

Software Project Image Compression Using Truncated SVD Error Analysis

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1 Globe

Value of k	Frobenius error	Relative error	Compression ratio	Visual quality
10	15108.69	0.095550	42.927666	Image cannot be identified big pixels appear
20	10656.55	0.067394	21.463833	continents are visible but still not clear
50	6195.86	0.039184	8.585607	Shape visible with bad texture
100	3695.64	0.023271	4.292785	Sharp boundaries with bad texture
200	1795.41	0.011355	2.146397	Close to original

Table 1:

2 Einstein

Value of k	Frobenius error	Relative error	Compression ratio	Visual quality
5	4716.58	0.216617	18.34795	Image cannot be identified big pixels appear
10	3250.93	0.149304	9.173975	Blur image appears
20	2127.95	0.097730	4.586987	Face visible
50	881.85	0.040501	1.834798	Image can be identified but bad texture
100	167.37	0.007687	0.917398	Close to original

Table 2:

3 Grayscale

Value of k	Frobenius error	Relative error	Compression ratio	Visual quality
10	6831.05	0.035269	51.175012	Numbers are not visible and lines appear on image
20	3412.2	0.017617	25.587506	Numbers are little blur
50	947.46	0.004892	10.235002	Close to original image
100	467.74	0.002415	5.117501	Close to original image
200	257.73	0.001331	2.558751	Close to original image

Table 3:

4 Index

$$\text{Frobenius Error} = \|A - A_k\|_F = \sqrt{\sum_{i=1}^m \sum_{j=1}^n (A_{ij} - A_{k,ij})^2}$$

$$\text{Relative Error} = \frac{\|A - A_k\|_F}{\|A\|_F}$$

$$\text{Compression Ratio} = \frac{m \times n}{k(m + n + 1)}$$