

Conditional Entropy

The cross-conditional entropy, H , of the DRR image relative to the X-ray image is calculated and minimized by the optimization algorithm ^[1].

$$H_{ccr}(DRR, Xray) = \sum_{i=0}^N \sum_{j=0}^N (pdf_{DRR}(j) * \log(pdf_{DRR}(j) / (pdf_{XRAY}(j) * pdf_{2D}(i,j))))$$

where: pdf_{2D} is the 2D histogram of the X-ray and DRR images
 pdf_{XRAY} and pdf_{DRR} are the histograms of the X-ray and DRR images, respectively
 N is the number of bins in each histogram
 i and j are the bin indices in the X-ray and DRR histograms, respectively

Parameters

Conditional Entropy Parameters

View Weighting:

0.50

Constant DRR Scaling:

☐

Parameters for Conditional Entropy Metric

* **View Weighting** This factor is used when evaluating a bone pose by comparing the DRR images to the X-ray images. It is the relative weight of the two views in the final image metric (0.0 = all view 1, 1.0 = all view 2). 0.5 means to weight each view equally.

* **Constant DRR Scaling** Whether or not to scale the DRRs for each view by a constant value for all iterations of an optimization. If false, each DRR will be scaled so that its maximum value is equal to the DRR image scale value ([//X-ray/DRR Settings//](#) widget). If true, a single scale value will be calculated during the first iteration and be used to scale the DRRs in all subsequent iterations.

1. [↑](#) Wang F, Vemuri B, Rao M, Chen Y (2003). Cumulative residual entropy, a new measure of information & its application to image alignment. Proceedings of the Ninth IEEE International Conference on Computer Vision, October, 2003. DOI: 10.1109/ICCV.2003.1238395.

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