Error Analysis and Tables

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Error Analysis

The error being calculated are Frobenius Error which is defined as:
For the given matrix $\mathbf{A}_i$, and the resultant matrix $\mathbf{A}_f$ the error can be written as:

$$e = \|\mathbf{A}_f - \mathbf{A}_i\|_F \tag{0.1}$$

Error for the globe picture:

k Value	Frobenius Error
50	24.550934
90	16.140119
150	10.328848
200	7.526983

TABLE 0: img 1

Error for the gray-scale image:

k Value	Frobenius Error
50	4.666718
90	1.982175
150	1.170241
200	0.789041

TABLE 0: img 2

Error for the Einstein image:

k Value	Frobenius Error
50	3.699289
90	1.067723
150	0.039846
200	0.176103

TABLE 0: img 3

In general, after high values in k, there was not a lot of changes in the image, but for small values of k, the image quality did become very poor. Frobenius Error is a good way to judge the difference between the image quality. We can see that when we move from k=50 to k=90 the error decreases quite a lot, while when we go from k=150 to k=200, the change in error is not that much. Thus we can say, for large values of k, the image quality does not improve much and converges to the original image.