Grid-Enabled SEE++
A Grid Software for Virtual Eye Surgery Based on Globus 4 and gLite

Abstract

“Grid-Enabled SEE++” is a software system that deals with the support of diagnosis and treatment of strabismus. Its goal is to adapt and to extend the original SEE++ in several steps and to develop an efficient grid-based tool for “Evidence Based Medicine”, which supports the surgeons to choose the optimal surgery techniques in case of the treatments of certain eye motility disorders. Originally, we have designed and developed a grid-enabled version of the SEE++ based on Globus Toolkit 4. Since we met with some limitations of Globus 4, we also designed a version of “Grid-Enabled SEE++” compatible with gLite.

Terminology

• **Strabismus** is the common name given to usually persistent or regularly occurring misalignment of the eyes where eyes point in different directions such that a person may see double images.

• SEE++ is able to simulate a typical medical examination called **Hess-Lancaster test** from which the reason for the pathological situation of the patient can be estimated.

• The outcome of the Hess-Lancaster test consists of two **Gaze Patterns** of blue points and of red points respectively (see the diagram in the middle of the GUI of SEE++ on Figure 1). The blue points represent the image seen by one eye and the red points the image seen by the simulated other eye; in a pathological situation there is a deviation between the blue and the red points.

• **Pathology Fitting**: It is possible to give the measured gaze pattern of a patient as input. In this case, SEE++ takes some default or estimated eye data and modifies a subset of them until the calculated gaze pattern of the simulated eye (red points) matches the measured gaze pattern (green points).

I. Former Results with Globus 4

I.a Grid-Enabled Hess-Lancaster Test.
The Speedup is a factor of 14-17.

I.b Preliminary Studies with the Pathology Fitting

The Outcome of the Pathology Fitting: Intended (blue), Measured (green) and Simulated (red) gaze patterns.

II. The Initial Architecture of SEE++ based on gLite

III. The Entire Design of the gLite Compaitible SEE++