Appendix for 'Reproducible Research and GIScience: an evaluation using GIScience conference papers'

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—— **Abstract** ——

GIScience conference authors and researchers face the same computational reproducibility challenges as authors and researchers from other disciplines who use computers to analyse data. Here, to assess the reproducibility of GIScience research, we apply a rubric for assessing the reproducibility of 75 conference papers published at the GIScience conference series in the years 2012-2018. Since the rubric and process were previously applied to the publications of the AGILE conference series, this paper itself is an attempt to replicate that analysis, however going beyond the previous work by evaluating and discussing proposed measures to improve reproducibility in the specific context of the GIScience conference series. The results of the GIScience paper assessment are in line with previous findings: although descriptions of workflows and the inclusion of the data and software suffice to explain the presented work, in most published papers they do not allow a third party to reproduce the results and findings with a reasonable effort. We summarise and adapt previous recommendations for improving this situation and propose the GIScience community to start a broad discussion on the reusability, quality, and openness of its research. Further, we critically reflect on the process of assessing paper reproducibility, and provide suggestions for improving future assessments. The code and data for this article are published at `https://doi.org/10.5281/zenodo.4032875`.

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1 Appendix

Table 1 Assessment results excerpt; for all fields (including assessors, authors, and assessment comments) see eproducibility package at `https://doi.org/10.5281/zenodo.4032875`.

year	title	con-cep-tual	input data	pre-proc.	method/anal./proc.	comp.env.	results
2018	Early Detection of Herding Behaviour during Emergency Evacuations	FALSE	1	NA	1	0	1
2018	What Makes Spatial Data Big? A Discussion on How to Partition Spatial Data	FALSE	0	1	1	0	1
2018	Intersections of Our World	FALSE	0	1	1	0	1
2018	Considerations of Graphical Proximity and Geographical Nearness	FALSE	0	NA	1	0	1
2018	An Empirical Study on the Names of Points of Interest and Their Changes with Geographic Distance	FALSE	0	1	1	0	1
2018	Outlier Detection and Comparison of Origin-Destination Flows Using Data Depth	FALSE	0	0	0	0	1
2018	Is Salience Robust? A Heterogeneity Analysis of Survey Ratings	FALSE	1	1	1	0	1
2018	Labeling Points of Interest in Dynamic Maps using Disk Labels	FALSE	1	2	2	0	1
2018	Improving Discovery of Open Civic Data	FALSE	0	NA	1	0	1
2018	Local Co-location Pattern Detection: A Summary of Results	FALSE	0	1	1	1	1
2018	Detection and Localization of Traffic Signals with GPS Floating Car Data and Random Forest	FALSE	0	1	1	1	1
2018	Heterogeneous Skeleton for Summarizing Continuously Distributed Demand in a Region	FALSE	0	NA	1	0	1
2018	A Network Flow Model for the Analysis of Green Spaces in Urban Areas	FALSE	1	1	1	1	1
2018	Continuous Obstructed Detour Queries	FALSE	0	0	1	1	1
2018	Enhanced Multi Criteria Decision Analysis for Planning Power Transmission Lines	FALSE	0	1	1	1	1
2018	FUTURES-AMR: Towards an Adaptive Mesh Refinement Framework for Geosimulations	FALSE	0	0	1	1	1
2018	xNet+SC: Classifying Places Based on Images by Incorporating Spatial Contexts	FALSE	0	1	1	1	1
2016	Computing River Floods Using Massive Terrain Data	FALSE	2	1	1	1	1
2016	Partitioning Polygons via Graph Augmentation	FALSE	0	NA	1	0	1
2016	Hierarchical Prism Trees for Scalable Time Geographic Analysis	FALSE	2	2	2	0	2
2016	Mining Network Hotspots with Holes: A Summary of Results	FALSE	1	0	1	0	1
2016	Distance-Constrained k Spatial Sub-Networks: A Summary of Results	FALSE	0	0	1	1	1
2016	GIScience Considerations in Spatial Social Networks	TRUE	NA	NA	NA	NA	NA
2016	On Distortion of Raster-Based Least-Cost Corridors	FALSE	0	0	1	0	1
2016	Model-Based Clustering of Social Vulnerability to Urban Extreme Heat Events	FALSE	1	1	1	0	1
2016	Representing the Spatial Extent of Places Based on Flickr Photos with a Representativeness-Weighted Kernel Density Estimation	FALSE	1	1	1	0	1
2016	Scaling Behavior of Human Mobility Distributions	FALSE	0	1	1	1	1
2016	pFUTURES: A Parallel Framework for Cellular Automaton Based Urban Growth Models	FALSE	0	0	1	1	1
2016	From Data Streams to Fields: Extending Stream Data Models with Field Data Types	TRUE	NA	NA	NA	NA	NA
2016	Point Partitions: A Qualitative Representation for Region-Based Spatial Scenes in R2	TRUE	NA	NA	NA	NA	NA
2016	Fine Scale Spatio-Temporal Modelling of Urban Air Pollution	FALSE	0	1	1	0	1
2016	Modeling Checkpoint-Based Movement with the Earth Movers Distance	FALSE	2	1	1	0	1
2016	Exploratory Chronotopic Data Analysis	FALSE	1	1	1	0	1
2016	Exploring the Notion of Spatial Lenses	FALSE	1	1	1	0	1
2016	Moon Landing or Safari? A Study of Systematic Errors and Their Causes in Geographic Linked Data	FALSE	1	0	1	0	1

