Real-Time Mesh Utilities

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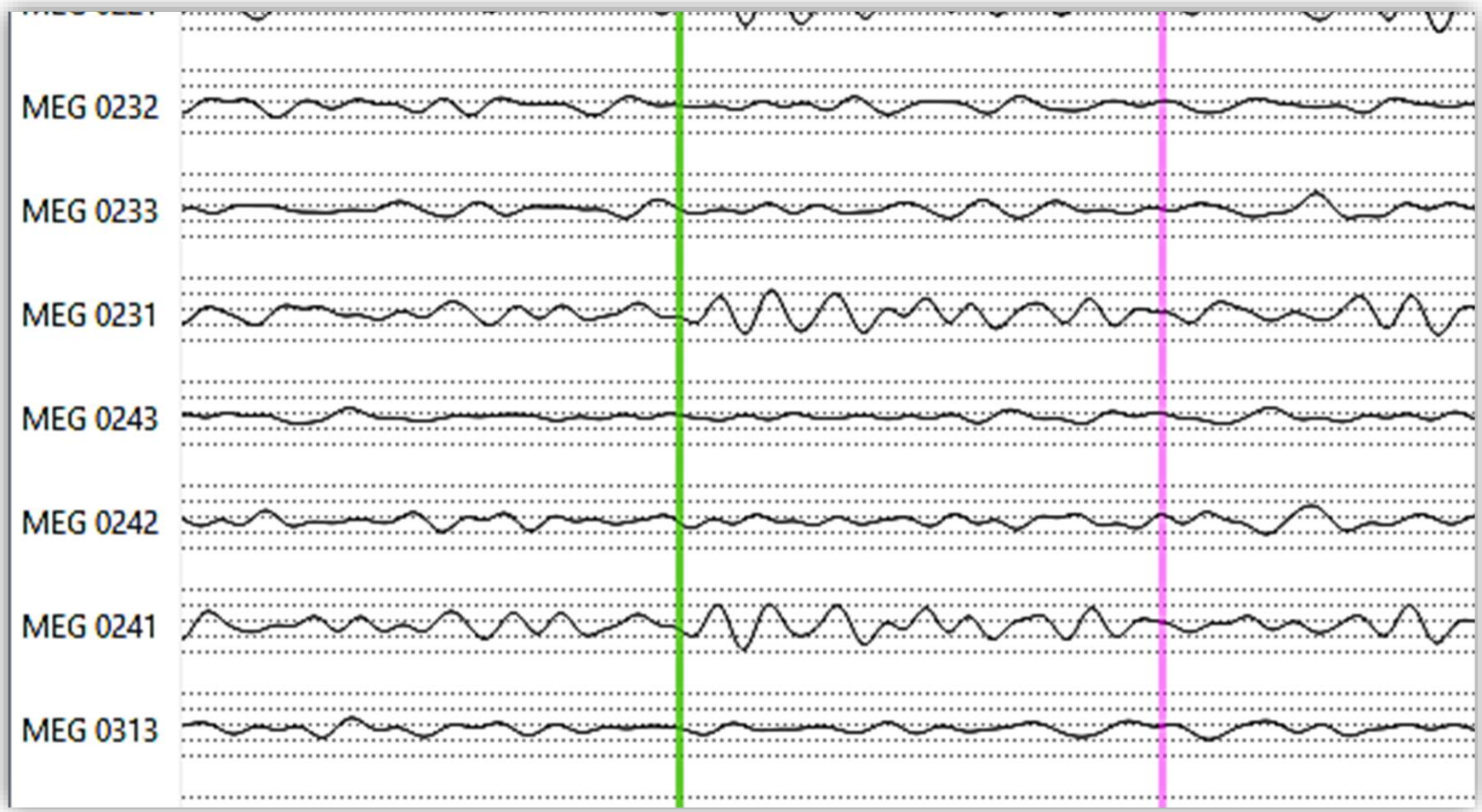
Outline

