Asmt 5: Regression

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Turn in through Canvas by 2:45pm:
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1 Singular Value Decomposition (20 points)

First we will compute the SVD of the matrix A we have loaded

$$[U, S, V] = svd(A)$$

Then take the top k components of A for values of $k = 1$ through $k = 10$ using

$$\begin{aligned} Uk &= U(:, 1:k) \\ Sk &= S(1:k, 1:k) \\ Vk &= V(:, 1:k) \\ Ak &= Uk * Sk * Vk' \end{aligned}$$

A: (10 points): Compute and report the L_2 norm of the difference between A and Ak for each value of k using

$$norm(A - Ak, 2)$$

Table 1: L_2 norm of $A - Ak$ for each value of k

k	L_2 Norm
1	40.483
2	26.717
3	25.000
4	22.192
5	17.675
6	15.813
7	13.351
8	12.188
9	9.1206
10	9.0000

B (5 points): Find the smallest value k so that the L_2 norm of $A - Ak$ is less than 10% that of A; k might or might not be larger than 10.

The L_2 norm of A is 120.19 and 10% of that is 12.019. From table 1, we can see that the smallest value of k such that the L_2 norm of $A - Ak$ is less than 10% that of A is 9.