Computer Graphics

Monday, Sept. 21
Vectors & Matrices
Where We’re Coming From

How comfortable were you with matrix multiplication before today’s class?

21 responses

1 (4.8%)  2 (9.5%)  7 (33.3%)  8 (38.1%)  3 (14.3%)
Q. How do you type vectors in vector format (like with the brackets and the hat or arrow over the letter) on your slides?
A. I use Powerpoint’s equation editor.

Q. Would we use vectors in 3D space as well?
A. Yes! We will use vectors with x, y, and z components.

Q. Could you quickly go over basis vectors and what they would be used for again?
A. This is more background than something we’ll use directly. Basis vectors are a set of unit vectors, usually orthogonal, such that vectors can be expressed as a linear combination of them.
Q. Can two scalar multiplications of the same matrix have the scales added together instead of multiplying out, adding the matrices, and then factoring the scale back out? Like how in the first question you can reach the answer much easier if you just calculate the scale as 3-1?

A. I think you’re asking about a distributive rule for scalar multiplication. Yes, you can combine the scalars first and then multiply.

Q. How does it work that when you multiply different matrices with different numbers and rows and columns, we end up with the row and column that are not the same while the one that is the same goes away in the final result? Could you do an example in class?

A. The one that is the same allows us to take the dot product of a row with a column. Since the dot product sums everything, this dimension collapses.
Q. How did you find the new basis unit vectors and the transformation matrix on slide 19?

A. Rotation matrices have a standard form. We’ll go over this next time.

Q. I may just need more time to sit with this, but I don't fully understand the pseudocode for matrix multiplication.

A. You’ll have a chance to develop it step by step in lab today. But I can do an animation for you.
Matrix Multiplication

\[ \text{for } i \text{ from } 1 \text{ to } m \]
\[ \text{for } j \text{ from } 1 \text{ to } p \]
\[ C_{ij} = 0 \]
\[ \text{for } k \text{ from } 1 \text{ to } n \]
\[ C_{ij} = C_{ij} + A_{ik} \times B_{kj} \]
\[ \text{endfor} \]
\[ \text{endfor} \]
\[ \text{endfor} \]

\[
\begin{bmatrix}
2 & 1 & -3 \\
4 & -4 & 3
\end{bmatrix}
\begin{bmatrix}
-1 & 5 \\
3 & 4 \\
2 & 1
\end{bmatrix}
= \begin{bmatrix}
-5 \\
\end{bmatrix}
\]
Other Questions?
Lab M: Use of matrices in Javascript