.294e-02	1.042e-02	2.545e-02	1.616e-02	1.151e-02	**5.154e-03**
		Best	8.301e-01	**8.344e-01**	8.276e-01	8.300e-01	8.184e-01	8.306e-01	8.291e-01	8.294e-01	8.286e-01	8.284e-01	8.084e-01
		Worst	**7.997e-01**	7.846e-01	7.713e-01	7.974e-01	7.426e-01	7.472e-01	7.832e-01	7.880e-01	7.723e-01	7.866e-01	7.916e-01
	8	Mean	**8.628e-01**	8.463e-01	8.403e-01	8.563e-01	8.286e-01	8.254e-01	8.488e-01	7.831e-01	8.365e-01	8.556e-01	8.560e-01
		Std	**3.183e-03**	1.913e-02	1.887e-02	1.507e-02	1.771e-02	1.782e-02	9.544e-03	2.688e-02	1.384e-02	1.222e-02	5.384e-03
		Best	8.681e-01	8.699e-01	8.636e-01	**8.784e-01**	8.580e-01	8.548e-01	8.691e-01	8.682e-01	8.633e-01	8.679e-01	8.731e-01
		Worst	**8.536e-01**	8.068e-01	7.941e-01	8.309e-01	7.899e-01	7.859e-01	8.296e-01	8.400e-01	8.146e-01	8.179e-01	8.452e-01
	10	Mean	**9.021e-01**	8.675e-01	8.611e-01	8.948e-01	8.578e-01	8.492e-01	8.788e-01	8.125e-01	8.665e-01	8.879e-01	8.902e-01
		Std	**3.835e-03**	1.778e-02	1.755e-02	1.200e-02	1.999e-02	1.912e-02	1.178e-02	2.492e-02	1.311e-02	1.477e-02	7.704e-03
		Best	9.058e-01	8.967e-01	8.953e-01	**9.083e-01**	8.713e-01	8.876e-01	8.933e-01	9.071e-01	8.968e-01	9.069e-01	9.050e-01
		Worst	**8.804e-01**	8.269e-01	8.277e-01	8.541e-01	8.034e-01	8.193e-01	8.653e-01	8.663e-01	8.253e-01	8.668e-01	8.689e-01
	12	Mean	**9.259e-01**	8.905e-01	8.804e-01	9.173e-01	8.794e-01	8.806e-01	9.006e-01	8.356e-01	8.928e-01	9.085e-01	9.131e-01
		Std	**6.207e-03**	1.548e-02	1.782e-02	1.266e-02	1.132e-02	1.614e-02	1.051e-02	2.211e-02	1.304e-02	1.679e-02	1.196e-02
		Best	**9.359e-01**	9.094e-01	9.162e-01	9.347e-01	9.038e-01	9.087e-01	9.195e-01	9.324e-01	9.158e-01	9.313e-01	9.308e-01
		Worst	**9.167e-01**	8.488e-01	8.487e-01	8.890e-01	8.407e-01	8.318e-01	8.856e-01	8.924e-01	8.631e-01	8.987e-01	8.868e-01
Cov-5	4	Mean	7.152e-01	7.149e-01	7.160e-01	7.150e-01	**7.173e-01**	7.150e-01	7.158e-01	7.141e-01	7.166e-01	7.140e-01	7.151e-01
		Std	**1.147e-03**	2.638e-03	5.231e-03	1.619e-03	7.954e-03	4.719e-03	4.011e-03	1.405e-02	3.540e-03	2.471e-03	1.436e-03
		Best	7.175e-01	7.212e-01	7.251e-01	7.177e-01	**7.279e-01**	7.254e-01	7.218e-01	7.204e-01	7.235e-01	7.189e-01	7.200e-01

The best results are in bold

Table 4 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Worst	**7.132e-01**	7.098e-01	7.067e-01	7.118e-01	7.040e-01	7.012e-01	7.054e-01	7.116e-01	7.081e-01	7.118e-01	7.129e-01
	6	Mean	**7.681e-01**	7.650e-01	7.612e-01	7.663e-01	7.527e-01	7.575e-01	7.598e-01	7.386e-01	7.640e-01	7.639e-01	7.663e-01
