

Flow signatures and basin parameters for Hierarchical tunisian Catchments clustering and similarity assessement.



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Introduction

- Hydrology modeling constraints: lack of data : ungauged or poor gauged catchments.
- Regionalisation: transferring data for gauged to non gauged catchment (geographical proximity, similarity hydrologic behavior, catchment clustering (based on catchment parameters, hydrologic signatures , ...))
- Hierarchical clustering: unsupervised method based on metrics data to delineate clusters.



Objectif

Comparing hierarchical clustering efficiencies with various distances (metrics) based on parameters.

(Tunisian geomorphological watersheds).

Data and Methods

Case of study

- nineteen (19) catchments situated in the Tunisian ridge, monitored since 1992.
- Annual Rainfall range from 280 mm to 500 mm.

Methods

- Hierarchical Ascendent clustering



Data and Methods

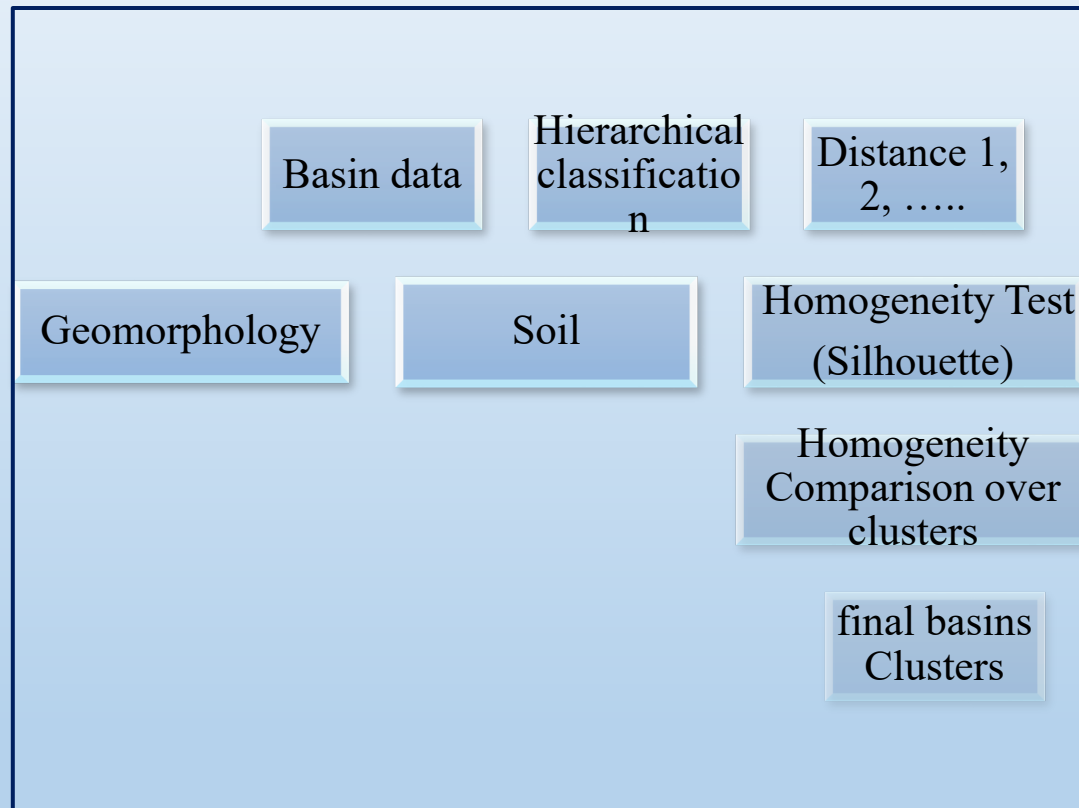


Figure 1: Clustering Approach

Parameters

- latitude (LatN), longitude (LongE), area (A), specific height (DS), global slope index (Ip), Gravellus index (Ig), infiltration index (phi), runoff coefficient (Cr), the percentage of forest cover (Pf), the percentage of cereal culture area (Pc)
- rainfall maximum intensity (Imax), rainfall duration (D).

Distances : euclidean, cosine, ..



Results and discussion

Table 1. Silhouettes mean values

Distance	Cluster 1	Cluster 2
Euclidean	0,241	0,058
Seuclidean	0,241	0,058
Spearman	0,257	0,160
Cheybechev	-0,007	0,104
cityblock	0,101	0,161
correlation	0,418	0,173
cosine	0,284	0,188
hamming	0,044	0,001
Jaccard	0,044	0,001

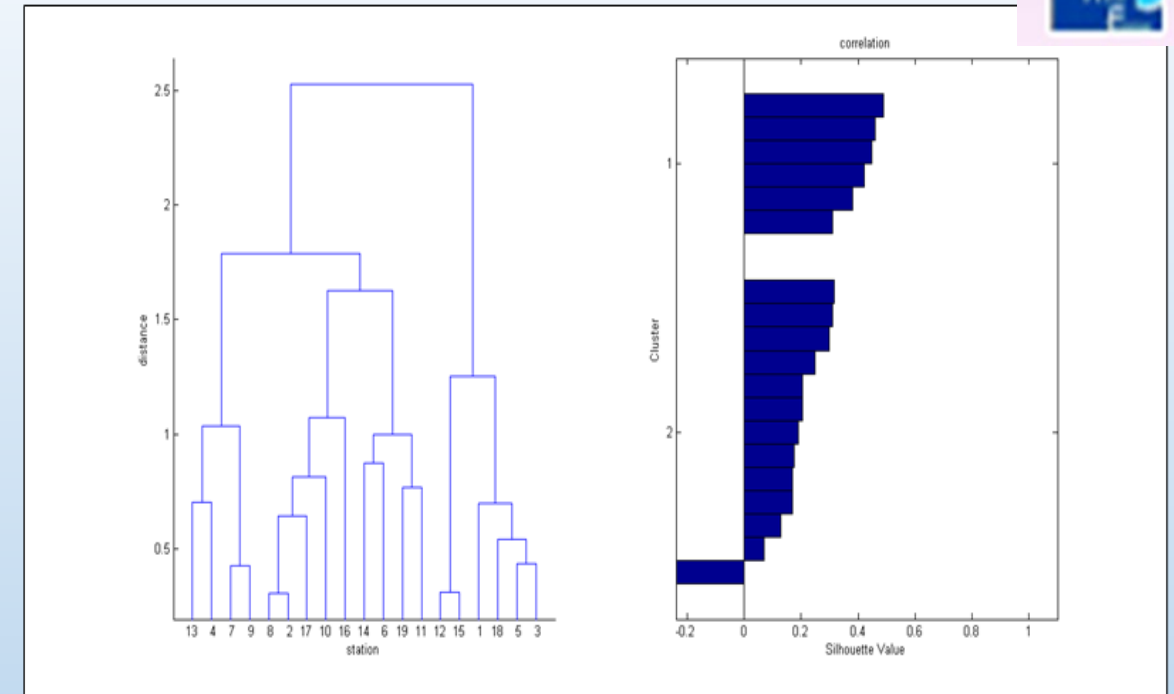


Figure 2. HCA clustering with correlation distance

Conclusion: For this application case, correlation distance give the most dense clusters. However one catchment is not well assigned.