

Influence of the number of hooks on the root-mean-square error (RMSE) and the peak signal-to-noise-ratio (PSNR)

We used our greedy string art algorithm together with supersampling (window size 8x8) to reconstruct the image shown in Figure 1. Our aim was to investigate the influence of the number of hooks on the root-mean-square error (RMSE) and the peak signal-to-noise-ratio (PSNR). We started with 50 hooks and increased the number successively by 50 hooks until we reached a total number of 400 hooks, resulting in 8 reconstructed images.



Figure 1: Input Image

As can be seen in Figure 2 and Table 1, additional 50 hooks result in a 27.01% better RMSE value when taking 100 instead of 50 hooks and even a 48.81% better value when taking 150 instead of 100 hooks. However, we could observe a significant drop of the effectiveness of additional hooks for numbers above 250. When 300 instead of 250 hooks are used we could observe an improvement of only 3.29%, from 350 to 400 hooks the improvement of the RMSE value is only 0.98%. The PSNR behaves similarly and indicates analogously to the RMSE the highest effectiveness of additional 50 hooks when using 150 instead of 100 hooks and the lowest effectiveness of additional 50 hooks when using 400 instead of 350 hooks.

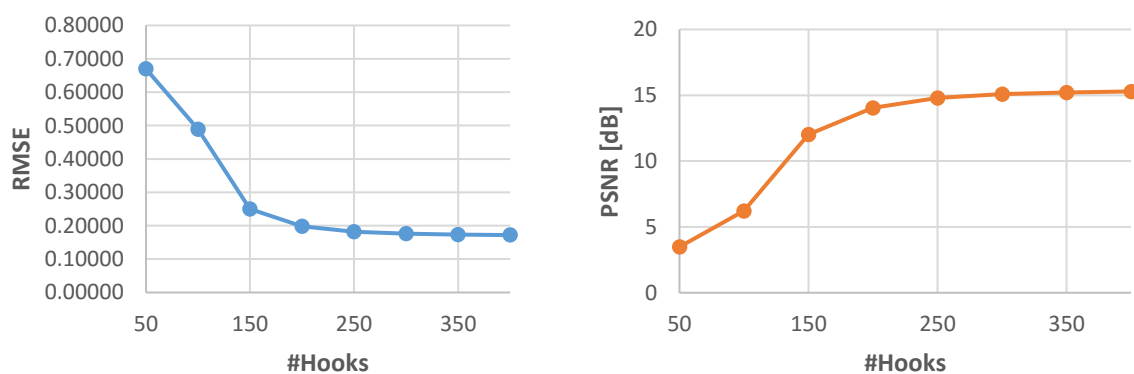


Figure 2: Influence of the number of hooks on the RMSE (left) and the PSNR (right)


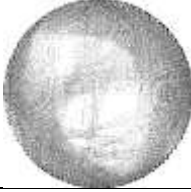






#Hooks	#Valid Edges	Reconstruction Result	RMSE	PSNR [dB]	Improvement w.r.t. to prior value of #Hooks	
					RMSE	PSNR
50	1225		0.66971	3.4823		
100	4950		0.48885	6.2164	27.01%	78.51%
150	11175		0.25024	12.0328	48.81%	93.57%
200	19900		0.19826	14.0554	20.77%	16.81%
250	31125		0.18208	14.7946	8.16%	5.26%
300	44850		0.17609	15.0855	3.29%	1.97%
350	61075		0.1737	15.2041	1.36%	0.79%
400	79800		0.17199	15.2898	0.98%	0.56%

Tabella 1: RMSE and PSNR according to the number of hooks