		Std	**1.308e-03**	4.652e-03	8.928e-03	5.645e-03	1.217e-02	1.188e-02	9.483e-03	1.820e-02	8.777e-03	7.582e-03	4.091e-03
		Best	7.699e-01	7.771e-01	7.729e-01	7.718e-01	7.763e-01	7.794e-01	7.703e-01	7.768e-01	**7.864e-01**	7.834e-01	7.761e-01
		Worst	**7.659e-01**	7.433e-01	7.465e-01	7.625e-01	7.227e-01	7.257e-01	7.437e-01	7.415e-01	7.423e-01	7.542e-01	7.613e-01
	8	Mean	8.062e-01	8.008e-01	7.910e-01	**8.062e-01**	7.881e-01	7.852e-01	7.948e-01	7.707e-01	7.981e-01	8.005e-01	8.050e-01
		Std	**3.818e-03**	1.015e-02	9.220e-03	4.632e-03	1.395e-02	1.305e-02	1.187e-02	1.653e-02	9.581e-03	1.052e-02	5.179e-03
		Best	8.175e-01	8.160e-01	8.082e-01	8.108e-01	8.107e-01	**8.206e-01**	8.129e-01	8.135e-01	8.186e-01	8.123e-01	8.156e-01
		Worst	**8.007e-01**	7.798e-01	7.595e-01	7.940e-01	7.622e-01	7.627e-01	7.786e-01	7.851e-01	7.687e-01	7.703e-01	7.844e-01
	10	Mean	**8.418e-01**	8.249e-01	8.171e-01	8.365e-01	8.084e-01	8.055e-01	8.197e-01	7.921e-01	8.253e-01	8.325e-01	8.328e-01
		Std	**6.503e-03**	1.054e-02	1.408e-02	7.229e-03	1.346e-02	1.652e-02	1.152e-02	1.856e-02	1.166e-02	7.621e-03	1.024e-02
		Best	**8.491e-01**	8.443e-01	8.393e-01	8.469e-01	8.442e-01	8.359e-01	8.371e-01	8.484e-01	8.465e-01	8.489e-01	8.471e-01
		Worst	**8.287e-01**	8.082e-01	7.772e-01	8.125e-01	7.594e-01	7.870e-01	7.959e-01	8.211e-01	8.002e-01	8.028e-01	8.185e-01
	12	Mean	**8.670e-01**	8.480e-01	8.342e-01	8.655e-01	8.295e-01	8.336e-01	8.411e-01	8.179e-01	8.458e-01	8.501e-01	8.523e-01
		Std	**5.946e-03**	1.347e-02	1.327e-02	6.167e-03	1.562e-02	1.201e-02	1.220e-02	1.894e-02	1.255e-02	1.338e-02	1.169e-02
		Best	**8.788e-01**	8.713e-01	8.582e-01	8.725e-01	8.577e-01	8.612e-01	8.629e-01	8.764e-01	8.751e-01	8.732e-01	8.755e-01
		Worst	**8.599e-01**	8.193e-01	8.097e-01	8.458e-01	7.944e-01	8.125e-01	8.157e-01	8.376e-01	8.226e-01	8.181e-01	8.352e-01
Cov-6	4	Mean	7.388e-01	7.381e-01	**7.394e-01**	7.377e-01	7.338e-01	7.282e-01	7.385e-01	7.155e-01	7.383e-01	7.373e-01	7.386e-01
		Std	**7.828e-04**	6.790e-03	2.693e-03	8.426e-03	1.312e-02	1.850e-02	1.826e-03	1.571e-02	2.368e-03	8.281e-03	9.687e-04
		Best	7.404e-01	7.431e-01	7.424e-01	7.415e-01	7.453e-01	**7.468e-01**	7.437e-01	7.416e-01	7.427e-01	7.421e-01	7.404e-01
		Worst	7.374e-01	7.055e-01	7.038e-01	7.365e-01	7.155e-01	6.910e-01	7.322e-01	6.935e-01	7.295e-01	7.329e-01	**7.378e-01**
