# A Systematic Approach to the Exploratory Analysis of Spatial and Temporal Data

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Exploratory data analysis (EDA) is about detecting and describing patterns, trends, and relations in data, motivated by certain purposes of investigation. As something relevant is detected in data, new questions arise, causing specific parts to be viewed in more detail.

The authors suggest a generic framework for systematic, comprehensive EDA. For this purpose, they introduce an abstract model of a dataset under analysis and build on top of this a general task typology, distinguishing between elementary and synoptic tasks. This typology is then applied to the description of existing approaches, methods, and technologies, referred to as "tools". The authors systemize the tools into five categories: visualization, display manipulation, data manipulation, querying, and computation. Various tools are typically used in combination. On the one hand, different tools have different capabilities and therefore can aptly complement each other and jointly produce synergistic effects. On the other hand, data are often very abundant and/or very complex, multidimensional and multifaceted, and therefore cannot be adequately analyzed using any single tool. The authors consider two basic modes of tool combination, sequential and concurrent, and discuss the various mechanisms used for tool combination.

One of the authors' major points is that the primary tool for analysis is the human imaginative mind whereas the other tools supply it with the necessary material, appropriately prepared and presented. The most appropriate form for the presentation of such material is visual, since the mind, as most scientists tend to agree, operates predominantly with images. Hence, visualization plays a crucial role among all the tools and is an essential component of any tool ensemble. Thus, initial data visualization is used in order to understand what tools should be used for further work, and results produced by any non-visual tool need to be visualized so that the analyst can see and interpret them.

The authors also introduce a set of general principles of EDA, which are intended to help analysts in finding the right tools for the data they need to analyze. The principles are strongly related to the tasks. The authors formulate a generic task of EDA and consider how it is decomposed into subtasks and what tools are used for the decomposition, fulfilling the subtasks, and synthesis of an overall model from the results of the subtasks.

## References

ANDRIENKO, N., ANDRIENKO, G. (2006) Exploratory Analysis of Spatial and Temporal Data: A Systematic Approach. Springer, Berlin