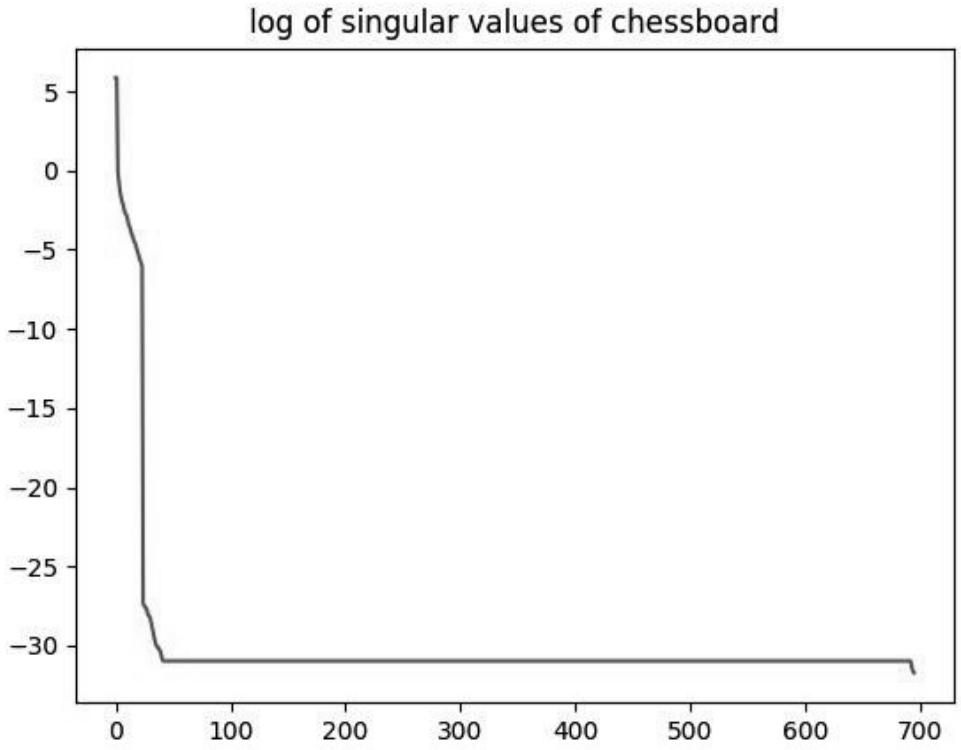
1 Report SVD

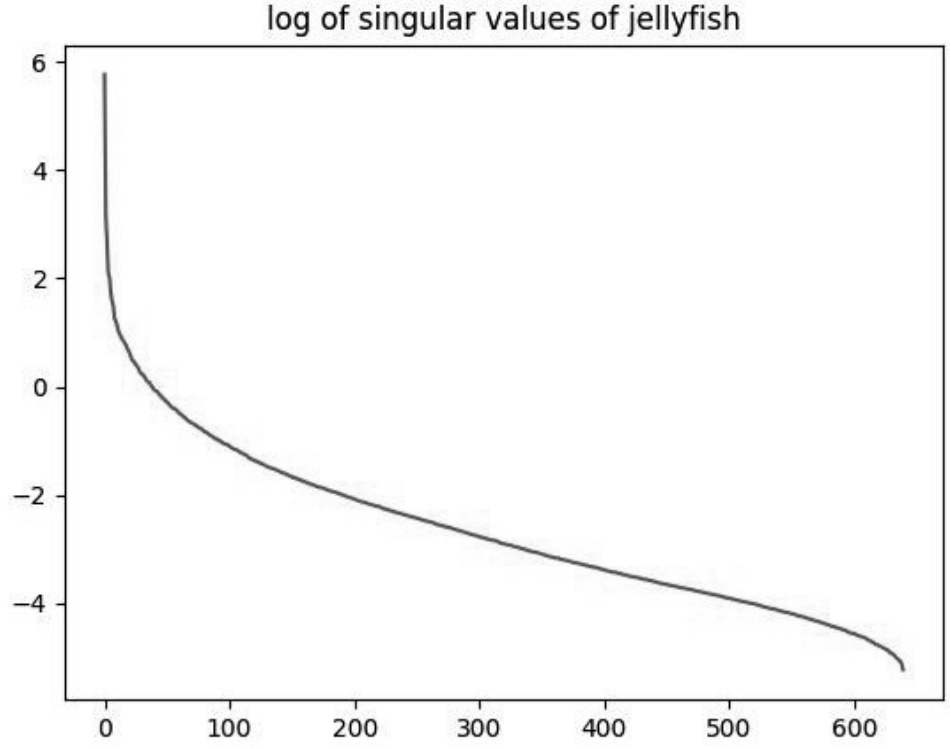
The compression ratio as a function of n,m and r is (m*n)/((m+n+1)*r), uncompressed size/compressed size.

