



Beyond Mapping Compilation Series

by Joseph K. Berry

...Beyond Mapping columns appearing in [GeoWorld](#) (formally GIS World) magazine from **March 1989** through **December 2013**.

Most GIS applications have focused on mapping and spatial data management for viewing and geo-query of mapped data. Map analysis and GIS modeling involve entirely new spatial reasoning concepts and procedures that are not reflected in our paper map legacy. The four books in the Beyond Mapping Compilation Series are based on Joe Berry's popular "Beyond Mapping" columns in GIS World/GeoWorld magazine that discusses the new breed of map analysis tools, how they can be used to better characterize and communicate spatial relationships, be organized into effective GIS model solutions, and spark entirely new spatial paradigms. The topics covered are written for novices, as well as GIS professionals, in a witty style that entertains as well as informs.

([click](#) to access additional **Chronological, Applications, Interactive** and **Index Listings** with hyperlinks to individual Beyond Mapping columns)

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Operations Listing

with hyperlinks to individual Beyond Mapping columns

The following **Operations Listing** contains all of Beyond Mapping (BM) columns appearing in GeoWorld from 1989 through 2013 alphabetically sorted into ten General themes, fifteen Analysis groupings and twelve Statistics groupings (< click > on any of the items to jump to that grouping)—

General Themes:	Spatial Analysis Classes:	Spatial Statistics Classes:
ConceptualFramework_Modeling (9 columns)	Distance_AccumulationSurface (5 columns)	Map_ComparisonContinuousData (2 columns)
ConceptualFramework_Operations (12 columns)	Distance_Connectivity (3 columns)	Map_ComparisonDiscreteData (3 columns)
DataConsiderations_Accuracy (6 columns)	Distance_EffectiveProximity (24 columns)	Map_ComparisonTtest (1 column)
DataConsiderations_Input (2 columns)	Distance_Narrowness (2 columns)	Map_Normalization (6 columns)
DataConsiderations_Structure (26 columns)	Distance_Routing (17 columns)	SpatialDataMining_Classification (3 columns)
Display_2D3D (3 columns)	Distance_TravelTime (6 columns)	SpatialDataMining_Clustering (5 columns)
Education_Approaches (9 columns)	Distance_VisualExposure (8 columns)	SpatialDataMining_Regression (6 columns)
General_Historical (12 columns)	Neighborhood_Configuration (10 columns)	SpatialDataMining_Similarity (2 columns)
General_Overview (36 columns)	Neighborhood_Summary (10 columns)	SurfaceModeling_Accuracy (3 columns)
Processing_Approaches (7 columns)	Overlay_CellbyCellCoincidence (15 columns)	SurfaceModeling_DensityAnalysis (2 columns)
	Overlay_MapWide (1 column)	SurfaceModeling_Interpolation (16 columns)
	Overlay_RegionWide (2 columns)	SurfaceModeling_PointSampling (2 columns)
	Reclassify_Contiguity (2 columns)	
	Reclassify_InitialValue (1 column)	
	Reclassify_Shape (6 columns)	

*Note: The colors in column 1 and 5 indicate the book— ■ blue= Book IV, **GIS Modeling**; ■ Salmon= Book III, **Map Analysis**; ■ green= Book II, **Spatial Reasoning**; and, ■ Grey= Book I, **Beyond Mapping**. When viewing the results of sorting on Groupings of Approaches and Operations or Application Areas the colors are helpful in quickly identifying the Book associated with each record (original Beyond Mapping column) appearing in the reorganized listing.*

General Themes:

*Note: The colors in column 1 and 5 indicate the book— ■ blue= Book IV, **GIS Modeling**; ■ Salmon= Book III, **Map Analysis**; ■ green= Book II, **Spatial Reasoning**; and, ■ Grey= Book I, **Beyond Mapping**. When viewing the results of sorting on Groupings of Approaches and Operations or Application Areas the colors are helpful in quickly identifying the Book associated with each record (original Beyond Mapping column) appearing in the reorganized listing.*

Date Code (Col 1)	Month (Col 2)	Year (Col 3)	Column Title/Description (Col 4)	Book/ Topic/Section (Col 5)	Groupings of <i>Operations</i> (Col 6)	Groupings of <i>Applications</i> (Col 7)
2010.11	November	2010	A Suitable Framework for GIS Modeling — describes a framework for suitability modeling based on a flowchart of model logic	B4, Topic 5, S5	ConceptualFramework_Modeling	NaturalResources_Suitability
2010.10	October	2010	Putting GIS Modeling Concepts in Their Place — develops a typology of GIS modeling types and characteristics	B4, Topic 5, S4	ConceptualFramework_Modeling	Basic_ConceptsApproach
1997.08	August	1997	Varied Applications Drive GIS Perspectives — discusses how map analysis is enlarging the traditional view of mapping	B3, Epilog, Further Reading4	ConceptualFramework_Modeling	Basic_Discussion
1996.01	January	1996	Extending Basic Models through Logic Modifications — describes extensions to a simple Landslide Susceptible model by adding additional criteria that changes a model's structure	B2, Topic 8, S2	ConceptualFramework_Modeling	NaturalResources_Suitability
1995.22	February	1995	Layers to Tapestry (supplement) — describes an interactive environment for diagramming GIS Logic and processing flows	B2, Topic 5, S3	ConceptualFramework_Modeling	Basic_Discussion
1995.12	December	1995	From Recipes to Models — describes basic Binary and Rating model expressions using a simple Landslide Susceptible model	B2, Topic 8, S1	ConceptualFramework_Modeling	NaturalResources_Suitability
1993.05	May	1993	Is Conflict Resolution an Oxymoron? — discusses how weights are used combining individual map layers of concern to derive an overall map of suitability that reflects group consensus	B1, Topic 10, S4	ConceptualFramework_Modeling	NaturalResources_Planning

