

15-464 / 15-664 Reference List for Feb 3, 2020

The topics for today were 3D orientation representations and classical motion capture data manipulation and editing techniques.

We started by reviewing techniques for representing 3D rotations, following this paper:

Grassia, F. Sebastian. "Practical parameterization of rotations using the exponential map." *Journal of graphics tools* 3, no. 3 (1998): 29-48.

<http://www.cs.cmu.edu/afs/cs.cmu.edu/user/spiff/www/moedit99/expmap.pdf>

More material can be found in the 15-462/15-662 course materials here:

<http://15462.courses.cs.cmu.edu/spring2019/lecture/3Drotate>

https://www.essentialmath.com/GDC2013/GDC13_quaternions_final.pdf

We then turned to motion editing, beginning with one of the early papers on motion graphs:

Kovar, Lucas, Michael Gleicher, and Frédéric Pighin. "Motion graphs." In *Proceedings of the 29th annual conference on Computer graphics and interactive techniques*, pp. 473-482. 2002.

<https://research.cs.wisc.edu/graphics/Gallery/kovar.vol/MoGraphs/>

The relatively freeform nature of traversing such motion graphs is in contrast to the typical notion of preconstructed state machines which still frequently appear in games. This paper illustrates the state machine approach:

Lau, Manfred, and James J. Kuffner. "Precomputed search trees: planning for interactive goal-driven animation." In *Proceedings of the 2006 ACM SIGGRAPH/Eurographics symposium on Computer animation*, pp. 299-308. Eurographics Association, 2006.

http://graphics.cs.cmu.edu/projects/precomputed_search_trees/

We then took a quick look at this paper, which discusses how to process motion capture data into a hierarchy of fitted b-splines and then how to edit it interactively by adding displacement curves to those b-splines. This is still a very effective method for modifying motion capture data and is used throughout character animation.

Lee, Jehee, and Sung Yong Shin. "A hierarchical approach to interactive motion editing for human-like figures." In *Proceedings of the 26th annual conference on Computer graphics and interactive techniques*, pp. 39-48. 1999.

<https://dl.acm.org/doi/10.1145/311535.311539>