- Assignment / Task
- Features
- Status
- Outlook
- Software Demonstration

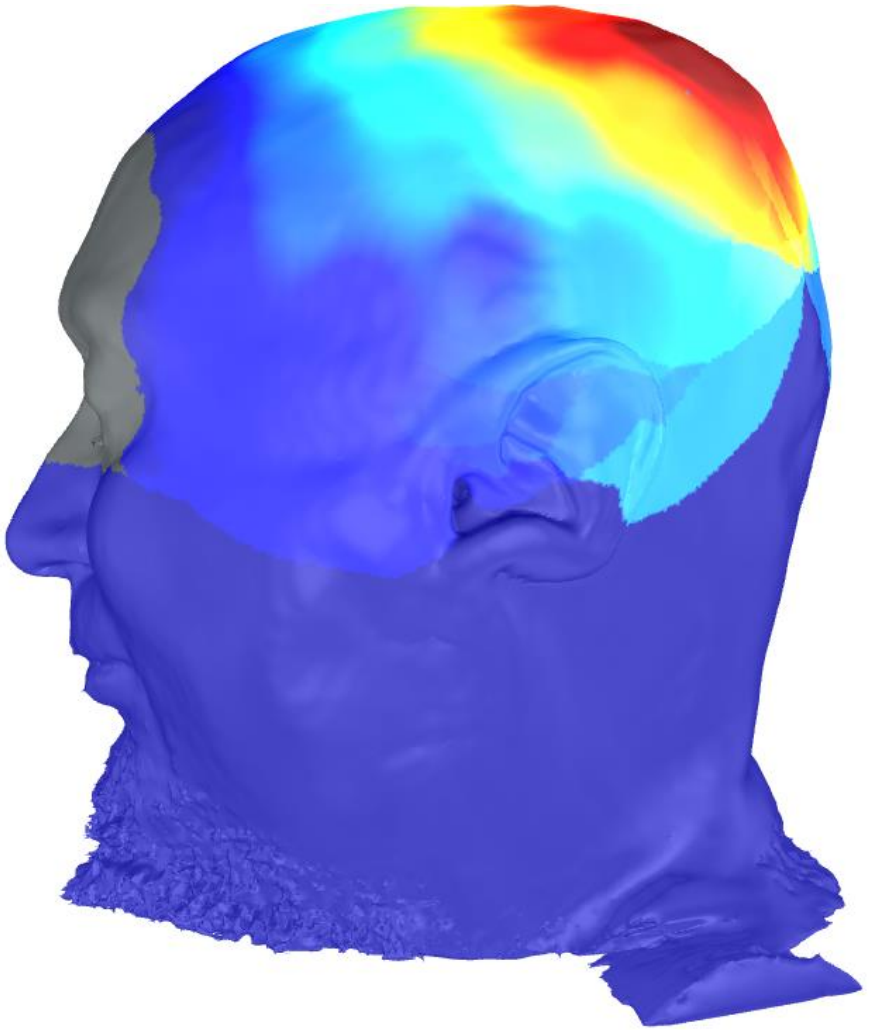
Assignment/Task

Goal: Utilities for real-time capable interpolation and visualization of MEG/EEG sensor data