1993.04	April	1993	Maps Speak Louder than Words — describes analysis procedures that translate decision-maker concerns into maps	B1, Topic 10, S3	ConceptualFramework_Modeling	NaturalResources_Planning
1993.02	February	1993	GIS Mirrors Perceptions of Decision Criteria — describes a flowcharting procedure that expresses GIS model logic in a clear and concise form	B1, Topic 10, S1	ConceptualFramework_Modeling	Basic_ConceptsApproach
2013.10	October	2013	Laying the Foundation for SpatialSTEM: Spatial Mathematics, Map Algebra and Map Analysis — discusses the conceptual foundation and intellectual shifts needed for SpatialSTEM	Topic 9, S6	ConceptualFramework_Operations	Basic_ConceptsAnalyticOperations
2013.02	February	2013	Recasting Map Analysis Operations for General Consumption — reorganizes ArcGIS's Spatial Analyst tools into the SpatialSTEM framework that extends traditional math/stat procedures	B4, Topic 9, Further Reading4	ConceptualFramework_Operations	Basic_ConceptsAnalyticOperations
2013.01	January	2012	SpatialSTEM Has Deep Mathematical Roots — provides a conceptual framework for a map-ematical treatment of mapped data	B4, Topic 9, S1	ConceptualFramework_Operations	GIS_Education
2012.05	May	2012	Infusing Spatial Character into Statistics — describes a statistical structure for spatial statistics operations	B4, Topic 9, S3	ConceptualFramework_Operations	GIS_Education
2012.04	April	2012	Simultaneously Trivializing and Complicating GIS — describes a mathematical structure for spatial analysis operations	B4, Topic 9, S2	ConceptualFramework_Operations	GIS_Education
2012.03	March	2012	Paint by Numbers Outside the Traditional Statistics Box — discusses the nature of Spatial Statistics operations	B4, Topic 9, Further Reading2	ConceptualFramework_Operations	GIS_Education
2012.02	February	2012	Map-ematically Messing with Mapped Data — discusses the nature of grid-based mapped data and Spatial Analysis operations	B4, Topic 9, Further Reading1	ConceptualFramework_Operations	GIS_Education
2004.03	March	2004	Use a Map-ematical Framework for GIS Modeling — describes a conceptual structure for map analysis operations and GIS modeling	B3, Topic 3, S1	ConceptualFramework_Operations	Basic_Discussion

1996.03	March	1996	Classifying the Analytical Capabilities of GIS — discusses the differences and similarities in the Berry and Tomlin map analysis classification schemes	B2, Topic 7, S2	ConceptualFramework_Operations	Basic_ConceptsApproach
1995.21	February	1995	Dodge the GIS Modeling Babble Ground — identifies a Classification Guide for categorizing GIS models	B2, Topic 5, S2	ConceptualFramework_Operations	Basic_ConceptsAnalyticOperations
1995.01	January	1995	What's in a Model? — discusses a conceptual framework for GIS model types and characteristics	B2, Topic 5, S1	ConceptualFramework_Operations	Basic_Discussion
1991.07	July	1991	Special URISA Issue — no BM column; special supplement made available, A Mathematical Structure for Analyzing Maps — a 1986 journal article establishing a framework for map analysis/modeling	B1, Epilog, S3	ConceptualFramework_Operations	Basic_ConceptsAnalyticOperations
1991.04	Apr/Mar	1991	What's Needed to Go Beyond Mapping — lists and describes the analytical tools needed to go beyond mapping	B1, Topic 4, S2	ConceptualFramework_Operations	Basic_Discussion
2008.02	February	2008	How to Determine Exactly "Where Is What" — discusses the levels of precision (correct placement) and accuracy (correct characterization)	B4, Topic 5, S2	DataConsiderations_Accuracy	Basic_ConceptsData
2007.03	March	2007	Understand Resolution to "Think with Maps" — discusses the factors that determine the "informational scale" digital maps	B4, Intro, S2	DataConsiderations_Accuracy	Basic_ConceptsData
2002.08	August	2002	Maps Are Numbers First, Pictures Later — discusses the numeric and geographic characteristics of map values	B3, Topic 1, S2	DataConsiderations_Accuracy	Basic_Discussion
1994.12	December	1994	Resolving Map Detail — discusses the four basic types Map Resolution (Spatial, Minimum Mapping, Thematic, Temporal) that define the level of detail in a digital map as dramatically different from the traditional concept of Map Scale	B2, Topic 7, S3	DataConsiderations_Accuracy	Basic_ConceptsData
1994.10	October	1994	Empirical Verification Assesses Mapping Performance — describes procedures for assessing mapping performance through Error Matrix (discrete) and Residual Analysis (continuous)	B2, Topic 4, S4	DataConsiderations_Accuracy	Basic_ConceptsApproach
1993.03	March	1993	Effective Standards Required to Go Beyond	B1, Topic 10,	DataConsiderations_Accuracy	Basic_ConceptsData

