Animated Statistical Graphics using R

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Abstract: Visualizing data and statistical results is crucial for all scientists. For data collected over multiple dimensions, such as space and time, effective visualization requires more sophisticated and unique tools. For example, changes over space and time can be conveyed through the display of several contour (e.g. topographical) plots at different moments in time. A more intuitive and streamlined approach is to display the change over time with an animation. Allowing for a dynamic time variable helps us visualize and understand the changes in the data more intuitively. We can also extend this concept to visualize error associated with statistical prediction or estimation. Typically, such information is provided in two separate plots, a contour plot of the prediction and one for the standard error of the prediction. An animation would streamline this process by providing all of the information, the prediction and standard error, in one dynamic plot. Functions to do this are not yet widely available in statistical software, thus I extend the current methods by changing the dynamic variable from time into a variable that quantifies the margin of error associated with prediction or estimation over space. Effectively, I create an animated spatial prediction interval plot to convey the information. In addition creating functions for the two animations mentioned above, I also develop computer code containing functions for displaying change in temporal data, as well as creating teaching mechanisms for introductory statistics. The code runs in the statistical software R and can be easily accessed through an R package, a streamlined group of functions. R is free open source software, runs on all platforms, and is widely used in many disciplines. The animations that the user creates can be run within R and also saved as Flash files. Examples of my functions are available on my website: http://studentweb.montana.edu/autumn.laughbaum/research.html. Animations are easy to understand and foster a level of excitement in the viewer. My animation functions not only streamline current methods of visualization, but they also provide more intuitive resources for statisticians and non-statisticians alike.