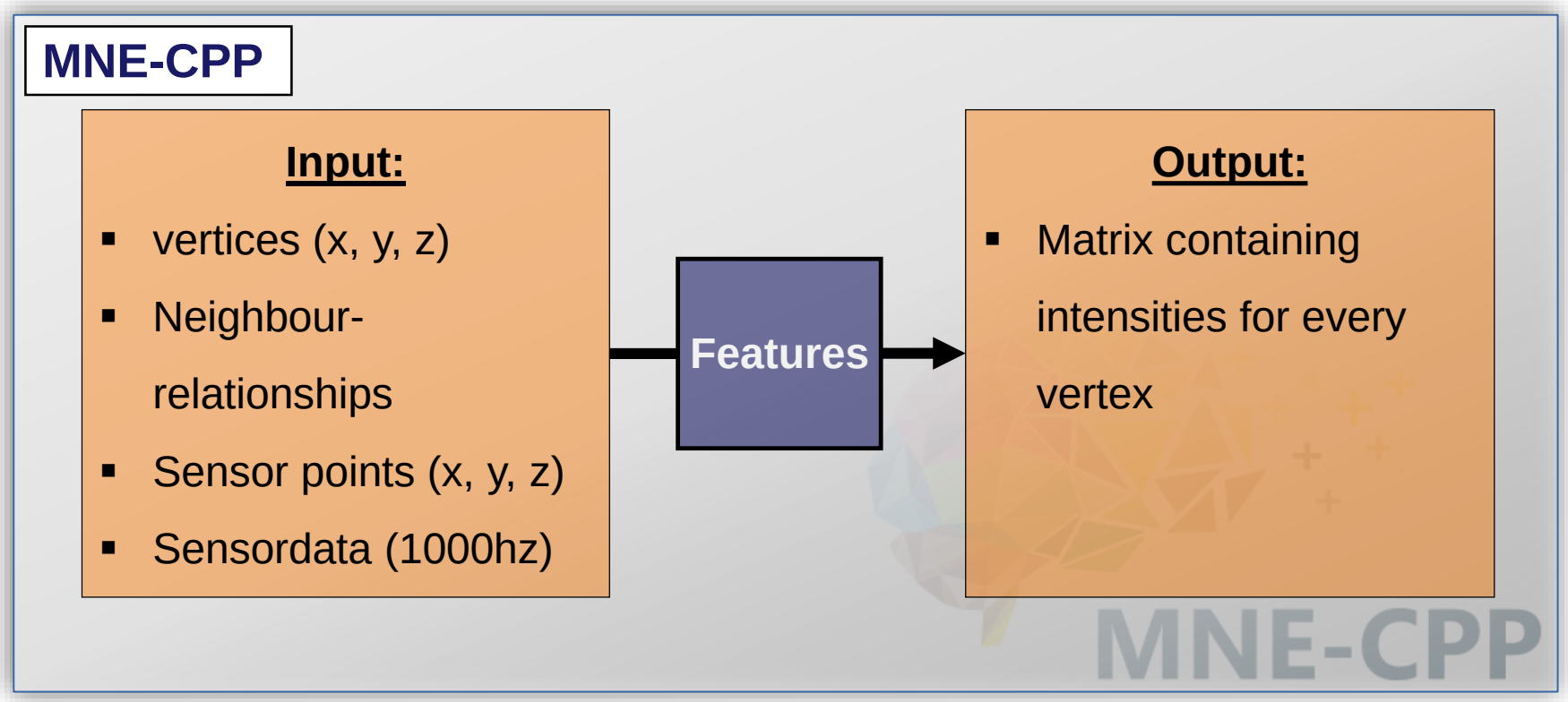
Standard Visualization



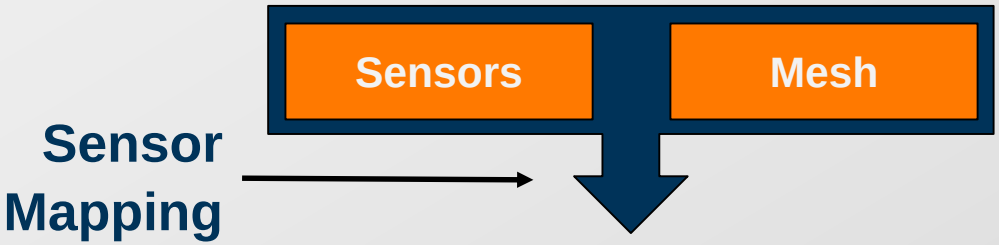
3D Visualization



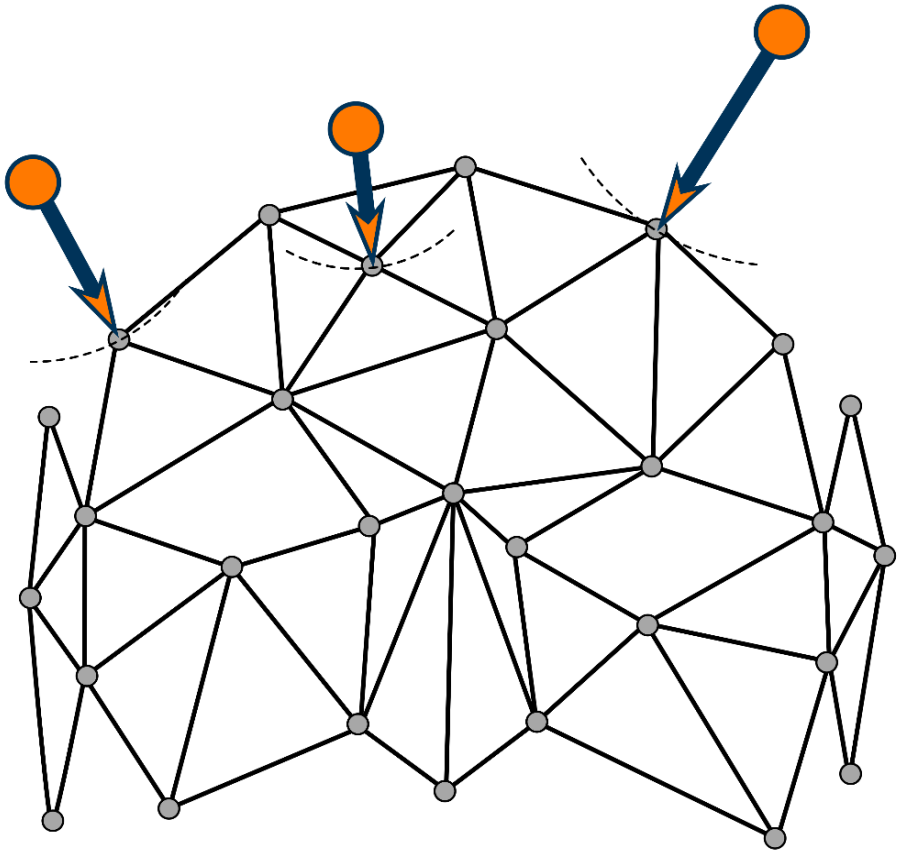
Input/Output