			Mapping — identifies and describes four levels of GIS standards (data Exchange, Geographic, Algorithmic and Interpretational)	S2		
1995.11	November	1995	Heads-Up and Feet-Down Digitizing — discusses the design components of a GIS/GPS/RS field unit	B2, Topic 9, S3	DataConsiderations_Input	Basic_ConceptsData
1995.09	September	1995	Put Things in Their Proper Places with GPS — identifies the basic concepts, principles and theoretical underpinnings of the Global Positioning System (GPS)	B2, Topic 9, S1	DataConsiderations_Input	Basic_ConceptsData
2013.09	September	2013	The Spatial Key to Seeing the Big Picture — describes a five step process for generating grid map layers from spatially tagged data	B4, Topic 9, Further Reading3	DataConsiderations_Structure	Basic_ConceptsData
2013.06	June	2013	Setting a Place at the Table for Grid-based Data — describes the differences between individual file and table storage approaches	B4, Topic 1, S4	DataConsiderations_Structure	Basic_ConceptsData
2013.03	March	2013	Depending on Where is What — develops an organizational structure for spatial statistics	B4, Topic 9, S5	DataConsiderations_Structure	Basic_ConceptsApproach
2012.10	October	2012	To Boldly Go Where No Map Has Gone Before — identifies Lat/Lon as a Universal Spatial Key for joining database tables	B4, Topic 9, S4	DataConsiderations_Structure	Basic_ConceptsData
2012.09	September	2012	Organizing Geographic Space for Effective Analysis — an overview of data organization for grid-based map analysis	B4, Topic 1, S1	DataConsiderations_Structure	Basic_ConceptsData
2011.12	December	2011	VtoR and Back! — describes various techniques for converting between vector and raster data types	B4, Topic 1, S3	DataConsiderations_Structure	Basic_ConceptsData
2011.10	October	2011	The Universal Key for Unlocking GIS's Full Potential — outlines a global referencing system approach compatible with standard DBMS systems	B4, Topic 7, S6	DataConsiderations_Structure	Basic_ConceptsData
2009.12	December	2009	From a Map Pancake to a Soufflé — continues the discussion of concepts and configuration of a 3D GIS	B4, Topic 10, Further Reading1	DataConsiderations_Structure	Basic_ConceptsData

2009.11	November	2009	Thinking Outside the Box — discusses concepts and configuration of 3-dimensional geography	B4, Topic 10, S4	DataConsiderations_Structure	Basic_ConceptsData
2009.10	October	2009	Visualizing a Three-dimensional Reality — uses visual connectivity to introduce and reinforce the paradigm of three-dimension geography	B4, Topic 10, S3	DataConsiderations_Structure	Basic_ConceptsData
2007.05	May	2007	Getting the Numbers Right — describes a classification scheme for map analysis operations based on how map values are retrieved for processing (Local, Focal, Zonal)	B4, Topic 5, S3	DataConsiderations_Structure	Basic_ConceptsData
2007.04	April	2007	Geo-Referencing Is the Cornerstone of GIS — describes current and alternative approaches for referencing geographic and abstract space	B4, Intro,S3	DataConsiderations_Structure	Basic_ConceptsData
2007.02	February	2007	Finding Common Ground in Paper and Digital Worlds — describes the similarities and differences in information and organization between traditional paper and digital maps	B4, Intro, S1	DataConsiderations_Structure	Basic_ConceptsData
2003.04	April	2003	Multiple Methods Help Organize Raster Data — discusses different approaches to storing raster data	B3, Topic 1, Further Reading1	DataConsiderations_Structure	Basic_ConceptsAnalyticOperations
2001.03	March	2001	Integrate Travel-Time into Mapping Packages — describes procedures for transferring travel-time data to other maps	B3, Topic 4, Further Reading5	DataConsiderations_Structure	GeoBusiness_TravelTime
1998.07	Jul/Aug	1989	GIS Technology Is Technical Oz — discusses and compares the relative advantages/disadvantages between Vector and Raster processing	B1, Topic 1, S3	DataConsiderations_Structure	Basic_ConceptsData
1998.05	May V2-3	1989	It Depends: Implications of data structure — discusses and compares the similarities and differences between Vector and Raster data structure applications	B1, Topic 1, S2	DataConsiderations_Structure	Basic_ConceptsData
1998.03	March V2-2	1989	Maps as Data: a 'Map-ematics' is Emerging — describes the differences between Discrete and Continuous mapped data	B1, Topic 1, S1	DataConsiderations_Structure	Basic_ConceptsData
1995.08	August	1995	Rasterized Lines and Vectorized Cells — describes specialized offshoots of	B2, Topic 6, S4	DataConsiderations_Structure	Basic_ConceptsData

			<i>traditional raster and vector data formats</i>			
1995.07	July	1995	How are your QUADS and TINS? — describes alternative Quadtree and Triangular Irregular Network data formats	B2, Topic 6, S3	DataConsiderations_Structure	Basic_ConceptsData
1995.06	June	1995	Raster is Faster, but Vector is Correcter — describes the structuring of traditional Vector data using explicit topology linking spatial and attribute tables	B2, Topic 6, S2	DataConsiderations_Structure	Basic_ConceptsData
1995.05	May	1995	Are You a GIS Dead Head? — describes the structuring of traditional Raster data using implicit topology based on the row/column positioning in a matrix	B2, Topic 6, S1	DataConsiderations_Structure	Basic_ConceptsData
1994.11	November	1994	What Does Your Computer Really Think of Your Map? — discusses Spatial Topology through the differences among Graphics Packages, Mapping Software, Spatial Database Management Systems, and GIS Analysis/Modeling Systems	B2, Topic 7, S1	DataConsiderations_Structure	Basic_ConceptsData
1993.09	September	1993	Terminology Accelerates Your Intellectual Depletion Allowance — introduces the concepts and organization used in GIS databases comprised of multiple map layers	B1, Intro, S3	DataConsiderations_Structure	Basic_ConceptsData
1993.08	August	1993	GIS Maps Are Dumb — compares the basic Vector and Raster data structure approaches for storing individual map layers	B1, Intro, S2	DataConsiderations_Structure	Basic_ConceptsData
1993.07	July	1993	Coming to Terms with Terminology — describes the underlying theory of how point, line and areal features are stored in Vector and Raster GISs	B1, Intro, S1	DataConsiderations_Structure	Basic_ConceptsData
2011.11	November	2011	Contour Lines versus Color Gradients for Displaying Spatial Information — discusses the similarities and differences between discrete contour line and continuous gradient procedures for visualizing map surfaces	B4, Topic 1, S4	Display_2D3D	Basic_ConceptsApproach
2003.06	June	2003	Use Mapping “Art” to Visualize Values — describes procedures for generating contour maps	B3, Topic 1, Further Reading2	Display_2D3D	Basic_ConceptsApproach
2002.07	July	2002	Grids and Lattices Build Visualizations —	B3, Topic 1, S1	Display_2D3D	Basic_ConceptsData

