VISUAL STORYTELLING AND DATA VISUALIZATION IN NUMERICAL SIMULATIONS

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Keywords: *data visualization, numerical simulations, data analytics, OpenFOAM, DAKOTA, design space exploration*

Data visualization is the presentation of data in a pictorial or graphical format in order to amplify cognition. Visual storytelling is about finding a story in our data, presenting and communicating that story, making it understandable and insightful to any audience. In today's world, an incredible amount of data is generated, collected, analyzed and used in making informed decisions, uncovering patterns, finding anomalies or predicting future outcomes, and numerical simulations are not an exception. Thanks to the technological advances in hardware and software, we can obtain a large amount of data in a very affordable time span, numerical simulations are not anymore *"run a few simulations and wait long times"*. We should be ready to analyze and communicate the data generated from numerical simulations (or any other field) in a way that yields insight and understanding. In the same way, we should also support data manipulation, filtering, cross-relating and visual thinking by using interactive systems. In this presentation, we will introduce a web-based data visualization and analysis toolkit, aimed at helping people to gather, understand and communicate data through the use of interactive systems for data analytics and exploratory data analysis. The data to be used can be obtained from any discipline (social sciences, econometrics, marketing, transport industry, health care, wearable technology, numerical simulations, the social web and so on), but we will focus our attention in data obtained from design optimization and design space exploration studies. To gather the data, we use OpenFOAM as the black box simulation software and DAKOTA as the optimization driver. The toolkit incorporates many charts and plots that let the user visually explore the data in an interactive way, and it makes use of descriptive statistics and machine learning tools for data analytics. The framework is based in javascript, D3.js, html5, python and R and can be run from any device (pc, tablet, smartphone).