FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Diplomarbeitspräsentation

Color Adjustment of Colored Range Images

Masterstudium:
Computergraphik &
Digitale Bildverarbeitung

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Problem Statement

With the increased availability of imaging systems for three dimensional objects virtual models of statues, buildings, archaeological excavation sites, or even whole cities can be created. A popular technique to build up these models is to generate a point cloud by combining multiple scans from a 3D scanner. The number of necessary scans depends on the size of the original object. The combination of the single scans leads to various color discontinuities in the overall model, which have to be corrected by post-processing.
This thesis shows two different approaches to automate the color correction process and improve the visual appearance of a point cloud. The first approach tries to bring all images made during the scan in the same lighting mood. The second approach recolors the single points according to the surrounding points.

Point-based Approach

The actual points of the point cloud are recolored according to their surrounding points.
First the neighbor points for each query point are searched. Then the final color of the query point is calculated by blending the query point color and the colors of the neighbor points together with a specific filter.

Image-based Approach

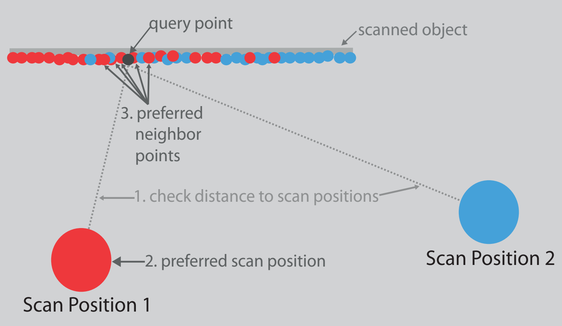
The images used for the colorization of the point model are transfered to have the same lighting mood like a chosen source image. These images are later used for the colorization of the point cloud.

Neighbor Point Selection Criteria

Maximum number of neighbor points

Maximum distance of neighbor point

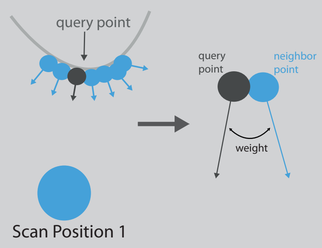
Nearest Scan position



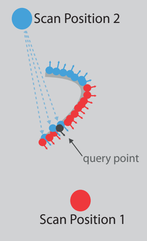
Normal Influence

The three criteria on the left side are used to select the neighbor points and then the neighbor points are weighted according to their normals.

Point Normal - Scan Direction Relationship



Point Normal - Neighbor Normal Relationship



Point Filter

The colors of the neighbor points and the query point color define the final color for the query point.
For the calculation of the final color for the query point the weight coming from the normal influence in combination with one of those filters can be used:

- Gauss
- Mean
- Median
- Bilateral
- Trilateral

Results

Original Image

Result with Gauss Filter

Result with Trilateral Filter

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