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year	title	con-cep-tual	input data	pre-proc.	method/anal./proc.	comp. env.	results
2016	Circles in the Water: Towards Island Group Labeling	FALSE	0	NA	1	0	1
2016	An Algorithmic Framework for Labeling Road Maps	FALSE	2	1	1	1	2
2016	Measuring Cognitive Load for Map Tasks Through Pupil Diameter	FALSE	1	1	1	1	1
2014	Map Schematization with Circular Arcs	FALSE	0	NA	1	0	1
2014	Travel-Time Maps: Linear Cartograms with Fixed Vertex Locations	FALSE	0	NA	1	0	1
2014	3D Network Spatialization: Does It Add Depth to 2D Representations of Semantic Proximity?	FALSE	1	1	1	1	1
2014	Uncertainty Analysis of Step-Selection Functions: The Effect of Model Parameters on Inferences about the Relationship between Animal Movement and the Environment	FALSE	2	1	1	0	1
2014	Logic Scoring of Preference and Spatial Multicriteria Evaluation for Urban Residential Land Use Analysis	FALSE	0	1	1	0	1
2014	Spatial Weights: Constructing Weight-Compatible Exchange Matrices from Proximity Matrices	FALSE	0	0	1	0	1
2014	Spatial Graphs Cost and Efficiency: Exploring Edges Competition by MCMC	FALSE	1	1	1	0	1
2014	Geosemantic Network-of-Interest Construction Social Media Data	FALSE	1	1	1	0	1
2014	Data Quality Assurance for Volunteered Geographic Information	FALSE	1	1	1	0	1
2014	Re-Envisioning Data Description Using Peirce Pragmatics	TRUE	NA	NA	NA	NA	NA
2014	Fields as a Generic Data Type for Big Spatial Data	FALSE	1	1	1	0	1
2014	Linked Data - A Paradigm Shift for Geographic Information Science	TRUE	NA	NA	NA	NA	NA
2014	An Ontology Design Pattern for Surface Water Features	TRUE	NA	NA	NA	NA	NA
2014	An Indoor Navigation Ontology for Production Assets in a Production Environment	FALSE	0	NA	0	0	1
2014	Wayfinding Decision Situations: A Conceptual Model and Evaluation	FALSE	1	1	1	0	1
2014	Understanding Information Requirements in Text Only Pedestrian Wayfinding Systems	FALSE	1	NA	1	0	1
2014	Automatic Itinerary Reconstruction from Texts	FALSE	1	1	1	0	2
2014	Integrating Sensing and Routing for Indoor Evacuation	FALSE	0	NA	1	0	1
2014	Significant Route Discovery: A Summary of Results	FALSE	2	0	1	0	1
2014	Location Oblivious Privacy Protection for Group Nearest Neighbor Queries	FALSE	2	NA	1	0	1
2014	Practical Approaches to Partially Guarding a Polyhedral Terrain	FALSE	1	NA	1	0	1
2014	Oriented Regions for Linearly Conceptualized Features	TRUE	NA	NA	NA	NA	NA
2014	RCC*-9 and CBM*	TRUE	NA	NA	NA	NA	NA
2012	Combining Trip and Task Planning: How to Get from A to Passport	TRUE	NA	NA	NA	NA	NA
2012	Automated Centerline Delineation to Enrich the National Hydrography Dataset	FALSE	2	1	1	1	1
2012	Evolution Strategies for Optimizing Rectangular Cartograms	FALSE	1	1	1	1	1
2012	Context-Aware Similarity of Trajectories	FALSE	2	1	1	0	1
2012	Generating Named Road Vector Data from Raster Maps	FALSE	1	NA	1	0	1
2012	An Ordering of Convex Topological Relations	TRUE	NA	NA	NA	NA	NA
2012	Toward Web Mapping with Vector Data	FALSE	0	NA	1	0	1
2012	spatial@linkedscience Exploring the Research Field of GIScience with Linked Data	FALSE	2	1	1	1	2
2012	Crowdsourcing Satellite Imagery Analysis: Study of Parallel and Iterative Models	FALSE	0	0	1	0	1

