

12-06_SVD_Compression

September 27, 2023

```
[1]: import numpy as np
import matplotlib.pyplot as plt
from PIL import Image
%matplotlib inline
```

```
[2]: img = Image.open("12-06_Khing.jpg").convert('L')
img
```

[2]:



```
[3]: A = np.array(img)
A
```

```
[3]: array([[ 32,  32,  38, ..., 144, 143, 143],
           [ 33,  28,  31, ..., 146, 146, 144],
           [ 33,  32,  33, ..., 143, 145, 146],
           ...,
           [ 43,  47,  56, ..., 183, 183, 182],
           [ 38,  39,  52, ..., 184, 183, 183],
           [ 37,  36,  44, ..., 184, 184, 185]], dtype=uint8)
```

```
[4]: plt.imshow(A, cmap='gray')
```

```
[4]: <matplotlib.image.AxesImage at 0x7f31905e7d60>
```



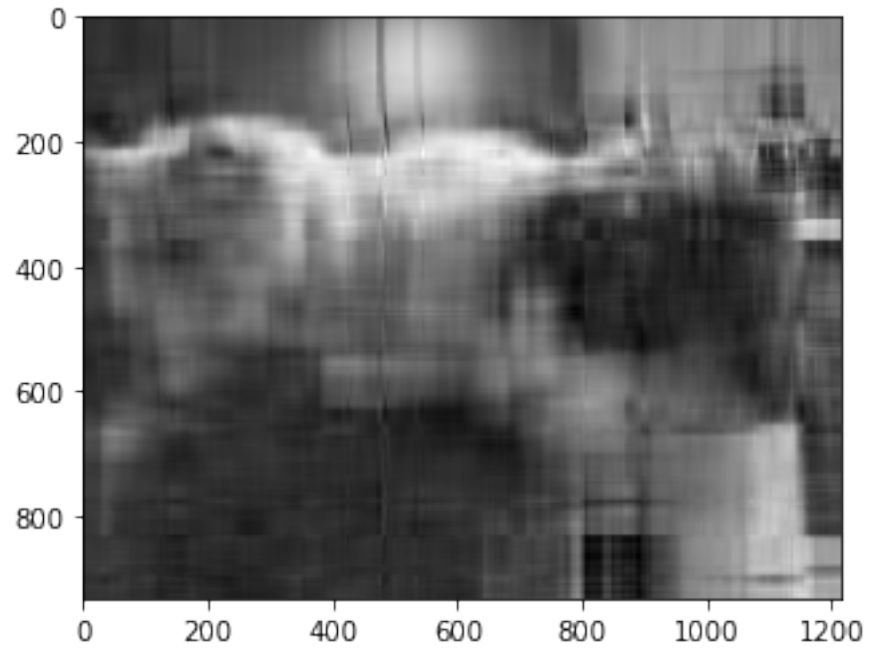
```
[5]: U, S, V = np.linalg.svd(A, False)
```

```
[6]: A10 = U[:, :10] @ np.diag(S[:10]) @ V[:10, :]
A10.shape, A.shape
```

```
[6]: ((932, 1216), (932, 1216))
```

```
[7]: plt.imshow(A10, cmap="gray")
```

```
[7]: <matplotlib.image.AxesImage at 0x7f3190579f40>
```