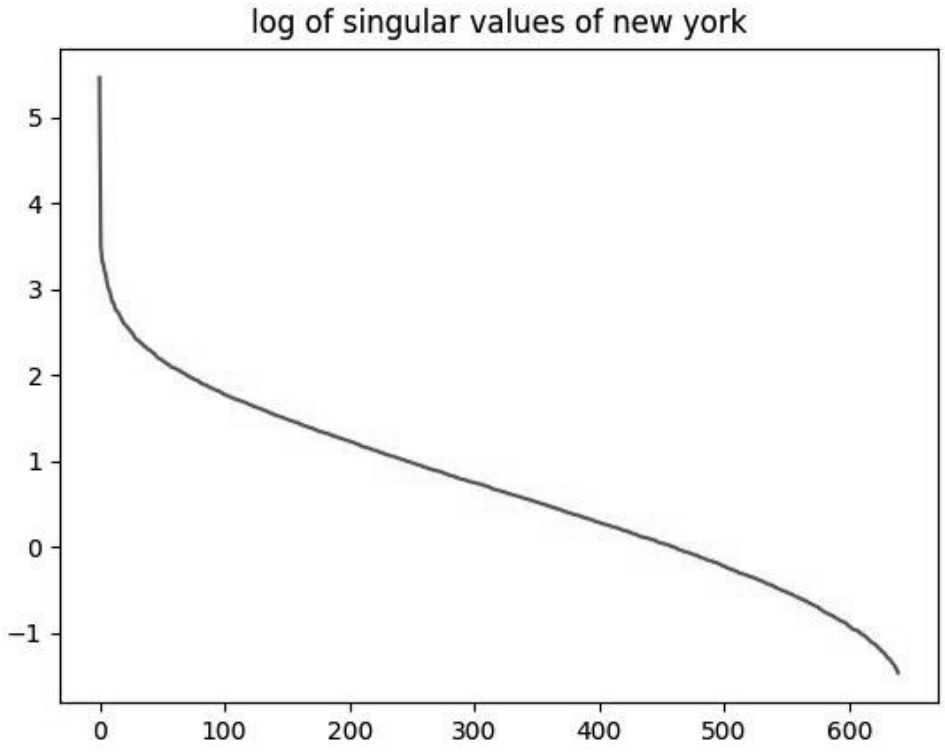
On the next pages are graph of the log of singular values of the chessboard, jellyfish and new york images. And pictures of the compressed pictures with different r. To find the r I tested what I think looked visually acceptable for each picture. I wrote my program in python and used numpy.linalg.svd to do the SVD. I took the log of the singular values and plotted the results. To compress the images I made the singular values to an r*r matrix, u into m*r and v into r*n, so I could multiply them. The result is the compressed image. The first singular values are the most important and significant for the picture, therefore a compressed picture can look almost as good as the original.

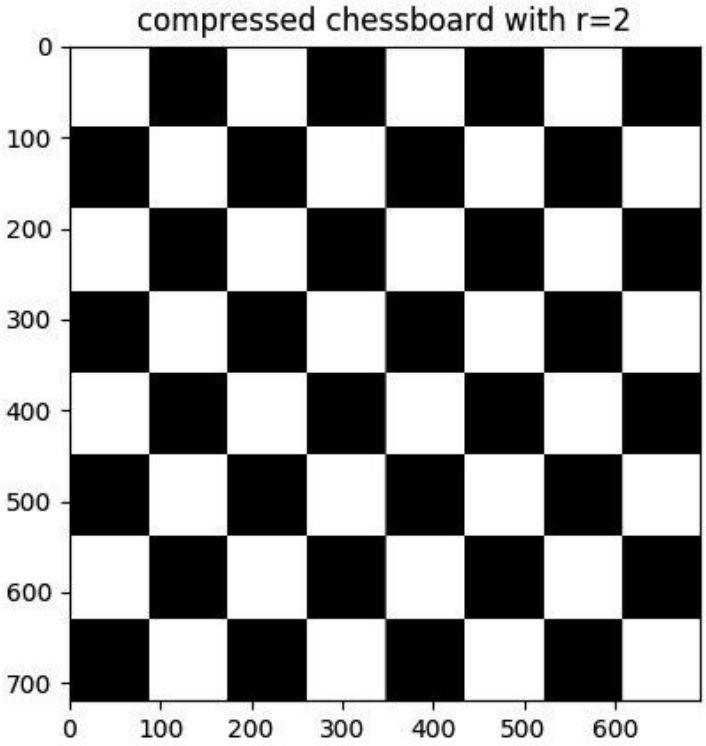
The reason that r can be much lower for chessboard than the other pictures is that the picture has less different color shades, with fewer color shades it need less info.

