UNIVERSITÄT STUTTGART
Institut für Visualisierung und Interaktive Systeme (VIS)

Dr. Filip Sadlo *Stuttgart, 10. 05. 2013*

Visualization (Assignment 4)

Exercise 4. 1 [3 Points] Inverse Distance Weighting

The Shepard Interpolation, which was discussed in the lecture, can be used for interpolation within scattered data. In Figure 1 such data are depicted. $P_i(x, y, d)$ with $i \in \{1, 2, 3, 4, 5, 6\}$ are the given points, where x and y are the coordinates and d is the assigned value. Interpolate the value d at the points P_7 and P_8 considering neighbors within a radius of 3 using exponent $p = 2$ in the basis functions. For each interpolation specify the distances to all considered points and give the evaluated basis functions.

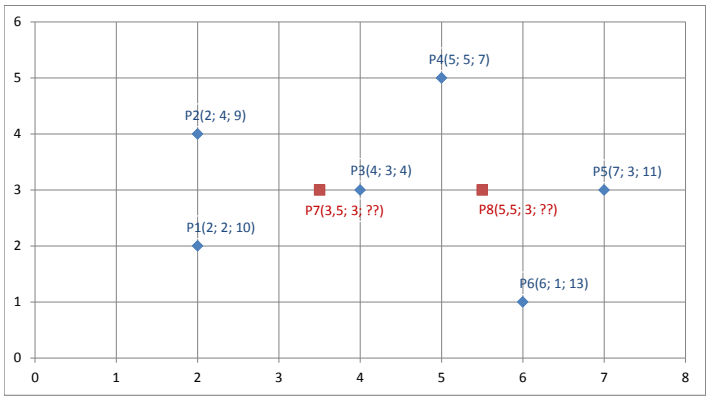
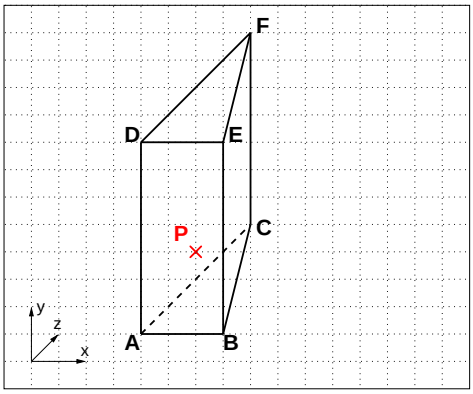


Figure 1: Plot of scatterd data

Exercise 4. 2 [3 Points] Interpolation inside Prism



The prism shown in the figure is part of a volume that shall be colored. Therefore color values in the prism must be interpolated. The coordinates and values of the vertices of the prism are as follows:

$A = (0, 0, 0) \quad f(A) = 3$
$B = (3, 0, 0) \quad f(B) = -6.75$
$C = (0, 0, 4) \quad f(C) = 0$
$D = (0, 7, 0) \quad f(D) = 18$
$E = (3, 7, 0) \quad f(E) = 12$
$F = (0, 7, 4) \quad f(F) = 6$

Determine the scalar value that will be assigned to point $P : (1, 2, 1)$ using interpolation.

Exercise 4. 3 [4 Points] VTK: Color Mapping

In this exercise, you should visualize the velocity magnitude of a 3D vector field (field.vtk) with color mapping. To avoid occlusion issues, only a single slice through the dataset is displayed. Extend the provided source code at positions with ”INSERT” comments. Detailed instructions are provided as comments in the source code. An image of a correct solution is shown in Figure 2.

Don’t forget to set the correct library paths according to task 3.3 (last assignment) in order to execute the programm.

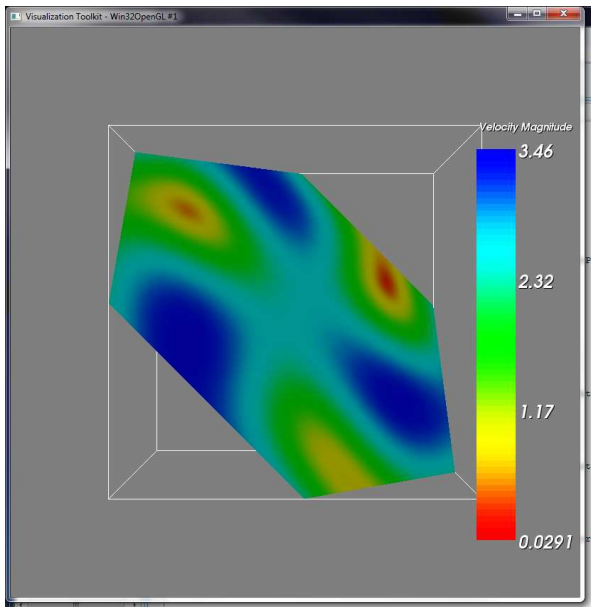


Figure 2: Slice of vektor field velocity magnitude

Exercise 4. 4 [2 Points] VTK Pipeline

Now, after you have created visualization pipelines using VTK, give a graphical representation (flow chart) for the pipeline from exercise 4.3 with all modules included.

Submission: 17.05.2013, 10:00

please hand in your submission in the eClaus system.

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