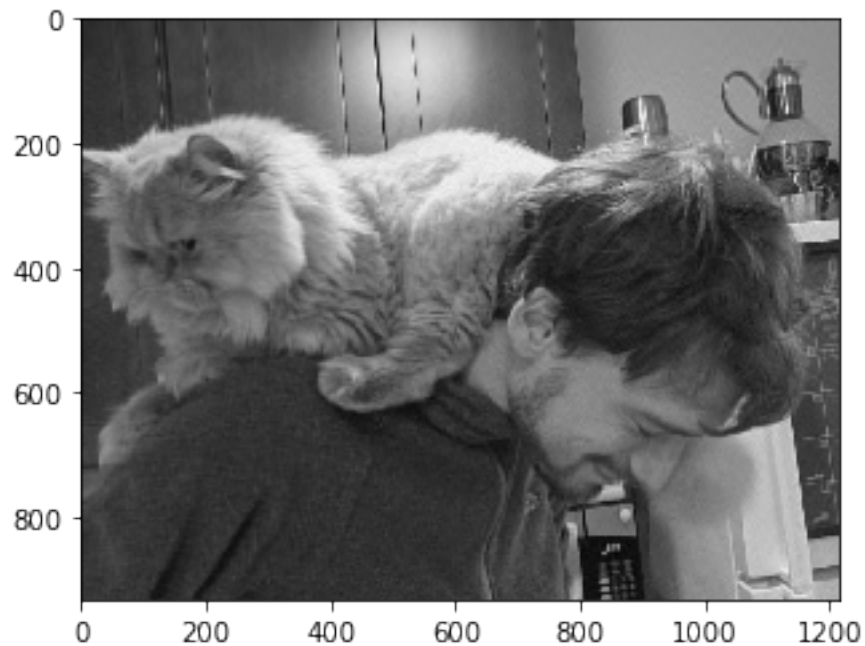
```
[8]: A50 = U[:, :50] @ np.diag(S[:50]) @ V[:50, :]  
plt.imshow(A50, cmap="gray")
```

```
[8]: <matplotlib.image.AxesImage at 0x7f31904d8d60>
```



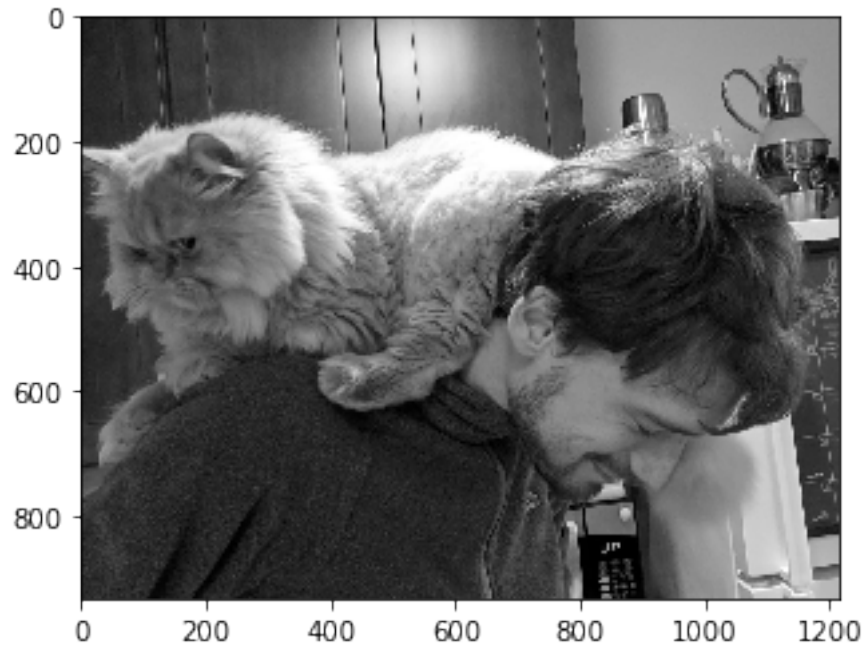
```
[9]: A100 = U[:, :100] @ np.diag(S[:100]) @ V[:100, :]  
plt.imshow(A100, cmap="gray")
```

```
[9]: <matplotlib.image.AxesImage at 0x7f31904b8160>
```



```
[10]: plt.imshow(A, cmap="gray")
```

```
[10]: <matplotlib.image.AxesImage at 0x7f31904814c0>
```



```
[11]: A.size
```

```
[11]: 1133312
```

```
[12]: U[:, :100].size + S[:100].size + V[:, :100].size
```

```
[12]: 214900
```

```
[13]: (U[:, :100].size + S[:100].size + V[:, :100].size) / A.size
```

```
[13]: 0.18962121639936752
```

```
[ ]:
```