	6	Mean	**7.993e-01**	7.912e-01	7.861e-01	7.983e-01	7.837e-01	7.815e-01	7.954e-01	7.523e-01	7.937e-01	7.968e-01	7.972e-01
		Std	**1.433e-03**	1.323e-02	1.294e-02	5.609e-03	1.636e-02	1.452e-02	8.408e-03	1.757e-02	9.372e-03	6.255e-03	3.231e-03
		Best	8.006e-01	8.050e-01	8.025e-01	8.015e-01	8.053e-01	8.027e-01	8.092e-01	8.036e-01	**8.114e-01**	8.075e-01	8.055e-01
		Worst	**7.960e-01**	7.555e-01	7.647e-01	7.686e-01	7.527e-01	7.547e-01	7.851e-01	7.679e-01	7.777e-01	7.669e-01	7.938e-01
	8	Mean	**8.456e-01**	8.325e-01	8.251e-01	8.441e-01	8.119e-01	8.174e-01	8.284e-01	7.837e-01	8.262e-01	8.366e-01	8.427e-01
		Std	**2.861e-03**	1.451e-02	1.388e-02	6.785e-03	1.285e-02	1.274e-02	1.032e-02	2.725e-02	1.079e-02	1.255e-02	5.651e-03
		Best	8.484e-01	8.502e-01	8.460e-01	8.490e-01	8.293e-01	8.367e-01	8.454e-01	**8.525e-01**	8.420e-01	8.479e-01	8.499e-01
		Worst	**8.415e-01**	7.978e-01	7.935e-01	8.202e-01	7.894e-01	7.732e-01	8.102e-01	8.124e-01	8.076e-01	8.008e-01	8.302e-01
	10	Mean	**8.774e-01**	8.581e-01	8.465e-01	8.760e-01	8.344e-01	8.386e-01	8.548e-01	8.013e-01	8.531e-01	8.633e-01	8.733e-01
		Std	6.634e-03	1.091e-02	1.359e-02	**4.047e-03**	1.512e-02	1.085e-02	1.065e-02	2.142e-02	1.082e-02	1.497e-02	7.916e-03
		Best	**8.847e-01**	8.828e-01	8.754e-01	8.821e-01	8.611e-01	8.720e-01	8.726e-01	8.831e-01	8.712e-01	8.818e-01	8.821e-01
		Worst	**8.685e-01**	8.269e-01	7.843e-01	8.485e-01	7.969e-01	8.112e-01	8.386e-01	8.489e-01	8.291e-01	8.349e-01	8.515e-01
	12	Mean	**8.997e-01**	8.788e-01	8.726e-01	8.977e-01	8.511e-01	8.604e-01	8.716e-01	8.294e-01	8.691e-01	8.879e-01	8.915e-01
		Std	**4.764e-03**	1.109e-02	1.259e-02	4.991e-03	1.600e-02	1.262e-02	1.079e-02	2.003e-02	1.211e-02	1.258e-02	1.031e-02
		Best	9.082e-01	9.000e-01	8.893e-01	9.060e-01	8.869e-01	8.792e-01	8.952e-01	9.075e-01	8.869e-01	9.060e-01	**9.083e-01**
		Worst	**8.901e-01**	8.460e-01	8.327e-01	8.810e-01	8.144e-01	8.220e-01	8.506e-01	8.697e-01	8.565e-01	8.675e-01	8.713e-01
Cov-7	4	Mean	7.506e-01	7.500e-01	7.510e-01	7.507e-01	7.505e-01	7.486e-01	**7.513e-01**	7.443e-01	7.505e-01	7.510e-01	7.508e-01
		Std	1.008e-03	5.674e-03	3.239e-03	1.938e-03	5.628e-03	4.072e-03	2.517e-03	1.257e-02	3.946e-03	**8.387e-04**	8.842e-04
		Best	7.523e-01	7.582e-01	7.587e-01	7.530e-01	**7.607e-01**	7.576e-01	7.572e-01	7.523e-01	7.602e-01	7.548e-01	7.547e-01
		Worst	**7.494e-01**	7.477e-01	7.461e-01	7.379e-01	7.376e-01	7.450e-01	7.470e-01	7.473e-01	7.454e-01	7.479e-01	7.487e-01