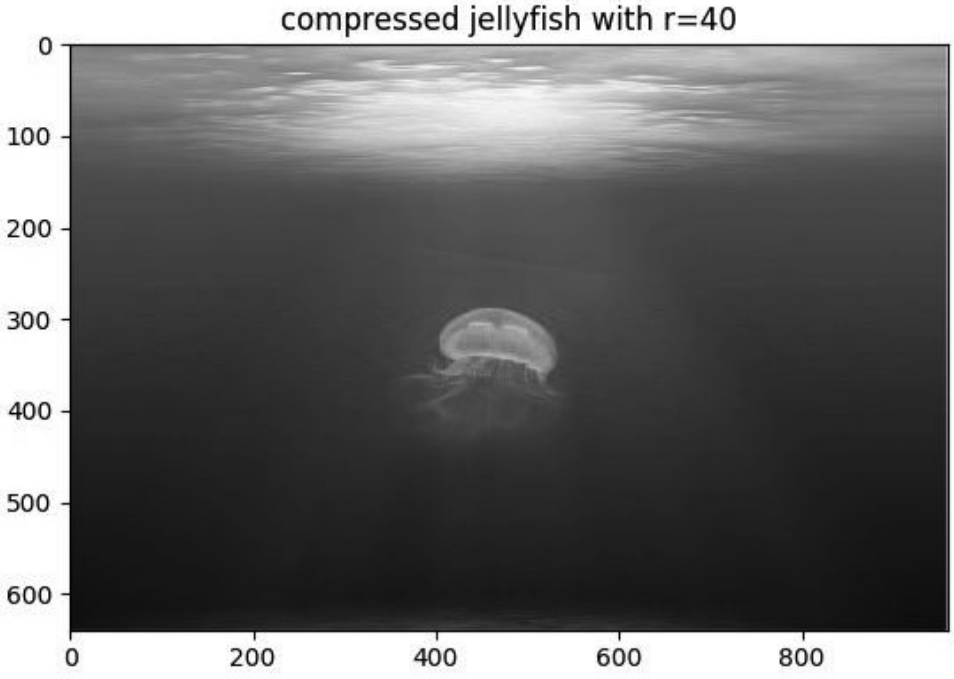
2 Images

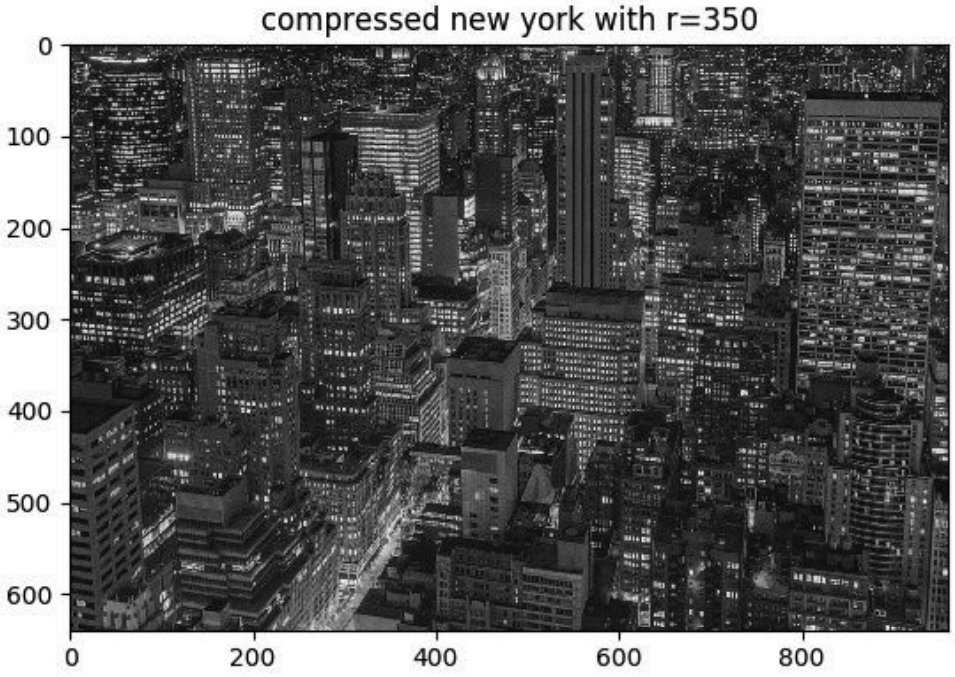

log of singular values of chessboard
5
0
−5
−10
−15
−20
−25
−30
0
100
200
300
400
500
600
700


log of singular values of jellyfish
6
4
2
0
−2
−4
0
100
200
300
400
500
600


log of singular values of new york
5
4
3
2
1
0
−1
0
100
200
300
400
500
600


compressed chessboard with r=2
0
100
200
300
400
500
600
700
0
100
200
300
400
500
600


compressed jellyfish with r=40
0
100
200
300
400
500
600
0
200
400
600
800


compressed new york with r=350
0
100
200
300
400
500
600
0
200
400
600
800