

ATELIER NSDC « ANALYSE DE DONNÉES DIRECTIONNELLES AVEC APPLICATIONS EN BIOMÉCANIQUE
ET EN IMAGERIE MÉDICALE »

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**NICDS WORKSHOP “THE ANALYSIS OF DIRECTIONAL DATA WITH APPLICATIONS TO
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An Application of Persistent Homology for 3 Dimensional Landmark Data

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Persistent homology is useful in differentiating “true” topological features from noise in high dimensional data. Betti numbers count the topological features such as connected components, holes, and voids in topological spaces. Persistence diagrams are obtained using Betti numbers at various points in a filtration of a space. Using a 3 dimensional landmark data set arising from an orthodontic clinical trial, filtrations are performed on each landmark configuration individually. We illustrate that low-dimensional embeddings based on distances between persistence diagrams can detect clinically relevant treatment effects. We also compare the result with the conventional shape analyses by Dryden and Mardia and Euclidean Distance Matrix Analysis.