	6	Mean	**7.932e-01**	7.881e-01	7.859e-01	7.913e-01	7.864e-01	7.848e-01	7.901e-01	7.658e-01	7.874e-01	7.922e-01	7.925e-01
		Std	**1.145e-03**	1.002e-02	8.270e-03	6.007e-03	7.913e-03	9.869e-03	4.820e-03	1.459e-02	7.976e-03	1.899e-03	2.855e-03
		Best	7.955e-01	7.998e-01	7.956e-01	7.983e-01	7.993e-01	7.972e-01	7.990e-01	7.956e-01	**8.034e-01**	7.977e-01	8.003e-01
		Worst	**7.900e-01**	7.665e-01	7.767e-01	7.824e-01	7.703e-01	7.602e-01	7.813e-01	7.675e-01	7.715e-01	7.792e-01	7.824e-01
	8	Mean	**8.344e-01**	8.209e-01	8.191e-01	8.319e-01	8.151e-01	8.120e-01	8.270e-01	7.913e-01	8.215e-01	8.297e-01	8.328e-01
		Std	**2.599e-03**	1.073e-02	1.171e-02	5.865e-03	1.352e-02	1.517e-02	5.751e-03	1.454e-02	1.257e-02	9.683e-03	4.413e-03
		Best	8.379e-01	8.422e-01	8.375e-01	8.392e-01	8.362e-01	8.431e-01	**8.445e-01**	8.376e-01	8.440e-01	8.391e-01	8.434e-01
		Worst	**8.311e-01**	8.052e-01	8.016e-01	8.130e-01	7.865e-01	7.841e-01	8.009e-01	8.096e-01	8.020e-01	8.143e-01	8.177e-01
	10	Mean	**8.675e-01**	8.500e-01	8.483e-01	8.623e-01	8.353e-01	8.369e-01	8.510e-01	8.095e-01	8.444e-01	8.599e-01	8.617e-01
		Std	**5.745e-03**	1.104e-02	1.430e-02	1.316e-02	1.402e-02	1.887e-02	8.962e-03	1.521e-02	1.094e-02	1.145e-02	7.681e-03

The best results are in bold

Table 4 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Best	8.733e-01	8.701e-01	8.645e-01	8.729e-01	8.750e-01	8.627e-01	8.746e-01	8.720e-01	**8.766e-01**	8.719e-01	8.711e-01
		Worst	**8.620e-01**	8.075e-01	8.146e-01	8.337e-01	8.088e-01	8.083e-01	8.357e-01	8.396e-01	8.170e-01	8.371e-01	8.368e-01
	12	Mean	**8.918e-01**	8.662e-01	8.615e-01	8.875e-01	8.567e-01	8.539e-01	8.669e-01	8.211e-01	8.637e-01	8.767e-01	8.847e-01
		Std	**6.555e-03**	1.286e-02	1.229e-02	8.853e-03	1.170e-02	1.693e-02	9.436e-03	1.934e-02	1.146e-02	1.139e-02	9.276e-03
		Best	8.993e-01	8.974e-01	8.814e-01	8.969e-01	8.698e-01	8.851e-01	8.884e-01	8.975e-01	8.833e-01	8.978e-01	**9.029e-01**
		Worst	8.792e-01	8.369e-01	8.360e-01	8.698e-01	8.307e-01	8.336e-01	8.478e-01	**8.794e-01**	8.429e-01	8.532e-01	8.656e-01
Cov-8	4	Mean	7.128e-01	7.126e-01	7.116e-01	7.134e-01	7.082e-01	7.088e-01	7.112e-01	6.893e-01	**7.146e-01**	7.103e-01	7.129e-01
		Std	**1.123e-03**	2.024e-03	8.573e-03	1.244e-03	7.483e-03	1.015e-02	4.611e-03	2.205e-02	3.721e-03	8.490e-03	1.321e-03
		Best	7.146e-01	7.157e-01	7.187e-01	7.161e-01	7.200e-01	**7.206e-01**	7.175e-01	7.168e-01	7.203e-01	7.181e-01	7.157e-01
