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Grobentwurf: Realtime Mesh Utilities

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1 Basic structure of MNE-CPP

MNE-CPP is a framework of tools and programs to analyze and work with MEG/EEG data. mehr hinschreiben

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2 Integration of the product into MNE-CPP

The realtime mesh utilities are to be integrated into the structure of the MNE-CPP framework. Too provide a versatile interface, the utilities are organized inside a package within the library layer (see Figure 1).

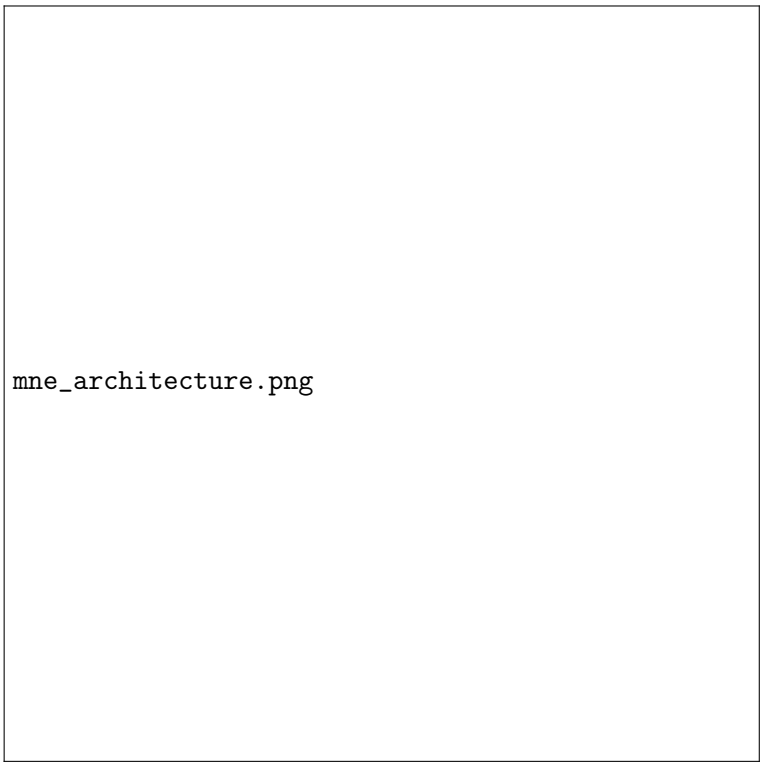

Figure 1 - Overview of the MNE-CPP basic architectural layout, including application and library layer.

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Later on, the features are to be ported to MNE-Scan (see section 1).

3 Subdivision of program features

SCDC The surface constrained distance calculation algorithm receives a mesh data set as its input, which is stored inside a file. It then calculates approximate distances between vertices. When no further input arguments are provided, the SCDC algorithm calculates a full distance table, that is the distance between any vertex to any other vertex. When it receives a subset of the vertices as an additional argument, it only calculates the distances from said subset to every other vertex of the mesh. The SCDC algorithm stores its results inside a two-dimensional matrix.

Projecting The projecting algorithm maps MEG/EEG-sensors to vertices of the mesh. In case of MEG-sensors, the orientation is known and thus a radial projection is applied in

order to assign each sensor to a vertex. In case of EEG-sensors, the orientation is not know and a nearest-neighbor algorithm is used. The projecting algorithm then outputs the results of the calculation as an array of indices, which point to the respective vertices of the mesh.

Interpolation The interpolation algorithm uses the results of both the projecting algorithm and the SCDC algorithm. Based on the distance table, it calculates a weight matrix for the later live interpolation. Thus the interpolation algorithm receives three different inputs: the distance table created by SCDC, the sensors mapping and the actual sensor input, i.e. brain activity recorded by sensors over a period of time. The recorded brain activity gets passed to the interpolation algorithm either from an ongoing MME/EEG-Scan or a prerecorded data set, i.e. a file.

Disp3D In order to provide control over aspects of the interpolation within the MNE-CPP framework, a new function is added to the Disp3D tree model.

By dividing the realtime mesh utilities into the mentioned components, internal changes and extensions are easy to implement. Added to that, the single components can be reused elsewhere within the MNE-CPP framework.

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