

Visual Analytics for Effective Interdisciplinary Collaboration

Computational & Visual Analytics Tools for Educational and Applied Engineering on an International Scale

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INTRODUCTION

In the data deluge of the modern era, an efficient method for identification, extraction and visualization of pertinent data is an absolute necessity. To this end interdisciplinary and international collaborations are a definite necessity; however there are many obstacles that prevent effective communication between engineers and researchers in such an environment. Communicative devices such mathematical diagrams and computer models serve to mitigate the problems arising from disciplinary and language barriers.

The goal of this project is to create discipline-specialized tools that take advantage of an individual's knowledge base and expertise in an interdisciplinary collaborative environment and allowing them to present the result of their analytical work using expressive models. These tools are intended to significantly improve the speed and efficiency of data analysis.

This project takes advantage of an interdisciplinary undergraduate research group led by two faculty advisors, also known as an Affinity Research Group (ARG), to investigate and implement a toolset for visual analysis of statistical data in various disciplines and areas. As depicted in figure 1, the end result of the project will be tools that allow for effective extraction of information from raw data.

METHOD

The research is conducted in two phases. The first consisted of researchers familiarizing themselves with the intended development environment while investigating its potential applications and limitations. The second phase is focused on the development, testing and eventual

distribution of the toolset. This phase was executed by subdividing the research team into task specific subgroups, with each individual contributing to three separate subgroups. This allowed researcher to remain task oriented while remaining aware of the interdependencies of separate components. Results from each subgroup were periodically distributed to other members to allow for deeper collaboration and constructive feedback.

TOOLS

The primary tools used for the project are the R statistical environment and its Rcmdr and RGL packages. This project takes advantage of existing R features and plugins to build a better overall suite of statistical visualization and analysis tools. The project takes advantage of the Graphical User Interface (GUI) provided by the Rcmdr package and the RGL interactive 3 dimensional (3D) rendering tools in the RGL package.

Utilizing existing R packages as prerequisites takes advantage of future improvement in these components. Also the dissemination mechanism for R packages allows users to download only updates for the packages/prerequisites necessary for the task at hand, thereby sidestepping the difficulties associated with updating monolithic solutions. Future implementations may be updated to take advantage of technologies such as cloud computing.

PROGRESS AND RESULTS

The first phase of the project has been complete and the second phase is well under way. Results are categorized as technical requirements, algorithms and software

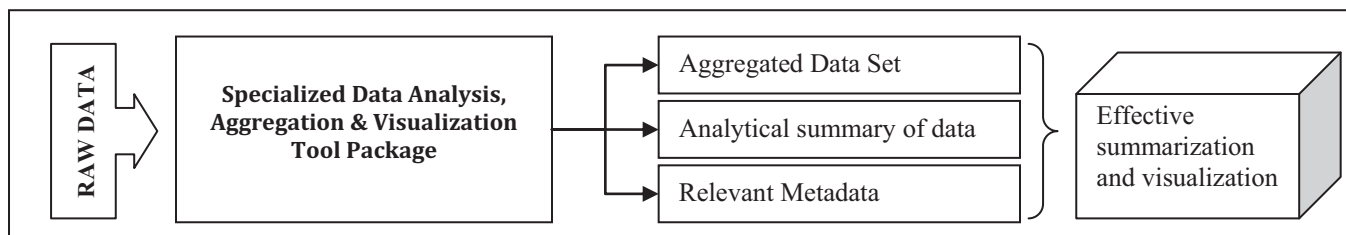


Figure 1 - Overview of toolset application