		Worst	**7.111e-01**	6.982e-01	6.798e-01	6.696e-01	6.964e-01	6.638e-01	7.015e-01	**7.111e-01**	7.039e-01	6.986e-01	**7.111e-01**
	6	Mean	7.828e-01	7.803e-01	7.735e-01	7.809e-01	7.695e-01	7.661e-01	7.762e-01	7.326e-01	7.747e-01	**7.830e-01**	7.829e-01
		Std	4.840e-03	8.867e-03	1.335e-02	9.940e-03	1.382e-02	1.804e-02	7.837e-03	2.250e-02	8.104e-03	7.027e-03	**3.407e-03**
		Best	7.866e-01	7.905e-01	7.907e-01	7.873e-01	7.934e-01	7.890e-01	7.908e-01	7.877e-01	7.921e-01	**7.942e-01**	7.924e-01
		Worst	**7.837e-01**	7.592e-01	7.461e-01	7.543e-01	7.284e-01	7.341e-01	7.588e-01	7.625e-01	7.510e-01	7.528e-01	7.754e-01
	8	Mean	**8.383e-01**	8.223e-01	8.132e-01	8.341e-01	8.101e-01	8.016e-01	8.207e-01	7.682e-01	8.185e-01	8.310e-01	8.331e-01
		Std	**2.876e-03**	1.141e-02	1.427e-02	8.699e-03	1.676e-02	1.930e-02	1.046e-02	2.136e-02	1.315e-02	1.533e-02	6.920e-03
		Best	8.404e-01	8.414e-01	8.373e-01	8.422e-01	8.317e-01	**8.454e-01**	8.356e-01	8.414e-01	8.414e-01	8.405e-01	8.428e-01
		Worst	**8.348e-01**	7.778e-01	7.711e-01	8.112e-01	7.705e-01	7.501e-01	8.022e-01	8.089e-01	8.018e-01	7.809e-01	8.068e-01
	10	Mean	**8.751e-01**	8.581e-01	8.385e-01	8.730e-01	8.310e-01	8.325e-01	8.477e-01	7.971e-01	8.506e-01	8.583e-01	8.647e-01
		Std	**5.477e-03**	9.556e-03	1.467e-02	7.788e-03	1.555e-02	1.444e-02	9.518e-03	1.924e-02	1.031e-02	1.175e-02	8.672e-03
		Best	8.785e-01	8.774e-01	8.718e-01	8.791e-01	8.587e-01	8.609e-01	8.661e-01	8.770e-01	8.697e-01	8.780e-01	**8.807e-01**
		Worst	**8.639e-01**	8.344e-01	8.155e-01	8.410e-01	7.948e-01	8.049e-01	8.330e-01	8.536e-01	8.238e-01	8.379e-01	8.455e-01
	12	Mean	**9.010e-01**	8.767e-01	8.619e-01	8.955e-01	8.523e-01	8.572e-01	8.710e-01	8.216e-01	8.690e-01	8.858e-01	8.908e-01
		Std	**3.046e-03**	1.056e-02	1.630e-02	7.757e-03	1.462e-02	1.291e-02	8.910e-03	1.550e-02	1.095e-02	1.215e-02	1.065e-02
		Best	**9.069e-01**	8.970e-01	8.901e-01	9.044e-01	8.820e-01	8.792e-01	8.812e-01	9.068e-01	8.923e-01	9.048e-01	9.058e-01
		Worst	**8.946e-01**	8.588e-01	8.112e-01	8.706e-01	8.233e-01	8.191e-01	8.492e-01	8.544e-01	8.495e-01	8.600e-01	8.677e-01
Cov-9	4	Mean	7.327e-01	7.329e-01	7.326e-01	7.333e-01	7.317e-01	7.262e-01	7.331e-01	7.182e-01	**7.334e-01**	7.327e-01	7.331e-01
		Std	**4.904e-04**	1.208e-03	2.057e-03	7.757e-04	3.955e-03	1.332e-02	1.939e-03	1.573e-02	1.610e-03	1.307e-03	6.353e-04
		Best	7.338e-01	7.355e-01	7.358e-01	7.352e-01	**7.397e-01**	7.376e-01	7.365e-01	7.350e-01	7.359e-01	7.365e-01	7.346e-01