			<i>describes Lattice and Grid forms of map surface display</i>			
2012.06	June	2012	Questioning GIS in Higher Education — describes thoughts and notes from a panel discussion on “GIS in Higher Education”	B4, Topic 6, Further Reading	Education_Approaches	GIS_Education
2011.01	January	2011	Which Direction Are You Headed? — describes four perspectives on the trailing “S” in the GIS acronym from a GIS’ers Perspective	B4, Topic 6, S1	Education_Approaches	Basic_Discussion
2010.03	March	2010	Fitting Square Pegs into Round GIS Educational Holes — discusses the need to engage non-GIS students in developing spatially distributed solutions	B4, Topic 6, S4	Education_Approaches	GIS_Education
2010.02	February	2010	GIS Education’s Need for “Hitchhikers” — establishes the need for engaging “domain experts” in moving geotechnology to the next level	B4, Topic 6, S3	Education_Approaches	GIS_Education
2010.01	January	2010	A Quick Peek Outside GIS’s Disciplinary Cave — discusses future directions of geotechnology with particular emphasis on career outlook and GIS education	B4, Topic 6, S2	Education_Approaches	GIS_Education
2009.07	July	2009	Melding the Minds of the “-ists” and “-ologists” — elaborates on the two basic mindsets driving the geotechnology community	B4, Topic 6, Further Reading2	Education_Approaches	NaturalResources_Planning
2003.05	May	2003	Turning GIS Education on Its Head — describes the numerous GIS career pathways and the need to engage prospective students from a variety of fields	B3, Epilog, Further Reading6	Education_Approaches	GIS_Education
1993.06	June	1993	Special URISA Issue — no BM column; special supplement made available, Learning Computer-Assisted Map Analysis — a 1986 journal article describing how “old-fashioned math and statistics can go a long way toward helping us understand GIS”	B1, Epilog, S2	Education_Approaches	GIS_Education
1992.08	August	1992	A Tailored Plan and Curriculum Cure GIS Training Woes — describes and discusses the importance of effective education and training needed for successful GIS adoption	B1, Topic 8, S3	Education_Approaches	GIS_Education
2013.12	December	2013	Where Do We Go from Here? — Swan	Epilog, S2	General_Historical	Basic_Discussion

			<i>Song after 25 years of Beyond Mapping columns</i>			
2008.01	January	2008	Explore the Softer Side of GIS — describes a Manual GIS (circa 1950) and the relationship between social science conceptual frameworks for understanding/judgment in GIS modeling	B4, Topic 5, Further Reading1	General_Historical	Basic_Discussion
2007.08	August	2007	GIS Innovation Drives Its Evolution — discusses the cyclic nature of GIS innovation (Mapping, Structure and Analysis)	B4, Topic 10, S1	General_Historical	Basic_Discussion
2007.01	January	2007	A Multifaceted GIS Community — investigates the technical shifts and cultural impacts of the rapidly expanding GIS tent of users, application developers and tool programmers	B3, Epilog, S2	General_Historical	Basic_Discussion
2006.12	December	2006	Pathways to GIS — explores different paths of GIS adoption for five disciplines (Natural Resources, Facilities Management, Public Health, Business and Precision Agriculture)	B3, Epilog, S1	General_Historical	Basic_Discussion
2006.11	November	2006	Contemporary GIS and Future Directions — discusses contemporary GIS and probable future directions (Multimedia Mapping and Spatial Reasoning/Dialog)	B3, Intro, S2	General_Historical	Basic_Discussion
2006.10	October	2006	Early GIS Technology and Its Expression — traces the early phases of GIS technology (Computer Mapping, Spatial Database Management and Map Analysis/Modeling)	B3, Intro, S1	General_Historical	Basic_Discussion
1998.09	September	1998	GIS Software's Changing Roles — discusses the evolution of GIS software and identifies important trends	B3, Intro, Further Reading1	General_Historical	Basic_Discussion
1996.11	November	1996	Does Anyone Object? — discusses some concerns of object-oriented GIS	B3, Intro, Further Reading4	General_Historical	Basic_Discussion
1996.10	October	1996	Spatial Objects—the Parse and Parcel of GIS? — discusses database objects and their map expressions	B3, Intro, Further Reading3	General_Historical	Basic_Discussion
1996.09	September	1996	What Is Object-Oriented Technology Anyway? — establishes the basic concepts in object-oriented technology	B3, Intro, Further Reading2	General_Historical	Basic_Discussion

