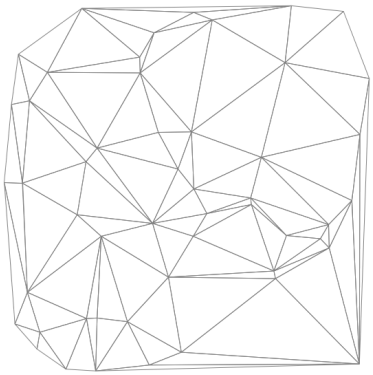
UNIVERSITÄT STUTTGART
Institut für Visualisierung und Interaktive Systeme (VIS)

Thomas Ertl, Steffen Frey *Stuttgart, 2019-05-03*

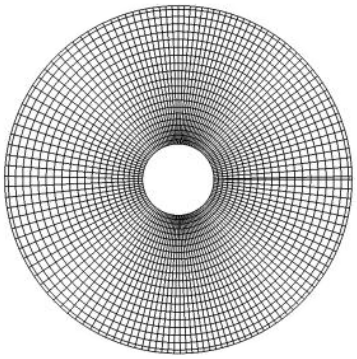
Scientific Visualization (Assignment 4)

Exercise 4. 1 [2 Points] Grid Types

Classify the following grids according to their data structure as described in the lecture. **Compare** the properties of the two grid types.



(a)



(b)

Exercise 4. 2 [1 Points] Voronoi Diagram

Describe the main property of a voronoi cell with respect to interpolation. **Name** the geometrical dual of a voronoi diagram and **describe** the relation of edges in a voronoi diagram and its dual.

Exercise 4. 3 [1 Points] Bi-linear Interpolation

Calculate the value at P (cf. figure 2) given the following points $(x, y, value)$:

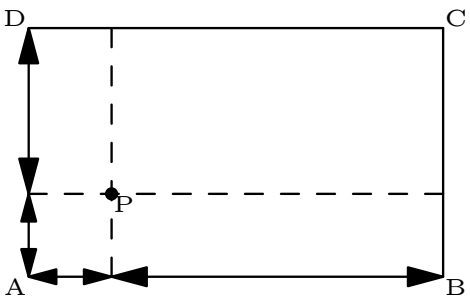


Figure 2: Setup for bi-linear interpolation.

- $A = (2, 3, 0.4)$

- $B = (7, 3, 0.1)$
- $C = (7, 5, -0.2)$
- $D = (2, 5, 0.2)$
- $P = (3, 3.5, ?)$

Exercise 4. 4 [6 Points] ParaView: Color Mapping

In this exercise, you are going to visualize a 3D velocity field (field.vtk) using color mapping.

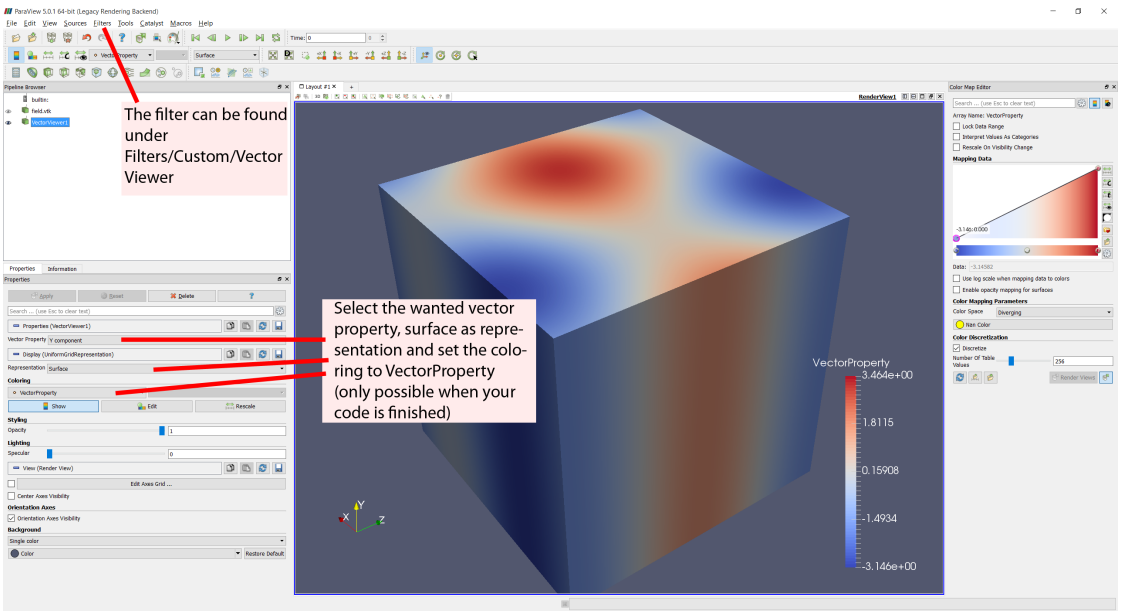


Figure 3: Y-component of the velocity field

You have to visualize the velocity magnitude, all three directional components of the velocity (x,y,z), and all three components of the velocity vector in spherical coordinates (r,θ,ϕ). Refer to Wikipedia, if you need to look up formulas for spherical coordinates.

The code you have to extend is given in form of a ParaView plugin. Replace the `TODO` comments with your own code. All three source files have to be altered (`VectorViewer.xml`, `vtkVectorViewer.cxx` and `vtkVectorViewer.h`). Detailed instructions are provided as comments in the source code. The process of compiling and loading a ParaView-plugin was discussed in the last assignment.

If you are implementing the plugin on your own computer running Windows, remove the if-clause surrounding this option `option(PARAVIEW_INSTALL_DEVELOPMENT_FILES ...)` in the ParaView `CMakeLists.txt` and enable it before building ParaView. This will install the necessary development files to build the plugin. You have to refer to them while configuring the ParaView path in your plugin with CMake.

An image of a correct solution, visualizing the y-component is shown in Figure 3. You need to apply your custom filter "VectorViewer" to the provided field.vtk file. The drop-down menu and the coloring mode named "VectorProperty" is shown only when you have added it in the `VectorViewer.xml` file. **Please hand in all three relevant source files.**

Submission Deadline: 2019-05-10, 23:55

please hand in your submission through the ILIAS system.

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