		Worst	**7.320e-01**	7.302e-01	7.196e-01	7.304e-01	7.245e-01	7.270e-01	7.299e-01	7.317e-01	7.293e-01	7.309e-01	**7.320e-01**
	6	Mean	**7.877e-01**	7.810e-01	7.780e-01	7.865e-01	7.662e-01	7.671e-01	7.742e-01	7.504e-01	7.775e-01	7.865e-01	7.851e-01
		Std	**1.813e-03**	9.993e-03	9.830e-03	5.454e-03	1.231e-02	1.353e-02	8.389e-03	1.710e-02	9.859e-03	4.329e-03	5.129e-03
		Best	7.911e-01	7.950e-01	7.920e-01	7.931e-01	7.915e-01	**7.979e-01**	7.976e-01	7.933e-01	7.976e-01	7.949e-01	7.915e-01
		Worst	**7.822e-01**	7.590e-01	7.527e-01	7.659e-01	7.493e-01	7.466e-01	7.646e-01	7.799e-01	7.597e-01	7.660e-01	7.700e-01
	8	Mean	**8.235e-01**	8.139e-01	8.086e-01	8.218e-01	7.985e-01	8.050e-01	8.127e-01	7.743e-01	8.133e-01	8.165e-01	8.202e-01
		Std	**2.903e-03**	9.450e-03	1.070e-02	8.045e-03	1.134e-02	1.444e-02	6.908e-03	2.113e-02	9.830e-03	1.139e-02	6.124e-03
		Best	8.276e-01	8.388e-01	8.275e-01	8.276e-01	8.377e-01	8.396e-01	8.313e-01	8.277e-01	**8.455e-01**	8.284e-01	8.294e-01
		Worst	**8.193e-01**	7.647e-01	7.761e-01	8.132e-01	7.685e-01	7.724e-01	7.907e-01	8.085e-01	7.926e-01	7.934e-01	8.067e-01
	10	Mean	**8.634e-01**	8.467e-01	8.329e-01	8.600e-01	8.226e-01	8.255e-01	8.418e-01	7.972e-01	8.364e-01	8.526e-01	8.533e-01
		Std	**4.189e-03**	1.157e-02	1.170e-02	5.919e-03	1.594e-02	1.492e-02	1.298e-02	1.897e-02	1.087e-02	1.147e-02	8.497e-03
		Best	8.695e-01	8.681e-01	8.585e-01	8.677e-01	8.595e-01	8.507e-01	8.611e-01	**8.700e-01**	8.547e-01	8.661e-01	8.665e-01
		Worst	**8.497e-01**	8.160e-01	8.113e-01	8.471e-01	7.977e-01	7.833e-01	8.144e-01	8.414e-01	8.155e-01	8.263e-01	8.371e-01
	12	Mean	**8.897e-01**	8.648e-01	8.566e-01	8.860e-01	8.417e-01	8.453e-01	8.630e-01	8.187e-01	8.618e-01	8.790e-01	8.760e-01
		Std	**6.460e-03**	1.421e-02	1.729e-02	7.555e-03	1.518e-02	1.705e-02	9.997e-03	1.666e-02	1.113e-02	1.180e-02	1.164e-02
		Best	8.996e-01	8.835e-01	8.791e-01	8.946e-01	8.715e-01	8.741e-01	8.859e-01	8.970e-01	8.805e-01	8.973e-01	**9.002e-01**
		Worst	**8.739e-01**	8.429e-01	8.320e-01	8.637e-01	8.065e-01	8.124e-01	8.392e-01	8.391e-01	8.423e-01	8.466e-01	8.558e-01
Cov-10	4	Mean	7.656e-01	7.656e-01	7.641e-01	**7.661e-01**	7.625e-01	7.621e-01	7.641e-01	7.430e-01	7.635e-01	7.656e-01	7.653e-01
		Std	1.242e-03	3.707e-03	7.199e-03	2.095e-03	7.629e-03	9.999e-03	4.145e-03	2.165e-02	5.494e-03	3.012e-03	**1.131e-03**
		Best	7.673e-01	7.716e-01	7.705e-01	7.727e-01	7.757e-01	7.744e-01	7.743e-01	7.688e-01	**7.763e-01**	7.734e-01	7.673e-01
