CPSC 314
Computer Graphics

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Frames in Graphics

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Announcements

- Quiz 1 handback now available.
- Assignment 2 available soon, possibly this weekend.
- Homework for today:
  - Read textbook Chapter 5
Quiz 1 stats

Histogram

- Mean: 76.7
- Median: 80.0
- Mode: 73.3

Quiz 1 handback

- Scanned exam books are now available here: [https://www.ugrad.cs.ubc.ca/~cs314/handback/](https://www.ugrad.cs.ubc.ca/~cs314/handback/)
- Login with your cs id

- Grades will be uploaded to Connect in a few days
Frames in Graphics (Chap. 5)

Basic Recipe
\[ \vec{p} = \vec{b} - \vec{p}_b = \frac{\vec{b} \cdot \vec{p}_a}{\vec{b} \cdot \vec{a}} = \frac{\vec{b} \cdot \vec{a}}{\vec{b} \cdot \vec{a}} \]

The point is the same, regardless of the free

covariant coordinates into the same frame

before you compute

Currency analogy of a frame

\$25 = \£20 = \$A20

§ Classic frames in graphics

World frame §

synonym: Scene

Object frame \( \vec{o} \)

syn: model frame

book's term

Eye frame \( \vec{e} \)

View frame

Camera frame

Everything is defined w.r.t. \( \vec{w} \)

(written top)

Fixed to an object. Positions

are defined w.r.t. \( \vec{o} \)

\[ \vec{o} = \vec{w} \vec{o} \]

Fixed to the eye/camera

convention in graphics:

looking along \(-z\)

y-axis is "up"

\[ \vec{e} = \vec{w} \vec{E} \]
When it is clear which frame we are using, we'll simplify notation as follows:

\[
\begin{bmatrix}
O \\
E \\
\nu
\end{bmatrix} \rightarrow \begin{bmatrix}
P \\
\mathbf{v}
\end{bmatrix}
\]

Just caps, lower case, still use the denotations for frames, points, vectors:

\[
\hat{P} = \hat{O} P_0 = \hat{w} O P_0
\]

\[
\hat{P} = \hat{e} P_e = \hat{w} E P_e
\]

so \( \hat{O} P_0 = E P_e \)

\( P_e = E^{-1} \hat{O} P_0 \)
How to transform object about an auxiliary frame:

Read Sec. 5.2 of book.

Want to apply a transform about:

\[ \mathbf{M} = \mathbf{w} \mathbf{M} \]

\[ \mathbf{p} = \mathbf{m} \mathbf{p}_m, \text{ convert to world frame and then back} \]

To be continued...