**Additional Files 1**

**Volume Overlap and Surface Distance Equations**

*Dice Coefficient*:

The Dice coefficient is calculated as:

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where A and B are binary segmentation maps.

*Jaccard Coefficient*:

The Jaccard coefficient (or intersection over union [IOU]) is given by:

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*Symmetric Hausdorff Distance (HD)*:

Intuitively, the symmetric Hausdorff distance, or maximum surface distance, is the maximum euclidean distance from a point in one surface map to the nearest point in another surface map. Concretely:

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where As and Bs are surface plots for binary segmentation maps A and B, sup is the supremum, inf the infimum, and d(a, b) the euclidean distance function.

*Average Symmetric Surface Distance (ASSD)*:

The average symmetric surface distance is similar to the SHD except that it uses the mean instead of the maximum/supremum:

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