CS855: Data Visualization (Assignment 3)

Volume visualization of salinity of Indian Ocean

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***Abstract*—This report explains the algorithms used for the volume visualization of ocean salintiy, details the data used and provides the insight of the visualization.**

Keywords—isosurface, slicing;

I. INTRODUCTION

This assignment does Volume visualization of Indian ocean salinty data using isosurfacing (marching cubes) and slicing.

II. DATASET

A. Data Procurement

The salinty data was made available as a part of the course. The file format used for reading data is *.csv.

B. Data Processing

The class DataHandler parses the .csv input file and fill the grid values accordingly.

III. VISUALIZATION

There are two phases of visualization:

A. Isosurface extraction (marching cubes)

According to the number of isosurfaces, evenly distributed isovalues are selected and marching cube is used to extract respective isosurface. The lookup table and base code for marching cube was taken from [2]. Gourad shading is used for better visualization.

B. Slicing

Three axis-parallel slices are provided for each plane with user-interaction options. Slices are then rendered as a 2D colormap in a separate view port along with a legend for isovalues and colormap.

C. User Interaction

- Lighting can be toggled by pressing 'l' key.
- Slice orientation can be changed by pressing 'home' key.
- Slices can be moved using 'pg up' and 'pg dn' keys.
- Rotation through 'w','a','s','d' and mouse scrolls.
- Movement through arrow keys.
- Jitter can be introduced by pressing 'j' key.

IV. INSIGHT

- Volume visualization helps in getting a better insight of the physical world.
- Sea creatures favoring particular salinities can be traced by following the isosurface.
- New underwater structures can be discovered by looking for patterns in the visualization.

REFERENCES

[1] Telea, A. (2008). Ch. 2: From Graphics to Visualization. In *Data visualization: Principles and practice*. Wellesley, Mass.: A K Peters.

[2] Polygonising a scalar field, Paul Bourke. Retrieved October 26, 2015. URL: http://paulbourke.net/geometry/polygonise/