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Visual Analysis Using Biplot Techniques of Rainfall Changes over Turkey

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Abstract
The variability in the averages of the monthly rainfall in Turkey's seven different climate regions was examined using a principal component analysis (PCA) biplot and a canonical variate analysis (CVA) biplot to analyse meteorological data from 81 stations in the country over a period of January 1970–December 2010. Using biplots as visuals for analysing meteorological data is extremely helpful for finding hidden information in the data structures. A PCA biplot was used to examine the multi-dimensional variation and the relationships among the variables, and a CVA biplot was used to study the separation and overlap between different climate regions. The Aegean region, Mediterranean region and Marmara region with similar amounts of rainfall in January, December and May were identified in this study. Marmara and Eastern Anatolian regions are opposite to each other in terms of rainfall amount in all months except June and February. Moreover, the inverse relationships between the biplot axes in CVA biplot and PCA biplot for February and June indicate a strong negative corelation, separating the regions into two distinct groups corresponding to summer rainfall and winter rainfall respectively. The results of this study suggest that PCA and CVA biplots can be a useful graphical method for rainfall monitoring, water management and examination of meteorological data. Rainfall is the primary source for the continuation of life on Earth. Therefore, this paper demonstrates some useful empirical results as well as the advantages of using biplot techniques.

Keywords
Rainfall – Biplot – Principal component analysis – Canonical variate analysis