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year	title	con-cep-tual	input data	pre-proc.	method/ anal./ proc.	comp. env.	results
2012	Quantifying Resolution Sensitivity of Spatial Autocorrelation: A Resolution Correlogram Approach	FALSE	0	1	1	1	1
2012	LocalAlert: Simulating Decentralized Ad-Hoc Collaboration in Emergency Situations	FALSE	NA	NA	2	1	1
2012	High-Level Event Detection in Spatially Distributed Time Series	FALSE	0	1	1	0	1
2012	Towards Vague Geographic Data Warehouses	FALSE	0	NA	2	0	2
2012	Measuring the Influence of Built Environment on Walking Behavior: An Accessibility Approach	FALSE	1	1	1	0	1
2012	Social Welfare to Assess the Global Legibility of a Generalized Map	FALSE	0	NA	1	0	1
2012	Investigations into the Cognitive Conceptualization and Similarity Assessment of Spatial Scenes	FALSE	1	NA	1	1	1
2012	A Qualitative Bigraph Model for Indoor Space	TRUE	NA	NA	NA	NA	NA
2012	Dynamic Refuse Collection Strategy Based on Adjacency Relationship between Euler Cycles	FALSE	2	NA	1	0	1
2012	Impact of Indoor Location Information Reliability on Users Trust of an Indoor Positioning System	FALSE	1	NA	1	0	1
2012	Ontology for the Engineering of Geospatial Systems	FALSE	1	NA	1	0	1
2012	Preserving Detail in a Combined Land Use Ontology	FALSE	1	1	1	0	0
2012	The Maptree: A Fine-Grained Formal Representation of Space	TRUE	NA	NA	NA	NA	NA
2012	Automatic Creation of Crosswalk for Geospatial Metadata Standard Interoperability	FALSE	1	0	1	0	1
2012	A Dartboard Network Cut Based Approach to Evacuation Route Planning: A Summary of Results	FALSE	2	NA	1	1	1
2012	Hybrid Geo-spatial Query Methods on the Semantic Web with a Spatially-Enhanced Index of DBpedia	FALSE	1	NA	1	0	1
2012	Extracting Dynamic Urban Mobility Patterns from Mobile Phone Data	FALSE	0	1	1	0	1