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# New tour methods for visualizing high-dimensional data

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Tour methods [1] are a powerful tool for visualizing high-dimensional spaces, providing an animated sequence of low-dimensional projections that help viewers understand multi-dimensional structures. To create this animation, we typically follow a two-step process: first, we select a target plane, and then we interpolate to gradually move from the current viewing plane to the selected target. While the tourr R package offers several methods for target selection, it currently only implements geodesic interpolation.

During this talk, I will discuss recent developments in tour methods, including manual user-guided control and a new interpolation method for frame-to-frame transitions instead of plane-to-plane. To provide context, I will describe work in interactive target selection and incremental updates in a manual tour [2], and how this relates to section visualization as proposed in the slice tour. This approach is particularly useful for interpreting how the observed structure depends on different input variables.

Next, I will focus on alternative interpolation methods that enable movement between frames rather than planes. This method allows for spinning within the projection plane, which is not preferred for viewing compared to geodesic interpolation. However, this interpolation is necessary for projection pursuit applications that aim to find the most interesting low-dimensional projection of the data, especially in cases where the index value depends on the orientation of the basis within the plane.

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[2] U. Laa, A. Aumann, D. Cook, and G. Valencia, "New and simplified manual controls for projection and slice tours, with application to exploring classification boundaries in high dimensions," *Journal of Computational and Graphical Statistics*, vol. 0, no. ja, pp. 1–12, 2023.