CIBC @ NU
SCIRun / BioPSE Class
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Lab 2: MatlabInterface and Volume Rendering

5. Create a network that:

    a. Export the isosurface or any other file from Lab 1. network 1d. to matlab:

        i **MatlabInterface::DataIO::MatlabFieldsWriter**

        > Run matlab from a second terminal window:
        > type 'matlab' to start matlab
        > load in the file and explore the file.

    b. Export the data from the volume field created in 1c.

        ii SCIRun::FieldsData::ManageField
        iii MatlabInterface::DataIO::MatlabMatricesWriter

        > load in the file and explore the file.

    c. Import the file create in 5b. using the following module

        i MatlabInterface::DataIO::MatlabMatricesReader
        ii MatlabInterface::DataIO::Matlab
            matlab code >> field1 = reshape(i1,16,16,16);

    d. Render the field we created

        i SCIRun::Visualization::ShowField
        ii SCIRun::Render::Viewer
        iii SCIRun::Visualization::GenStandardColorMaps

iv SCIRun:Visualization::RescaleColorMap

6. Volume rendering:
    a. Load dataset and visualize it:
        i Teem::DataIO::NrrdReader
           datafile is:
/home/user1/SCIRun1.24.2/SCIRunData/1.24.1/volume/tooth.nhdr
        ii SCIRun::Render::ViewSlices

    b. Use the ViewSlices module (press New Slice Window to get any
        of the other views).

    c. Convert the nrrd to a field so we can use it in SCIRun
        i Teem::Converter::NrrdToField

    d. Setting up the volume rendering:
        build a texture for volume rendering:
        i SCIRun::FieldsData::NodeGradient
        ii SCIRun::Visualization::TextureBuilder

        Volume render a volume:
        iii SCIRun::Visualization::EditColorMap2D
        iv SCIRun::Visualization::VolumeVisualizer
        v SCIRun::Render::Viewer

    e. Change the widgets in the EditColorMap2D to define the
        transfer function (y is gradient, x is data value)

    f. Modify the network to add the Matlab module:
        -> remove the the NrrdToField module and
           replace it with the Matlab module"
        i MatlabInterface::DataIO::Matlab
        -> enter the following:
           field1 = nrrd1(40:80,:,:);

g. Use Matlab for slicing the data and volume render the data

h. Add a NrrdWriter to save file
    i Teem::DataIO::NrrdWriter

7. Time data and Matlab Interface:

a. Create the following modules:
    i MatlabInterface::DataIO::MatlabFieldsReader
    > load file
/home/user1/SCIRun1.24.2/SCIRunData/1.24.1/Matlab/geometry.mat
    ii MatlabInterface::DataIO::MatlabMatricesReader
    > load file
/home/user1/SCIRun1.24.2/SCIRunData/1.24.1/Matlab/timeseries.mat

b. Use matrix select vector to select a column of the matrix with the time data and use ManageFieldData to project it onto the field.

    i SCIRun::Math::MatrixSelectVector
    > expore the GUI to see how to select a certain vector
    ii SCIRun::FieldsData::ManageFieldData

c. Use
    i SCIRun::Visualization::GenStandardColorMaps
    ii SCIRun::Visualization::RescaleColorMaps
    iii SCIRun::Render::Viewer
  to visualize the data.

d. Use the MatrixSelectVector to browse through the data. Use the number of colormaps to use less colors.

e. Now hook up the Matlab module and get the data from the MatlabMatricesReader.
  enter the following code to get a gradient:
    o1 = diff(i1,1,2);

f. Hook the output of this module to MatrixSelectVector.

       i SCIRun::Math::MatrixSelectVector

Synchronize both MatrixSelectVector modules using the index ports.

g. Duplicate the ShowField, RescaleColorMap, GenStandardColorMap and visualize two geometries on top of each other.

h. Use the newViewer option in the Viewer to create two linked views.

i. Add ShowColorMap to both views to show what is actually displayed.

       i SCIRun::Visualization::ShowColorMap