1996.07	July	1996	Don't Forget the Human Factor: an Experiential GIS — describes an early experience (1980) in the application of GIS to land use planning involving the spatial expression and public hearing of a Comprehensive Plan of Development and Conservation	B2, Epilog, S1	General_Historical	Basic_Discussion
1993.12	December	1993	Consider a GIS Modeler's Toolkit — discusses an Object-Oriented Programming System approach to GIS model development	B2, Topic 1, S3	General_Historical	Basic_Discussion
2013.12	December	2013	Where Do We Go from Here? — Swan Song after 25 years of Beyond Mapping columns	B4, Epilog, S2	General_Overview	Basic_Discussion
2013.11	November	2013	The Good, the Bad and the Ugly Sides of GIS — discusses the potential of geotechnology to hinder (or even thwart) societal progress	Epilog, S1	General_Overview	Basic_Discussion
2013.11	November	2013	The Good, the Bad and the Ugly Sides of GIS — discusses the potential of geotechnology to hinder (or even thwart) societal progress	B4, Epilog, S1	General_Overview	Basic_Discussion
2013.10	October	2013	Laying the Foundation for SpatialSTEM: Spatial Mathematics, Map Algebra and Map Analysis — discusses the conceptual foundation and intellectual shifts needed for SpatialSTEM	B4, Topic 9, S6	General_Overview	Basic_ConceptsApproach
2013.05	May	2013	Mixing It up in GIS Modeling's Kitchen — an overview of map analysis and GIS modeling considerations	B4, Topic 5, S1	General_Overview	Basic_ConceptsApproach
2010.12	December	2010	GIS's Supporting Role in the Future of Natural Resources — discusses the influence of human dimensions in natural resources and GIS technology's role	B4, Topic 8, S6	General_Overview	NaturalResources_Planning
2009.03	March	2009	What's in a Name — suggests and defines the new more comprehensive term "Geotechnology"	B4, Intro, Further Reading2	General_Overview	Basic_Discussion
2009.02	February	2009	Is it Soup Yet? — describes the evolution in GIS definitions and terminology	B4, Intro, Further Reading1	General_Overview	Basic_Discussion

2007.12	December	2007	Lumpers and Splitters Propel GIS — describes the two camps of GIS (GeoExploration and GeoScience)	B4, Topic 6, Further Reading1	General_Overview	Basic_Discussion
2006.08	August	2006	Spatial Data Mining "Down on the Farm" — discusses process for moving from Whole-Field to Site-Specific management	B3, Topic 10, S6	General_Overview	PrecisionAgriculture_Process
2004.12	December	2004	Moving Mapping to Analysis of Mapped Data — describes Spatial Analysis and Spatial Statistics as extensions to traditional mapping and statistics	B3, Topic 2, S1	General_Overview	Basic_ConceptsApproach
2000.10	October	2000	Video Mapping Brings Maps to Life — describes how video maps are generated and discusses some applications of video mapping	B3, Intro, Further Reading9	General_Overview	Video_Mapping
2000.09	September	2000	Capture "Where and When" on Video-based GIS — describes how GPS-enabled video and digital still cameras work	B3, Intro, Further Reading8	General_Overview	Video_Mapping
2000.08	August	2000	How to Represent Changes in a Virtual Forest — discusses how simulations and "fly-bys" are used to visualize landscape changes and characteristics	B3, Intro, Further Reading7	General_Overview	VirtualReality_Mapping
2000.07	July	2000	How to Rapidly Construct a Virtual Scene — describes the procedures in generating a virtual scene from landscape inventory data	B3, Intro, Further Reading6	General_Overview	VirtualReality_Mapping
2000.06	June	2000	Behind the Scenes of Virtual Reality — discusses the basic considerations and concepts in 3D-object rendering	B3, Intro, Further Reading5	General_Overview	VirtualReality_Mapping
1998.10	October	1998	GIS Data Are Rarely Normal — describes the basic non-spatial descriptive statistics	B3, Topic 9, S1	General_Overview	Basic_Discussion
1997.09	September	1997	Diverse Student Needs Must Drive GIS Education — identifies new demands and students that are molding the future of GIS education	B3, Epilog, Further Reading5	General_Overview	GIS_Education
1997.06	June	1997	Where Is GIS Education — describes the broadening appeal of GIS and its impact on academic organization and infrastructure	B3, Epilog, Further Reading3	General_Overview	GIS_Education
1996.08	August	1996	Developing an Understanding GIS — describes the translation of mapped data to	B2, Epilog, S2	General_Overview	Basic_Discussion

			<i>spatial information for decision-making</i>			
1996.06	June	1996	Analyzing Spatial Dependency between Maps — investigates multivariate analysis involving the coincidence of two or more map layers	B2, Topic 10, S3	General_Overview	Basic_Discussion
1996.05	May	1996	Analyzing Spatial Dependency within a Map — investigates univariate analysis involving spatial relationships within a single map layer	B2, Topic 10, S2	General_Overview	Basic_Discussion
1996.04	April	1996	The Unique Character of Spatial Analysis — discusses spatial analysis as deriving new spatial information based on geographic dependence within and among map variables	B2, Topic 10, S1	General_Overview	Basic_Discussion
1995.04	April	1995	Explore a New Spatial Paradigm — discusses the movement from mapping and spatial inventories by technologists to spatial reasoning and dialog involving enlightened users in development of solutions to complex spatial problems	B2, Intro, S2	General_Overview	Basic_Discussion
1995.03	March	1995	Is the GIS Cart in Front of the Horse? — discusses driving forces, trends and forecasts in contemporary GIS from the perspective of modeling interrelationships among mapped variables	B2, Intro, S1	General_Overview	Basic_Discussion
1994.06	June	1994	Build It and They Will Come — describes the tactical and conceptual considerations in GIS implementation	B2, Topic 3, S3	General_Overview	Basic_Discussion
1994.05	May	1994	What Can GIS Do for You? — identifies and discusses the seven basic types of questions addressed by GIS technology	B2, Topic 3, S2	General_Overview	Basic_Discussion
1994.04	April	1994	Question GIS before You Start — discusses the importance of an Information Needs Assessment (INA) and a GIS Reality Assessment (GRA)	B2, Topic 3, S1	General_Overview	Basic_Discussion
1994.01	January	1994	Averages Are Mean — compares nonspatial and spatial distributions of field data	B2, Topic 2, S1	General_Overview	Basic_ConceptsApproach
1993.11	November	1993	Moving Toward a Humane GIS — describes an interactive link between GIS	B2, Topic 1, S2	General_Overview	Basic_Discussion