Features



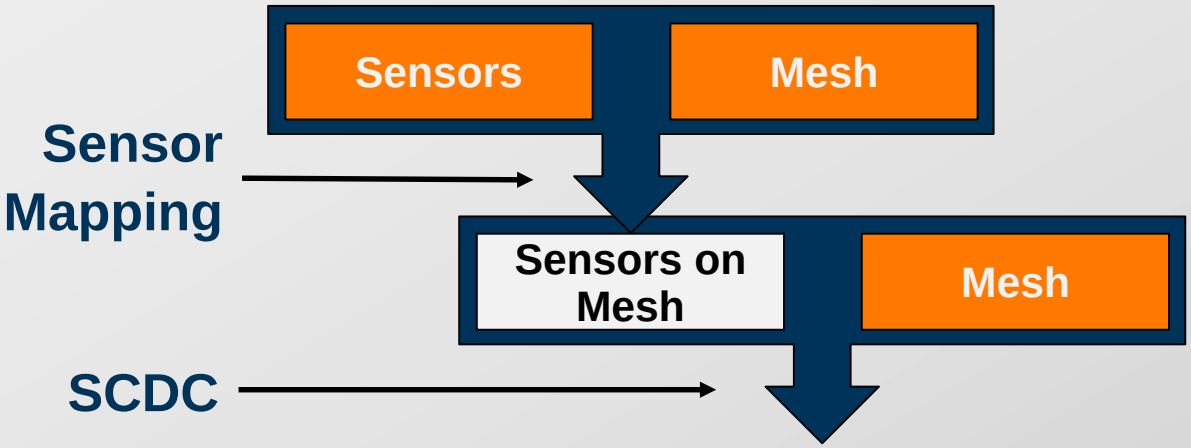
Sensor Mapping
Feature 1



- Sensorpoints are not part of the mesh
- relative position on surface unknown

