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W. Gilbert Strang* (gilstrang@gmail.com), Department of Mathematics, Massachusetts Institute of Technology, Room 2 - 245, Cambridge, MA 02139. *The big picture of linear algebra*

Linear algebra has surged in importance and we need to explain the key ideas in a memorable way. I have found two approaches that help students to understand the action of a matrix:

1. The Four Fundamental Subspaces (Row space, Nullspace, Column space, Left nullspace) Their dimensions / their orthogonality / their bases
2. Matrix factorizations that give particularly useful bases for those four subspaces

$$A = LU \quad A = QR \quad A = X\lambda X^{-1} \quad S = Q\lambda Q^T \quad A = U\sigma V^T \quad A = CMR$$

I hope to add something new about both of these approaches. (Received September 09, 2019)