GIS-MCDA Weighting

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| Method | Type | Description | Popularity | Year/author |
| Weighted Linear Combination (WLC) | Forward/ Aggregation | Calculates weighted sum of criteria | Very. | Jankowski (1995) |
| Analytic Hierarchy Process (AHP) | Forward/ pairwise comparisons | Uses eigenvector to build pairwise comparison matrix | very | Saaty (1980) |
| Ordered Weighted Averaging (OWA) |  |  |  |  |
| Entropy | Forward/ objective | Weights are determined via variability and uncertainty within the data | Somewhat common |  |
| UTA (Utilites Additives) | Inverse /Preference Disaggregation | Additive utility functions are derived from pre-defined rankings of alternatives (piecewise linear) | Common, rare in GIS applications |  |
| Robust Ordinal Regression (ROR) |  |  | Rare |  |
| MACBETH |  |  |  |  |
| PAPRIKA |  |  |  |  |
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**Analytical Hierarchy Process (AHP):** “AHP is composed of three main steps: (1) decomposing a problem into a hierarchy of elements, (2) making pairwise comparisons of elements on the same part of the hierarchy, and (3) developing the hierarchal score and apply it to relevant data (Church & Murray, 2008).

1. Pairwise Comparison Matrix:
   1. Experts will compare each criterion to every other, one at a time. Assign comparative importance (1-9 scale). With reciprocal values.
   2. A comparison matrix is formed:
2. Derive Weights from C(I,j)with eigenvector
   1. W is the eigenvector of C associated with the largest derived eigenvalue.

s.t.

1. Consistency Ratio (CR)
   1. A perfectly consistent matrix would be = k (number if criteria)

**Consistency Index (CI)**

**Consistency Ratio (CR).**

Confirms if derived index is consistent than a random one

where

**Random** index of matrix size k

* 1. A CR <= 0.1 is acceptable. If higher, derived weights are likely not representative of comparison matrix.