Interpretation of Matrix Multiplication

$$Ax$$

$$\begin{bmatrix} \\ A \\ \\ \end{bmatrix}\begin{bmatrix} | \\ x \\ | \end{bmatrix} = \begin{bmatrix} | & & | \\ V_1 & \cdots & V_n \\ | & & | \end{bmatrix}\begin{bmatrix} \lambda_1 & \cdots & 0 \\ \vdots & & \vdots \\ 0 & \cdots & \lambda_n \end{bmatrix}\underbrace{\begin{bmatrix} - & W_1^* & - \\ & \vdots & \\ - & W_n^* & - \end{bmatrix}\begin{bmatrix} | \\ x \\ | \end{bmatrix}}_{\begin{bmatrix} W_1^* x \\ \vdots \\ W_n^* x \end{bmatrix}\quad \text{transforming into eigen-vector coords}}$$

$$\underbrace{\begin{bmatrix} \lambda_1 W_1^* x \\ \vdots \\ \lambda_n W_n^* x \end{bmatrix}}_{\text{Scaling each coord by eigenvalue}}$$

$$\underbrace{V_1 \lambda_1 W_1^* x + \cdots + V_n \lambda_n W_n^* x}_{\text{Transforming back into regular coordinates}}$$