► **Multithreaded linear search**

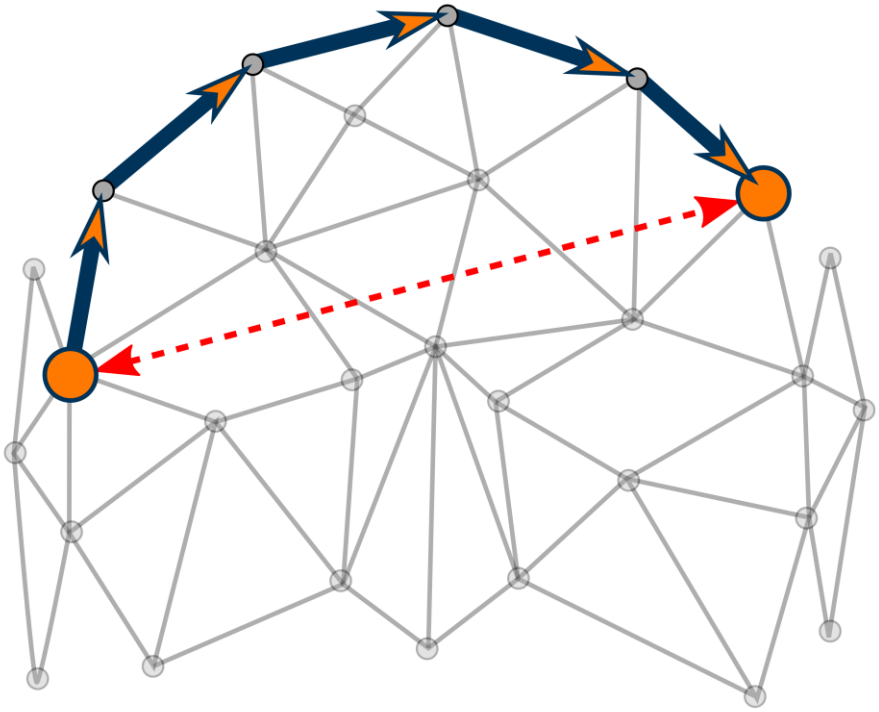
Features



SCDC

Feature 2

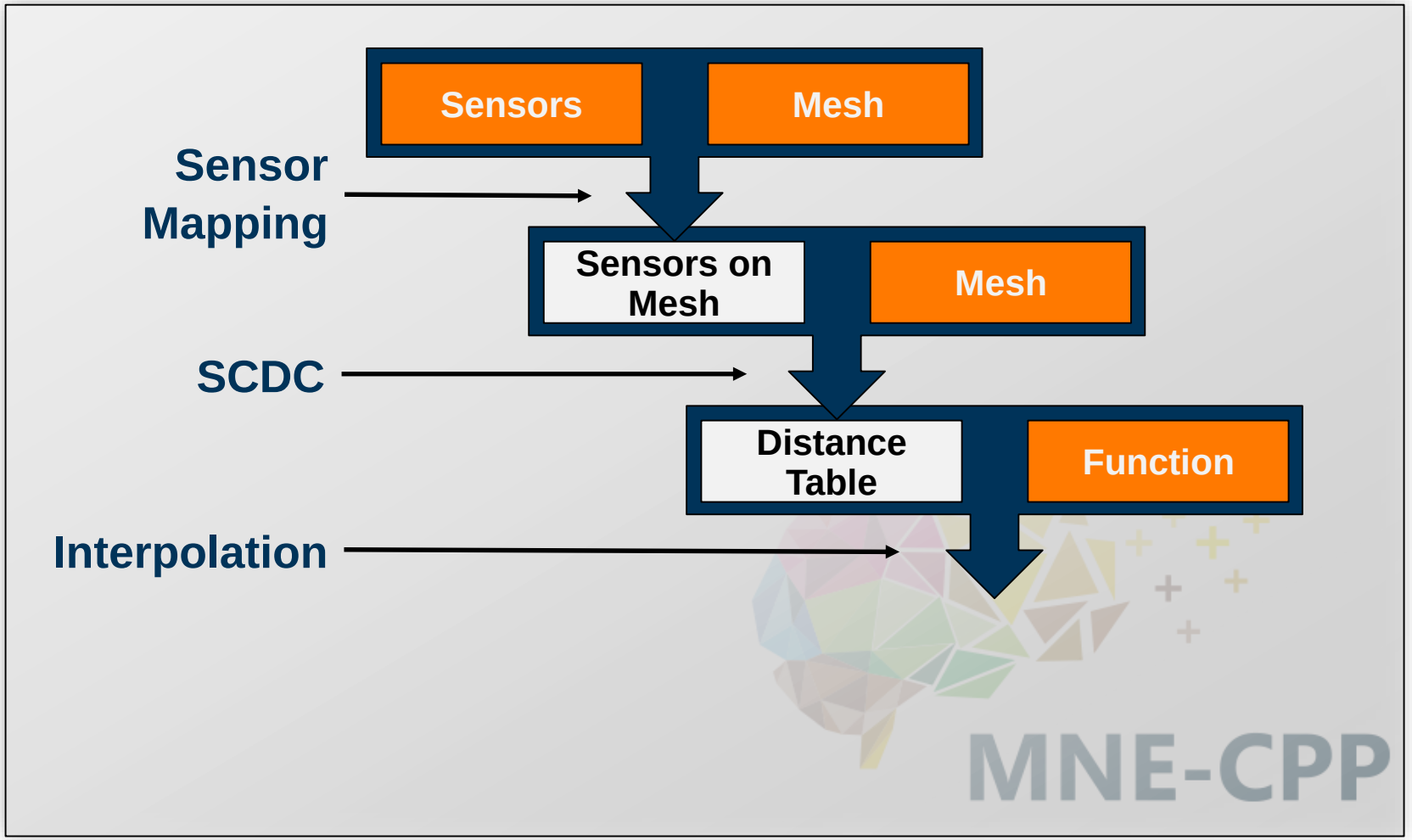
(Surface-Constrained Distance Calculation)