			<i>model logic and code</i>			
1993.10	October	1993	Distinguishing Data from Information and Understanding — considers the fundamental concepts behind moving mapped data to information and ultimately to understanding	B2, Topic 1, S1	General_Overview	Basic_Discussion
1992.07	July	1992	Bringing the GIS Paradigm to Closure — discusses the evolution and probable future of GIS technology	B1, Epilog, S1	General_Overview	Basic_Discussion
1992.06	June	1992	GIS Is Never Having to Say You're Sorry — discusses the human and organizational considerations in adopting GIS technology	B1, Topic 8, S2	General_Overview	Basic_Discussion
1992.05	May	1992	Both Dreams and Nightmares Are Born of Frustration — discusses the limitations of traditional cost/benefit analysis in evaluating the adoption of a radically new technology like GIS	B1, Topic 8, S1	General_Overview	Basic_Discussion
1991.06	June	1991	Frankly My Dear, I Don't Give a Damn — discusses how GIS modeling and spatial reasoning are changing policy formation and decision-making	B1, Topic 4, S4	General_Overview	Basic_Discussion
1991.05	May	1991	Who Says You Can't Teach an Old Dog New Tricks? — describes the basic concepts and approaches used in GIS modeling	B1, Topic 4, S3	General_Overview	Basic_Discussion
1991.02	Feb/Jan	1991	Technobabble — discusses the radical changes GIS technology and the digital map are bringing to traditional mapping	B1, Topic 4, S1	General_Overview	Basic_Discussion
2009.09	September	2009	GIS and the Cloud Computing Conundrum — describes cloud computing with particular attention to its geotechnology expression	B4, Topic 10, S2	Processing_Approaches	Basic_Discussion
1999.04	April	1999	GIS Represents Spatial Patterns and Relationships — discusses the important differences among discrete mapping, continuous map surfaces and map analysis	B3, Topic 2, Further Reading1	Processing_Approaches	Basic_Discussion
1999.03	March	1999	Observe the Evolving GIS Mindset — illustrates the "map-ematical" approach to analyzing mapped data	B3, Epilog, Further Reading2	Processing_Approaches	Basic_Discussion

1999.02	February	1999	Is GIS Technology Ahead of Science? — discusses several issues surrounding the differences in the treatment of non-spatial and spatial data	B3, Epilog, Further Reading1	Processing_Approaches	Basic_Discussion
1998.07	July	1998	Explore Data Space — establishes the concept of "data space" and how mapped data conforms to this fundamental view	B3, Topic 10, Further Reading3	Processing_Approaches	Basic_ConceptsApproach
1998.06	June	1998	Link Data and Geographic Distributions — describes the direct link between numeric and geographic distributions	B3, Topic 10, Further Reading2	Processing_Approaches	Basic_ConceptsApproach
1998.05	May	1998	Beware the Slippery Surfaces of GIS Modeling — discusses the relationships among maps, map surfaces and data distributions	B3, Topic 10, Further Reading1	Processing_Approaches	Basic_ConceptsApproach

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Spatial Analysis Classes:

Note: The colors in column 1 and 5 indicate the book— ■ blue= Book IV, **GIS Modeling**; ■ Salmon= Book III, **Map Analysis**; ■ green= Book II, **Spatial Reasoning**; and, ■ Grey= Book I, **Beyond Mapping**. When viewing the results of sorting on Groupings of Approaches and Operations or Application Areas the colors are helpful in quickly identifying the Book associated with each record (original Beyond Mapping column) appearing in the reorganized listing.

Date Code (Col 1)	Month (Col 2)	Year (Col 3)	Column Title/Description (Col 4)	Book/ Topic/Section (Col 5)	Approaches and Operations (Col 6)	Application Areas (Col 7)
1998.01	January	1998	Analyzing Stepped Accumulation Surfaces — describes a technique for forcing an optimal path through a series of points	B3, Topic 8, Further Reading7	Distance_AccumulationSurface	Basic_ConceptsApproach
1997.12	December	1997	Determining Optimal Path Corridors — describes a technique for determining the set of n th best paths between two points	B3, Topic 8, Further Reading6	Distance_AccumulationSurface	Basic_ConceptsApproach
1997.11	November	1997	Analyzing Accumulation Surfaces — describes how two surfaces can be analyzed to determine the relative travel-time advantages	B3, Topic 8, Further Reading5	Distance_AccumulationSurface	Basic_ConceptsApproach
1997.10	October	1997	Building Accumulation Surfaces — reviews how proximity analysis and effective distance is used to construct accumulation surfaces	B3, Topic 8, Further Reading4	Distance_AccumulationSurface	Basic_ConceptsApproach
1990.02	Feb/Mar	1990	Keep It Simple Stupid (KISS) — describes the use of “accumulation surfaces” for deriving optimal path density and N th best paths	B1, Topic 2, S3	Distance_AccumulationSurface	Basic_ConceptsAnalyticOperations
2009.05	May	2009	Identifying Upland Ridges — describes a procedure for locating extended upland ridges	B4, Topic 3, S3	Distance_Connectivity	Terrain_Analysis
2005.09	September	2005	Connect All the Dots to Find Optimal Paths — describes a procedure for determining an optimal path network from a dispersed set of end points	B3, Topic 8, Further Reading3	Distance_Connectivity	Infrastructure_Routing
2000.04	April	2000	Confluence Maps Further Characterize Micro-terrain Features — describes the use of optimal path density analysis for mapping surface flows	B3, Topic 4, Further Reading15	Distance_Connectivity	Terrain_Analysis
2012.11	November	2012	Just How Crooked Are Things? —	B4, Topic 2, Further	Distance_EffectiveProximity	NaturalResources_EmergencyResponse

