Abstract

The risk of flood prevention and to make the management and planning of hydrological resources effective, it is required to analyse and measure the flow of water continuously at a number of barrages and dams. The flow variation over a certain time period can graphically be represented through hydrograph for any barrage considered. The hydrograph provides information which is vital to determine the frequencies and severity regarding extreme events.

The major characteristics of flood hydrograph are duration (d), peak (p) and volume (v). Approaches for traditional analysis of hydrological frequency focused individually on each characteristic in a univariate case study. These features were considered jointly in the multivariate case study so that the structure of their dependency could be encountered. Hence, the univariate approaches are not reliable enough to represent the phenomenon and cause reducing the accuracy of risk estimation whereas multivariate approaches contribute in improving the accuracy of risk estimation by considering joint features and dependency structure between characteristics of a flood. However, all the subsequent approaches dealt with
characteristics of flood and do not include comprehensive information that can be achieved through hydrograph.

Present work carries an object which contains a framework to represent hydrograph as a functional data curve for frequency analysis. The context of this study considers hydrograph as the observation of infinite dimension such that more efficient and authentic estimates regarding risk related to extreme events are obtained. The aim of this study is to address the problem concerning incomplete data usually encountered in hydrology by exhaustively employing complete information produced by hydrology.

Approaches for analysis of functional data (AFD) are introduced with an intention to concentrate on the visualization of data and detection of outliers using graphical methods in the context of both functional and multivariate study. These methods are illustrated on real-world flood data of Sukkur barrage on the River Indus, in Sindh province, Pakistan.

References

Functional and Multivariate Hydrological Data Visualization and outlier Detection of Sukkuk Barrage

John Wiley.


Index Terms

Computer Science
Information Sciences

Keywords

Bivariate Bagplot, Bivariate Boxplot, Functional Bagplot, Functional Boxplot, Functional data,
Functional hydrograph, Multivariate data, Rainbow plot.