		Worst	7.632e-01	7.487e-01	7.483e-01	7.606e-01	7.501e-01	7.497e-01	7.579e-01	**7.633e-01**	7.518e-01	7.511e-01	7.632e-01
	6	Mean	8.116e-01	8.075e-01	8.067e-01	**8.132e-01**	8.084e-01	8.029e-01	8.079e-01	7.852e-01	8.070e-01	8.106e-01	8.099e-01

The best results are in bold

Table 4 – continued

Images	nTh	Metrics	WSChOA	WSO	GoldSA	WOA	SCA	Chimp	IChoA	GSChoA	EDO	GJO	IGWO
		Std	**3.465e-03**	7.562e-03	7.671e-03	5.014e-03	1.449e-02	1.014e-02	4.085e-03	1.952e-02	1.221e-02	4.494e-03	5.189e-03
		Best	8.210e-01	8.239e-01	8.213e-01	8.242e-01	**8.421e-01**	8.290e-01	8.228e-01	8.212e-01	8.291e-01	8.205e-01	8.204e-01
		Worst	**8.095e-01**	7.987e-01	7.894e-01	8.071e-01	7.798e-01	7.758e-01	7.993e-01	7.950e-01	7.796e-01	7.950e-01	7.997e-01
	8	Mean	**8.550e-01**	8.425e-01	8.344e-01	8.527e-01	8.294e-01	8.330e-01	8.446e-01	8.096e-01	8.372e-01	8.521e-01	8.511e-01
		Std	**3.452e-03**	1.118e-02	1.191e-02	4.649e-03	1.220e-02	1.304e-02	8.735e-03	1.613e-02	1.191e-02	1.093e-02	5.513e-03
		Best	8.594e-01	8.594e-01	8.514e-01	8.591e-01	8.542e-01	8.595e-01	8.595e-01	8.580e-01	8.577e-01	8.599e-01	**8.608e-01**
		Worst	**8.522e-01**	8.244e-01	8.074e-01	8.262e-01	8.110e-01	7.937e-01	8.147e-01	8.434e-01	8.188e-01	8.308e-01	8.410e-01
	10	Mean	**8.909e-01**	8.729e-01	8.668e-01	8.883e-01	8.526e-01	8.557e-01	8.713e-01	8.277e-01	8.596e-01	8.828e-01	8.848e-01
		Std	**5.353e-03**	1.098e-02	1.219e-02	6.106e-03	1.197e-02	1.304e-02	7.993e-03	1.724e-02	1.324e-02	1.067e-02	1.070e-02
		Best	**8.967e-01**	8.885e-01	8.842e-01	8.948e-01	8.783e-01	8.784e-01	8.960e-01	8.967e-01	8.901e-01	8.966e-01	8.952e-01
		Worst	**8.851e-01**	8.359e-01	8.215e-01	8.719e-01	8.229e-01	8.278e-01	8.478e-01	8.561e-01	8.384e-01	8.626e-01	8.599e-01
	12	Mean	**9.066e-01**	8.868e-01	8.828e-01	9.035e-01	8.702e-01	8.770e-01	8.880e-01	8.504e-01	8.813e-01	8.974e-01	9.014e-01
		Std	**4.102e-03**	1.188e-02	1.036e-02	4.997e-03	1.068e-02	1.218e-02	9.364e-03	2.035e-02	1.339e-02	1.012e-02	8.777e-03
		Best	**9.139e-01**	9.080e-01	9.026e-01	9.107e-01	9.003e-01	8.988e-01	9.042e-01	9.133e-01	9.021e-01	9.130e-01	9.125e-01
		Worst	**9.012e-01**	8.416e-01	8.573e-01	8.930e-01	8.407e-01	8.497e-01	8.646e-01	8.724e-01	8.635e-01	8.710e-01	8.849e-01
		$+/-/=$	$\sim$	49/1/0	47/3/0	43/7/0	49/1/0	50/0/0	46/4/0	50/0/0	47/3/0	47/3/0	42/8/0
		Mean Rank	1.60	5.62	7.46	2.48	9.24	9.22	5.52	10.98	6.54	4.12	3.22
		Rank	1	4	6	2	10	9	5	11	7	3	8