			<i>discusses distance-related metrics for assessing crookedness</i>	Reading1		
2011.09	September	2011	Assessing Wildfire Response (Part 2): Jumping Right into It — describes map analysis procedures for determining initial response time for alternative attack modes	B4, Topic 8, Further Reading5	Distance_EffectiveProximity	NaturalResources_WildFire
2011.08	August	2011	Assessing Wildfire Response (Part 1): Oneth by Land, Twoeth by Air — discusses a spatial model for determining effective helicopter landing zones	B4, Topic 8, Further Reading4	Distance_EffectiveProximity	NaturalResources_WildFire
2011.03	March	2011	A Dynamic Tune-up for Distance Calculations — describes the algorithms for dynamic effective distance procedures involving intervening conditions	B4, Topic 2, S2	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2011.02	February	2011	Advancing the Concept of Effective Distance — describes the algorithms used in implementing Starter value advanced techniques	B4, Topic 2, S1	Distance_EffectiveProximity	NaturalResources_EmergencyResponse
2010.06	June	2010	A Twelve-step Program for Recovery from Flaky Forest Formulations — describes a spatial model for identifying Landings and Timbersheds	B4, Topic 8, Further Reading1	Distance_EffectiveProximity	NaturalResources_Harvesting
2010.05	May	2010	Extending Forest Harvesting's Reach — discusses a multiplicative weighting method for model extension	B4, Topic 8, S2	Distance_EffectiveProximity	NaturalResources_Harvesting
2010.04	April	2010	Harvesting an Understanding of GIS Modeling — describes a prototype model for assessing off-road access to forest areas	B4, Topic 8, S1	Distance_EffectiveProximity	NaturalResources_Harvesting
2005.08	August	2005	Taking Distance to the Edge — discusses advance distance operations	B3, Topic 4, Further Reading3	Distance_EffectiveProximity	Basic_Discussion
2005.07	July	2005	Calculate and Compare to Find Effective Proximity — describes how effective proximity is calculated	B3, Topic 4, Further Reading2	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2005.06	June	2005	Extend Simple Proximity to Effective Movement — discusses the concept of effective distance responding to relative and absolute barriers	B3, Topic 4, S4	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2005.05	May	2005	Use Cells and Rings to Calculate Simple	B3, Topic 4,	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations

			Proximity — describes how simple proximity is calculated	Further Reading1		
2005.04	April	2005	Measuring Distance Is Neither Here nor There — discusses the basic concepts of distance and proximity	B3, Topic 4, S3	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2005.01	January	2005	Bending Our Understanding of Distance — uses effective distance in establishing erosion setback to demonstrate spatial analysis	B3, Topic 2, S2	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2004.02	February	2004	Migration Modeling Determines Spill Effect — describes procedures for assessing overland and channel flow impacts	B3, Topic 4, Further Reading21	Distance_EffectiveProximity	Infrastructure_Pipeline
2004.01	January	2004	Use Available Tools to Calculate Flow Time and Quantity — discusses procedures for tracking flow time and quantity	B3, Topic 4, Further Reading20	Distance_EffectiveProximity	Infrastructure_Pipeline
2003.12	December	2003	Constructing Realistic Downhill Flows Proves Difficult — discusses procedures for characterizing path, sheet, horizontal and fill flows	B3, Topic 4, Further Reading19	Distance_EffectiveProximity	Infrastructure_Pipeline
2003.11	November	2003	Traditional Approaches Can't Characterize Overland Flow — describes the basic considerations in overland flow	B3, Topic 4, Further Reading18	Distance_EffectiveProximity	Infrastructure_Pipeline
2000.11	November	2000	Extending GIS Procedures with Variable-Width Buffers — discusses the basic considerations in establishing variable-width buffers that respond to both intervening conditions and the type of connectivity	B3, Topic 4, S1	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2000.05	May	2000	Modeling Erosion and Sediment Loading — illustrates a GIS model for assessing erosion potential and sediment loading	B3, Topic 4, Further Reading16	Distance_EffectiveProximity	Terrain_Analysis
1998.11	Nov/Dec	1989	As the Crow Walks — describes the use of “propagating waves” for calculating effective distance and optimal paths	B1, Topic 2, S2	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
1998.09	Sep/Oct	1989	You Can't Get There from Here — introduces the similarities and differences between “simple” and “effective” distance measurement	B1, Topic 2, S1	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
1992.11	November	1992	Rubber Rulers Fit Reality Better —	B1, Topic 9, S3	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations

			<i>describes procedures for calculating effective distance that considers intervening absolute and relative barriers</i>			
1992.10	October	1992	Distance Is Simple and Straight Forward — describes simple distance calculation as a propagating wavefront	B1, Topic 9, S2	Distance_EffectiveProximity	Basic_ConceptsAnalyticOperations
2009.06	June	2009	A Narrow-minded Approach — describes how Narrowness maps are derived	B4, Topic 2, S4	Distance_Narrowness	NaturalResources_Suitability
1990.04	Apr/May	1990	There's Only One Problem Having All this Sophisticated Equipment — discusses the basic approaches used for calculating narrowness and visual connectivity	B1, Topic 2, S4	Distance_Narrowness	Basic_ConceptsAnalyticOperations
2013.01	January	2013	Optimal Path Density is not all that Dense (Conceptually) — uses Optimal Path Density Analysis to identify “corridors of common access”	B4, Topic 8, Further Reading3	Distance_Routing	NaturalResources_EmergencyResponse
2012.12	December	2012	Bringing Travel and Terrain Directions into Line — describes comparison procedures and route evaluation techniques	B4, Topic 8, Further Reading2	Distance_Routing	NaturalResources_EmergencyResponse
2010.08	August	2010	Extending Emergency Response Beyond the Lines — discusses basic model processing and modifications for additional considerations	B4, Topic 8, S4	Distance_Routing	NaturalResources_EmergencyResponse
2010.07	July	2010	E911 for the Backcountry — describes development of an on- and off-road travel-time surface for emergency response	B4, Topic 8, S3	Distance_Routing	NaturalResources_EmergencyResponse
2009.08	August	2009	Use Spatial Sensitivity Analysis to Assess Model Response — develops an approach for assessing the sensitivity of GIS models	B4, Topic 5, Further Reading2	Distance_Routing	Infrastructure_Routing
2006.03	March	2006	Use LCP Procedures to Center Optimal Paths — discusses a procedure for eliminating “zig-zags” in areas of minimal siting preference	B3, Topic 8, Further Reading2	Distance_Routing	Infrastructure_Routing
2003.10	October	2003	Think with Maps to Evaluate Alternative Routes — describes procedures for comparing routes	B3, Topic 8, S4	Distance_Routing	Basic_ConceptsAnalyticOperations
2003.09	September	2003	A Recipe for Calibrating and Weighting GIS Model Criteria — identifies procedures for calibrating and weighting map layers in GIS	B3, Topic 8, S3	Distance_Routing	Basic_ConceptsAnalyticOperations

