Supplementary Materials

Learning to Estimate the Fiber Orientation Distribution Function from Diffusion-Weighted MRI

Paper No. NIMG-20-2928

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1 Detailed expert tractography scores

Tables S1 to S3 below show the detailed scores assigned by the three experts to 8 different tracts on the tractograms from 17 test subjects from the dHCP dataset.

Subject No.	Method	CNG	IFOF	UF	\mathbf{FF}	CST	AC	FST	MCP	total
Subject 1	Proposed	3	2	2	3	3	3	3	3	22
Subject 1	\mathbf{SFM}	2	1	1	1	3	2	2	3	15
Subject 9	Proposed	3	3	3	3	3	2	3	3	23
Subject 2	\mathbf{SFM}	2	1	2	1	2	2	2	3	15
Subject 2	Proposed	2	3	3	3	3	3	3	3	23
Subject 5	\mathbf{SFM}	1	2	2	2	3	2	2	2	16
Subject 4	Proposed	3	3	3	3	3	3	3	2	23
Subject 4	\mathbf{SFM}	2	2	1	2	2	2	3	1	15
Subject 5	Proposed	3	3	1	3	3	3	3	3	22
Subject 5	\mathbf{SFM}	1	2	1	2	1	3	1	1	12
Subject 6	Proposed	3	3	2	3	3	3	3	3	23
Subject 0	SFM	1	1	2	2	2	2	2	3	15
Subject 7	Proposed	3	3	2	2	3	3	3	2	21
Subject 7	\mathbf{SFM}	2	1	1	1	2	3	3	1	14
Subject 8	Proposed	3	3	2	2	2	3	3	3	21
Subject 8	\mathbf{SFM}	2	1	1	1	2	3	2	2	14
Subject 0	Proposed	3	3	2	3	3	3	3	3	23
Subject 9	\mathbf{SFM}	3	2	1	1	2	2	2	2	15
Subject 10	Proposed	2	2	1	1	3	2	3	2	16
Subject 10	\mathbf{SFM}	1	1	1	2	3	2	2	2	14
Subject 11	Proposed	2	3	2	2	2	2	3	2	18
Subject 11	\mathbf{SFM}	1	2	1	1	2	2	3	1	13
Subject 12	Proposed	3	3	3	3	3	2	3	3	23
Subject 12	\mathbf{SFM}	3	3	2	2	3	2	2	2	19
Subject 12	Proposed	1	3	3	2	2	3	3	3	20
Subject 15	\mathbf{SFM}	2	3	3	1	2	3	3	2	19
Subject 14	Proposed	3	3	1	3	1	2	3	2	18
Subject 14	\mathbf{SFM}	3	1	1	2	2	1	2	1	13
Subject 15	Proposed	3	3	1	2	2	3	3	3	20
publect 19	SFM	2	2	1	3	2	3	3	2	18
Subject 16	Proposed	3	3	3	3	3	3	3	2	23
publect to	SFM	3	2	2	3	3	3	3	1	20
Subject 17	Proposed	3	3	3	3	3	3	3	3	24
Subject 1/	SFM	2	3	3	2	2	2	2	2	18

Table S1: Detailed scores from Expert 1.

CNG: Cingulum, IFOF: Inferior fronto-occipital fasciculus, UF: Unicinate fasciculus, FF: Frontopontine fibers, CST: Corticospinal tract, AC: Anterior Commisure, FST: Fornix and striae terminalis, MCP: Middle Cerebellar Penducles, total: sum of the scores for the eight tracts.

Subject No.	Method	CNG	IFOF	UF	\mathbf{FF}	CST	AC	FST	MCP	total
Subject 1	Proposed	3	3	3	3	3	3	3	3	24
Subject 1	\mathbf{SFM}	2	2	2	1	2	2	2	2	15
Subject 2	Proposed	3	2	2	2	3	2	3	3	20
Subject 2	SFM	2	1	1	1	2	2	2	3	14
Subject 2	Proposed	3	3	3	3	3	3	3	3	24
Subject 5	SFM	2	2	2	2	2	2	2	2	16
Subject 4	Proposed	3	3	3	3	3	3	3	3	24
Subject 4	\mathbf{SFM}	2	2	2	2	2	2	2	2	16
Cubicat E	Proposed	3	3	2	3	2	3	3	3	22
Subject 5	\mathbf{SFM}	2	2	2	1	2	3	2	2	16
Subject 6	Proposed	3	3	2	3	3	3	3	3	23
Subject 6	SFM	2	2	2	2	2	2	2	2	16
Carla in a t	Proposed	3	3	2	2	2	3	3	2	20
Subject (SFM	2	2	2	1	2	2	2	1	14
Q.,1	Proposed	3	3	3	2	3	2	3	3	22
Subject 8	SFM	2	1	1	1	2	2	2	2	13
G 1: 4 0	Proposed	3	2	3	3	3	3	3	3	23
Subject 9	SFM	3	1	2	1	2	2	2	2	15
C	Proposed	3	3	1	2	3	2	3	2	19
Subject 10	SFM	2	2	1	1	2	2	2	2	14
C.1 11	Proposed	3	3	3	2	3	2	3	3	22
Subject 11	SFM	2	2	1	2	2	2	3	2	16
C., 1	Proposed	3	3	3	2	3	2	3	2	21
Subject 12	SFM	2	2	2	2	3	2	2	2	17
C., 1	Proposed	2	2	3	2	2	2	3	3	19
Subject 13	SFM	2	2	2	2	2	2	3	2	17
C.1 14	Proposed	3	3	2	3	3	3	3	3	23
Subject 14	SFM	2	2	2	2	2	2	2	2	16
0.1 15	Proposed	3	3	2	3	3	3	3	3	23
Subject 15	SFM	2	2	2	2	2	2	3	2	17
Call is at 10	Proposed	3	3	3	3	3	3	3	3	24
Subject 16	SFM	2	2	2	2	2	2	2	2	16
G 1 : / 17	Proposed	3	3	2	3	3	3	3	3	23
Subject 17	$SF\dot{M}$	2	2	3	2	2	2	2	2	17

