

Dynamic Graphics for Research and Teaching, with Applications in the Life Sciences

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Abstract. Our ability to record increasingly larger and more complex sets of data is accompanied by a decline in our capacity to interpret and understand these data in the fullest sense. Multivariate analysis partially assists us in our quest by reducing the dimensionality in optimal ways, but our view is stuck in two dimensions because of the planar nature of the graphical medium, be it the printed page or the computer screen.

We are developing protocols and tools to explore dynamically high-dimensional data. The key idea is to introduce motion into the visualization process – not only can movement enlarge our view of data into the third dimension but it also allows us to see phenomena that are buried in the “deep space” of the data.

Using the freely available R language and modern methods of statistical learning and data mining, we construct animation sequences that take us on a dynamic journey through our data. As scientific publishing evolves more and more into electronic formats, the potential of dynamic graphics will change forever the way we visualize and interpret data. Dynamic graphics also affords a valuable teaching tool, for explaining and demonstrating complex concepts such as multivariate relationships and differences between multivariate methods.

The presentation concentrates on applications in the life sciences using examples from epidemiology, population disease statistics and genomics.