Uniform Deterministic Sampling on Rotation Groups and Applications to Biology J. Mitchell (University of Wisconsin)

The ability to construct uniform deterministic samples of rotation groups is useful in many contexts, such as molecular docking and medical imaging, but there are inherent mathematical difficulties that prevent an exact solution. The talk will present successive orthogonal images, an effective means for uniform deterministic sampling of orthogonal groups. The method is valid in any dimension, and analytical bounds are provided on the sampling uniformity. Numerical comparisons with other sampling methods are given for the special case of \$SO(3)\$. We make use of non-Riemannian distance metrics that are group-invariant and locally compatible with the Haar measure. In addition, our results provide a semi-unique decomposition of any orthogonal matrix into the product of planar rotations.