Table S2: Detailed scores from Expert 2.

CNG: Cingulum, IFOF: Inferior fronto-occipital fasciculus, UF: Unicinate fasciculus, FF: Frontopontine fibers, CST: Corticospinal tract, AC: Anterior Commisure, FST: Fornix and striae terminalis, MCP: Middle Cerebellar Penducles, total: sum of the scores for the eight tracts.

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Subject 6 Proposed 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Subject 5	\mathbf{SFM}	2	2	2	1	2	3	2	2	16
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Shbject 1 SFM 2 2 1 2 2 1 14 Subject 8 Proposed 3 3 3 2 3 2 3 3 22 Subject 9 Proposed 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 <td>Subject 7</td> <td>Proposed</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> <td>3</td> <td>2</td> <td>20</td>	Subject 7	Proposed	3	3	2	2	2	3	3	2	20
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Subject 8	SFM	2	1	1	1	2	2	2	2	13
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Subject 10	Proposed	3	3	1	2	3	2	3	2	19
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Subject 10	SFM	2	2	1	1	2	2	2	2	14
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Subject 11	SFM	2	2	1	2	2	2	3	2	16
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Subject 12	SFM	2	2	2	2	3	2	2	2	17
SHDject 13 SFM 2 2 2 2 2 2 3 2 17 Subject 14 Proposed 3 3 2 3 3 3 3 3 23 2 17 Subject 14 Proposed 3 3 2 3 3 3 3 23 2 16 Subject 15 Proposed 3 3 2 3 3 3 3 23 2 16 Subject 15 Proposed 3 3 2 2 2 2 2 2 16 Subject 16 Proposed 3 3 3 3 3 3 3 2 17 Subject 16 Proposed 3 3 3 3 3 3 3 3 2 17 Subject 17 Proposed 3 3 3 3 3 3 3 3 2	Subject 12	Proposed	2	2	3	2	2	2	3	3	19
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Caline 14	Proposed	3	3	2	3	3	3	3	3	23
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Subject 13 SFM 2 2 2 2 2 2 3 2 17 Subject 16 Proposed 3 3 3 3 3 3 3 3 24 24 24 26 2 2 2 2 2 26 2 2 2 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 26 27 26 27 26 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27 27 27 27 27 27 <td>Subject 15</td> <td>Proposed</td> <td>3</td> <td>3</td> <td>2</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>23</td>	Subject 15	Proposed	3	3	2	3	3	3	3	3	23
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Subject 10 SFM 2 2 2 2 2 2 2 16 Subject 17 Proposed 3 3 2 3 3 3 3 23 23 Subject 17 Proposed 2 2 3 2 2 2 2 17	Subject 16	Proposed	3	3	3	3	3	3	3	3	24
Subject 17 Proposed 3 3 2 3 3 3 3 23 SFM 2 2 3 2 2 2 2 2 17	Subject 16	\mathbf{SFM}	2	2	2	2	2	2	2	2	16
Subject 17 SFM 2 2 3 2 2 2 2 17	Subject 17	Proposed	3	3	2	3	3	3	3	3	23
	Subject 17	SFM	2	2	3	2	2	2	2	2	17

Table S3: Detailed scores from Expert 3.

CNG: Cingulum, IFOF: Inferior fronto-occipital fasciculus, UF: Unicinate fasciculus, FF: Frontopontine fibers, CST: Corticospinal tract, AC: Anterior Commisure, FST: Fornix and striae terminalis, MCP: Middle Cerebellar Penducles, total: sum of the scores for the eight tracts.

Table S4 shows the results of Wilcoxon signed-rank statistical significance tests to compare the scores assigned to the tracts generated by the proposed method and SFM.

Tract	Expert 1	Expert 2	Expert 3
Cingulum	+1	+1	+1
Inferior fronto-occipital fasciculus	+1	+1	+1
Unicinate fasciculus	+1	0	0
Frontopontine fibers	+1	+1	+1
Corticospinal tract	0	+1	+1
Anterior Commisure	0	+1	0
Fornix and striae terminalis	+1	+1	0
Middle Cerebellar Penducles	+1	$^{+1}$	+1
total (sum of the scores for the eight tracts)	$^{+1}$	+1	+1

Table S4: Results of statistical significance tests with Wilcoxon signed-rank test to compare the scores assigned to individual tracts for the proposed method and SFM. "+1" indicates that the score received by the proposed method was significantly higher than SFM at p = 0.01. "0" indicates that the two methods were not different at p = 0.01.