







Home ► All Journals ► Geography ► International Journal of Geographical Information Science ► List of Issues ► Volume 23, Issue 1 ► An improved Fuzzy Kappa statistic that a ....

### International Journal of Geographical Information Science >

Volume 23, 2009 - <u>Issue 1</u>

1,225 77
Views CrossRef citations to date Altmetric

Research Articles

# An improved Fuzzy Kappa statistic that accounts for spatial autocorrelation

Alex Hagen-Zanker

Pages 61-73 | Received 08 Aug 2008, Accepted 12 Oct 2008, Published online: 06 Apr 2009



➡ Reprints & Permissions

Read this article



## **Abstract**

Full Article

The Fuzzy Kappa statistic expresses the agreement between two categorical raster maps. The statistic goes beyond cell-by-cell comparison and gives partial credit to cells based on the categories found in the neighborhood. When matching categories are found at shorter distances the agreement is higher. Like the well-established Kappa statistic the Fuzzy Kappa statistic expresses the mean agreement relative to the expected agreement. The model underlying the expected agreement assumes absence of spatial autocorrelation in both compared maps. In reality however, spatial autocorrelation does lower the expected agreement as matching categories become less likely to be found close-by. Since most maps have some degree of spatial autocorrelation, the calculated expected agreement is generally higher than the true expected agreement. This leads to counterintuitive results when maps that appear to

have considerable agreement obtain negative Fuzzy Kappa values. Furthermore, the Fuzzy Kappa may be biased, as it systematically attributes lower agreement to maps with stronger spatial autocorrelation. This paper proposes an improved Fuzzy Kappa statistic that is based on the same local agreement and has the same attractive properties as the original Fuzzy Kappa. The novelty is that the new statistic accounts for spatial autocorrelation, such that the expected Fuzzy Kappa for maps that are not cross-correlated is equal to zero. The improved statistic is applied on two cases to demonstrate its properties.

## Keywords:

Fuzzy Kappa Map comparison Accuracy Validation

## Acknowledgements

This paper addresses the most frequently asked question of Map Comparison Kit users: 'Why do I get negative Fuzzy Kappa values for maps that appear quite similar?' I would like to thank the users for sending their feedback and enabling RIKS to improve on the methods and software. The elaborate and detailed feedback of three anonymous reviewers has been very helpful and is greatly appreciated.

#### Related Research Data

The magnitude and frequency of combined flow bed shear stress as a measure of exposure on the Australian continental shelf

Source: Continental Shelf Research

Fuzzy set approach to assessing similarity of categorical maps

Source: International Journal of Geographical Information Science

Further developments of a fuzzy set map comparison approach

Source: International Journal of Geographical Information Science

A new metric for evaluating the correspondence of spatial patterns in vegetation models

Source: Global Ecology and Biogeography

Use of the average mutual information index in evaluating classification error and consistency

Source: International Journal of Geographical Information Systems

## Related research 1



People also read Recommended articles Cited by 77

Information for

**Authors** 

**R&D** professionals

**Editors** 

Librarians

**Societies** 

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

**Open Select** 

**Dove Medical Press** 

F1000Research

Help and information

Help and contact

Newsroom

All journals

Books

#### Keep up to date

Register to receive personalised research and resources by email



Sign me up











Accessibility



Copyright © 2025 Informa UK Limited Privacy policy Cookies Terms & conditions



Registered in England & Wales No. 01072954 5 Howick Place | London | SW1P 1WG