WU-Minn HCP 1200 Subjects Release: Reference Manual

Appendix II – Matlab code for voxel-wise correction of dMRI gradients

1 March 2017

Code for voxel-wise correction of dMRI gradients (from BEDPOSTX/DTIFIT)

This file is downloadable at http://humanconnectome.org/documentation/data-release/correct_bvals_bvecs.m

```matlab
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Reading gradient nonlinearity file and bvals/bvecs
% The I/O below assumes FSL installed (4.0 or higher)
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Read gradient nonlinearity file
addpath([getenv('FSLDIR') '/etc/matlab'])
filename = 'grad_dev.nii.gz';
g = read_avw(filename);

% Read bvals and bvecs text files
bvecs = load('bvecs'); % should be 3xN
bvals = load('bvals'); % should be 1xN


% %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Actual correction starts here
% The following code corrects bvecs and bvals
% for a given voxel (i,j,k)
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% create matrices
L = reshape(squeeze(g(i,j,k,:)),3,3);
I = eye(3);

% correct bvecs and calculate their norm
v = (I+L)*bvecs;
n = sqrt(sum(v.^2));

% Normalise corrected bvecs and correct bvals
new_bvecs = v./repmat(n,3,1) ;
new_bvals = n.^2.*bvals;
```