

Supplementary Material for “Groupwise Deformable Registration of Diffusion Tensor Cardiovascular Magnetic Resonance: Disentangling Diffusion Contrast, Respiratory and Cardiac Motions”

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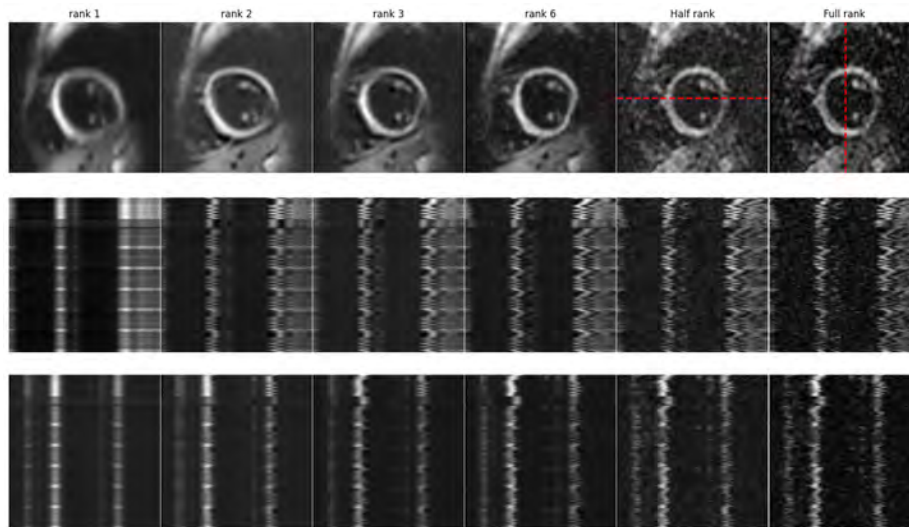


Fig. 1. The evolving ranks of a frame with comparatively image stack visualization. As rank gradually increases, the image includes respiratory shift, local deformation, diverse diffusion contrasts and noise.

Table 1. Implementation details of comparison methods

Rigid	
Data Normalisation	cropped to 96×96 and min-max on intensity
Loss 1	Cross Correlation
Description	In Fourier Domain
Transformation	Bi-linear
Pairwise or Groupwise	Pairwise
Fixed Frame	the brightest frame
Deformable	
Data Normalisation	cropped to 96×96 and min-max on intensity
Loss 1	Advanced Mattes Mutual Information
Loss 2	Bending Energy
Weight	1:100
Optimization	Stochastic Gradient Descent
Control space	(4,4)
Number Of Histogram Bins	32
Iteration	1000
Transformation	Bi-linear
Pairwise or Groupwise	Pairwise
Fixed Frame	the brightest frame
MIDIR	
Data Normalisation	cropped to 96×96 and min-max on intensity
Loss 1	Differential Mutual Information
Loss 2	L2 smoothness
Weight	1:30
Optimization	Adam Optimizer
Control space	(4,4)
Number Of Histogram Bins	32
Epoch	500
Learning rate	10^{-4}
Transformation	Bi-linear
Pairwise or Groupwise	Pairwise
Fixed Frame	the brightest frame
Transmorph	
Data Normalisation	cropped to 96×96 and min-max on intensity
Loss 1	Mutual Information
Loss 2	L2 smoothness
Weight	1:30
Optimization	Adam Optimizer
Epoch	1000
Learning rate	10^{-4}
Transformation	Bi-linear
Pairwise or Groupwise	Pairwise
Fixed Frame	the brightest frame
Proposed	
Data Normalisation	cropped to 96×96 and min-max on intensity
Loss 1	Differential Mutual Information
Loss 2	L2 smoothness
Loss 3	Perceptual
Weight	$1:30:10^{-1}$
Optimization	Adam Optimizer
Epoch	5000
Control space	(4,4)
Number Of Histogram Bins	32
Learning rate	10^{-4}
Transformation	Bi-linear
Pairwise or Groupwise	Groupwise