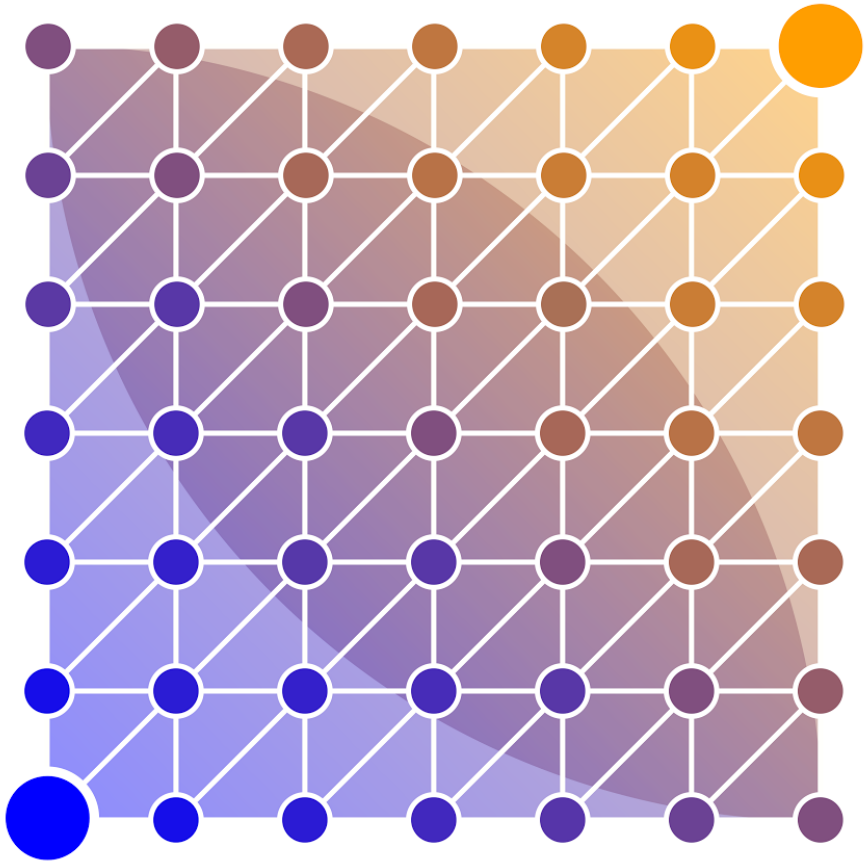
- Folded/Curved surface
- Distance between 2 vertices?
- Euclidian distance is inaccurate

► **Multithreaded iterative Dijkstra**

Features



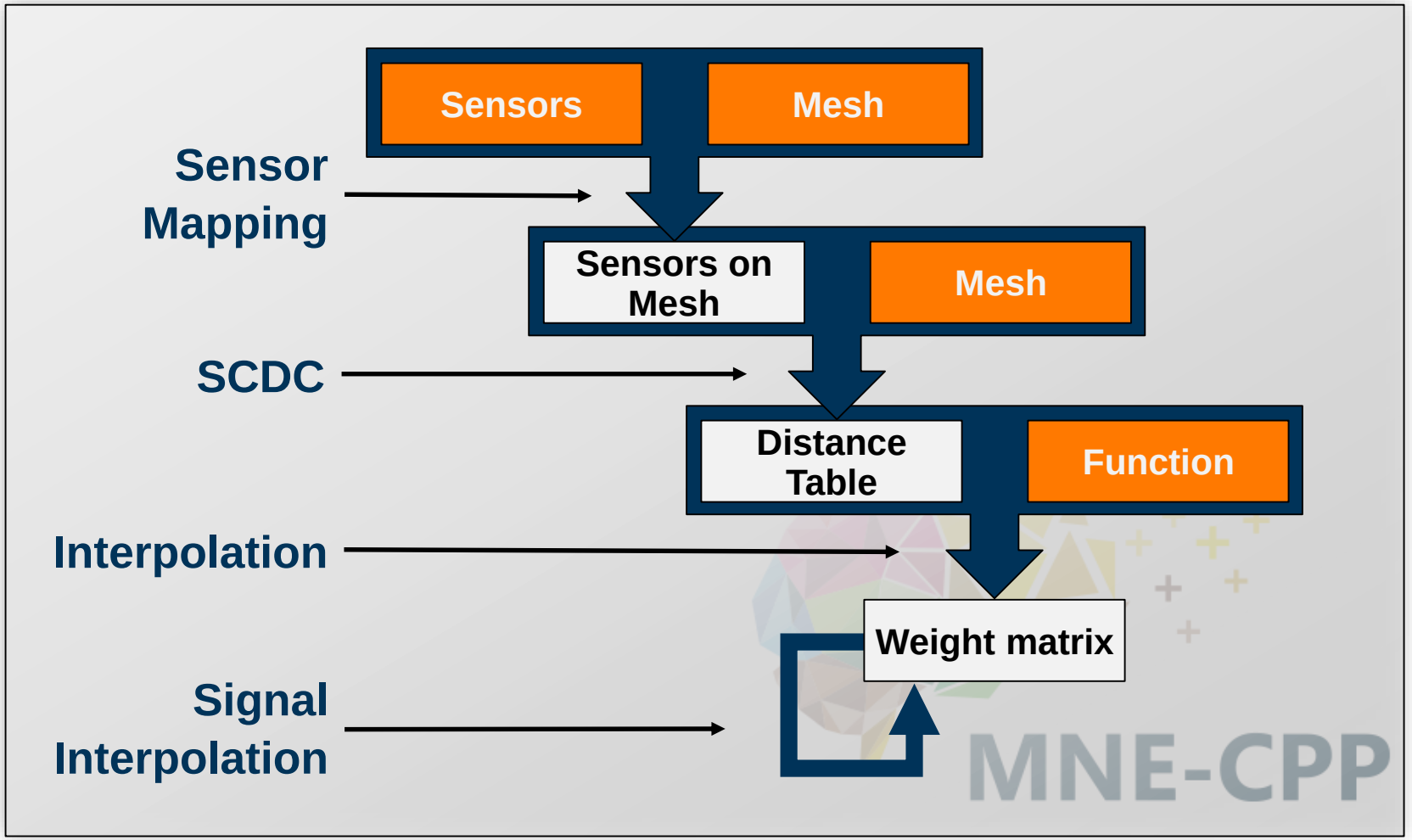
Interpolation
Feature 3



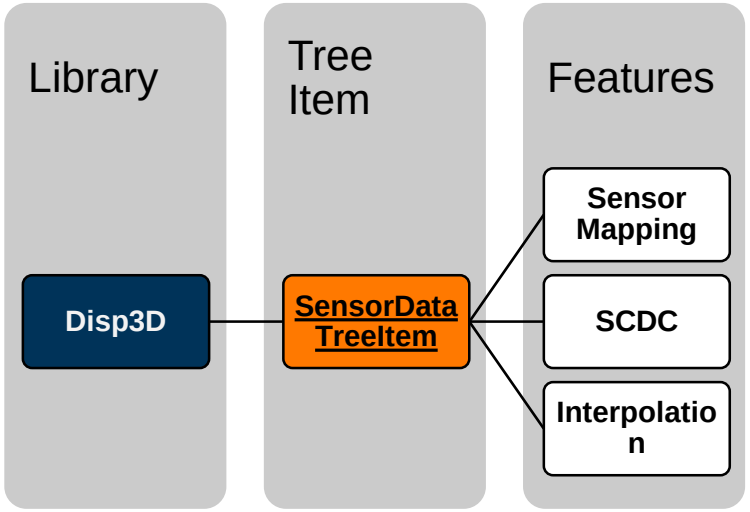
- Activity at certain points given (y_{sub})
- Activity at all points wanted (y_{full})

- **Weight matrix (W)**
- **Multiplication calculates the wanted values ($y_{full} = W * y_{sub}$)**

Features

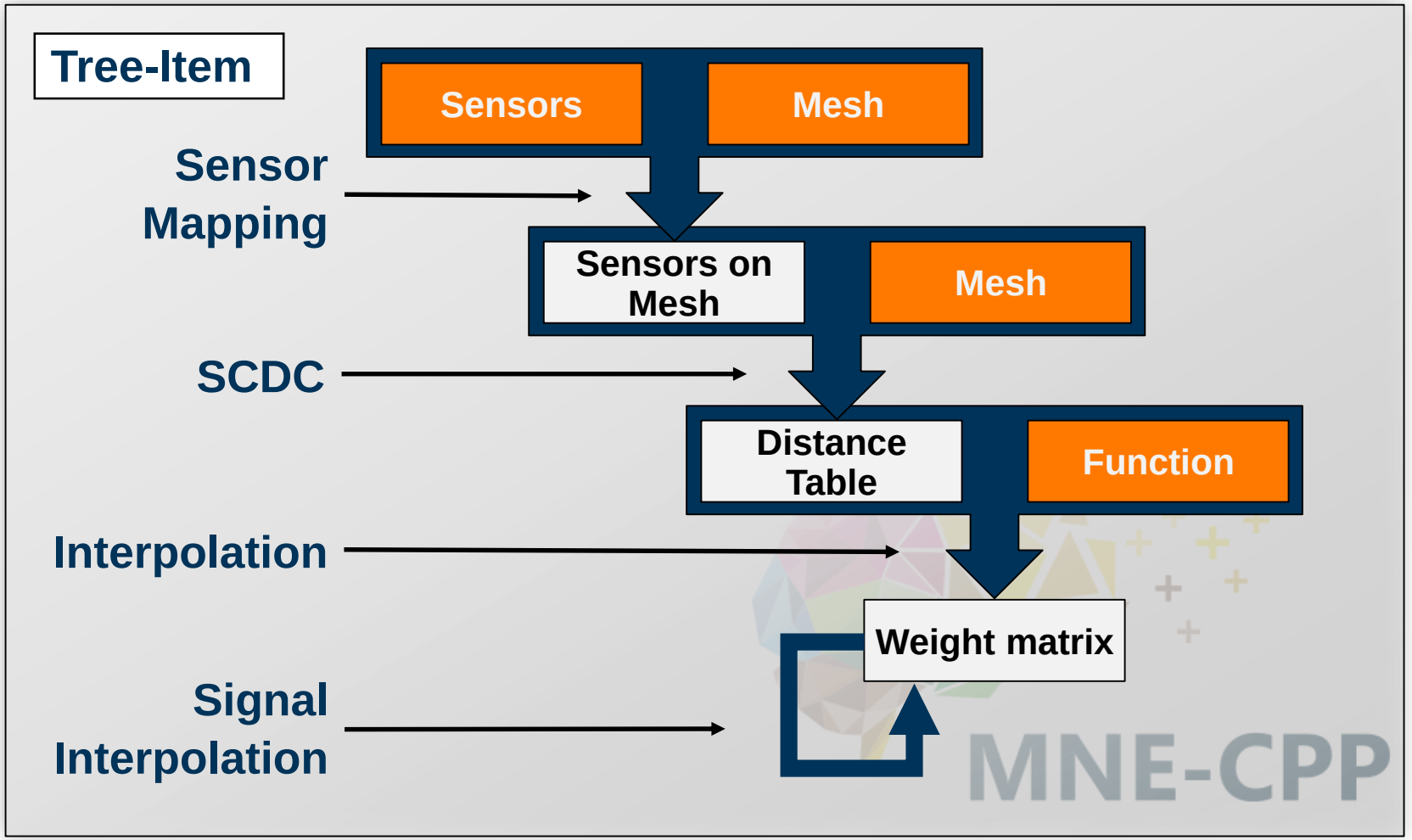


SensorDataTreeItem
Feature 4



- The disp3D library has a tree structure
- Features have to be integrated as a part of this tree
- The SensorDataTreeItem manages the features
- MetaTreeItems define the parameters of the algorithms

Features



Status

- ✓ Features 1, 2, 3 and 4 implemented and operational 
- ✓ Computation fast
- ✓ Integrated into existing project
- ✓ Documented for further usage and development

Review

- All functional requirements fulfilled
- Full SCDC needs more resources than estimated
- Internal communication good
- Detailed communication regarding the architecture with product owners sometimes complicated
- Issue-tracking ineffective (not updated correctly, not logged correctly)
- Feature 4 was far more complicated than estimated

Outlook

- MNE-CPP is an Open-Source project
- Therefore everyone can contribute
- Further development ongoing
- The generic features (SCDC, projecting, interpolation) will be used in other functionalities
- The code is documented as required by the project, it fits in seamlessly

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