			<i>models</i>			
2003.08	August	2003	Consider Multi-Criteria When Routing — discusses the construction of a discrete “cost/avoidance” map and optimal path corridors	B3, Topic 8, S2	Distance_Routing	Basic_ConceptsAnalyticOperations
2003.07	July	2003	A Three-Step Process Identifies Preferred Routes — describes the basic steps in Least Cost Path analysis	B3, Topic 8, S1	Distance_Routing	Basic_ConceptsAnalyticOperations
2002.10	October	2002	Accumulation Surfaces Connect Bus Riders and Stops — discusses an accumulation surface analysis procedure for linking riders with bus stops	B3, Topic 4, Further Reading8	Distance_Routing	Basic_ConceptsAnalyticOperations
2001.05	May	2001	Consider Slope and Scenic Beauty in Deriving Hiking Maps — describes a general procedure for weighting friction maps to reflect different objectives	B3, Topic 4, Further Reading7	Distance_Routing	Basic_ConceptsAnalyticOperations
2001.04	April	2001	Derive and Use Hiking-Time Maps for Off-Road Travel — discusses procedures for establishing hiking-time buffers responding to off-road travel	B3, Topic 4, Further Reading6	Distance_Routing	Basic_ConceptsAnalyticOperations
1998.04	April	1998	Continued Analysis of In-Store Movement and Sales Patterns — describes the use of temporal analysis and coincidence mapping to enhance shopping patterns	B3, Topic 4, Further Reading14	Distance_Routing	GeoBusiness_InStoreMovement
1998.03	March	1998	Further Analyzing In-Store Movement and Sales Patterns — discusses how map analysis is used to investigate the relationship between shopper movement and sales	B3, Topic 4, Further Reading13	Distance_Routing	GeoBusiness_InStoreMovement
1998.02	February	1998	GIS Analyzes In-Store Movement and Sales Patterns — describes a procedure using accumulation surface analysis to infer shopper movement from cash register data	B3, Topic 4, Further Reading12	Distance_Routing	GeoBusiness_InStoreMovement
1992.12	December	1992	Twists and Contortions Lead to Connectivity — describes procedures for calculating optimal paths and routing corridors	B1, Topic 9, S4	Distance_Routing	Basic_ConceptsAnalyticOperations
2009.01	January	2009	Follow These Steps to Map Potential Sales — describes an extensive geo-business application that combines retail competition analysis and product sales prediction	B4, Topic 7, Further Reading4	Distance_TravelTime	GeoBusiness_RetailMarketing

2002.06	June	2002	Use Travel Time to Connect with Customers — describes techniques for optimal path and catchment analysis	B3, Topic 4, Further Reading11	Distance_TravelTime	GeoBusiness_RetailMarketing
2002.04	April	2002	Maps and Curves Can Spatially Characterize Customer Loyalty — describes a technique for characterizing customer sensitivity to travel-time	B3, Topic 4, Further Reading10	Distance_TravelTime	GeoBusiness_RetailMarketing
2002.03	March	2002	Use Travel Time to Identify Competition Zones — discusses the procedure for deriving relative travel-time advantage maps	B3, Topic 4, Further Reading9	Distance_TravelTime	GeoBusiness_RetailMarketing
2001.02	February	2001	Use Travel-Time Buffers to Map Effective Proximity — discusses procedures for establishing travel-time buffers responding to street type	B3, Topic 4, Further Reading4	Distance_TravelTime	GeoBusiness_TravelTime
2001.01	January	2001	Create Effective Distance Buffers to Improve Map Accuracy — develops procedures for creating buffers that respond to the relative ease of movement	B3, Topic 4, S2	Distance_TravelTime	Basic_ConceptsAnalyticOperations
2013.07	July	2013	In Search of the Elusive Image — describes extended geo-query techniques for accessing images containing a location of interest	B4, Topic 2, Further Reading3	Distance_VisualExposure	Video_Mapping
2003.03	March	2003	Try Vulnerability Maps to Visualize Aesthetics — describes a procedure for deriving an aesthetics map based on visual exposure to pretty and ugly places	B3, Topic 5, Further Reading2	Distance_VisualExposure	Basic_ConceptsAnalyticOperations
2003.02	February	2003	Use Maps to Assess Visual Vulnerability — discusses a procedure for identifying visually vulnerable areas	B3, Topic 5, Further Reading1	Distance_VisualExposure	Basic_ConceptsAnalyticOperations
2001.08	August	2001	Use Exposure Maps and Fat Buttons to Assess Visual Impact — investigates procedures for assessing visual exposure	B3, Topic 5, S4	Distance_VisualExposure	Basic_ConceptsAnalyticOperations
2001.07	July	2001	Visual Exposure is in the Eye of the Beholder — describes procedures for assessing visual impact and creating simple models	B3, Topic 5, S3	Distance_VisualExposure	Basic_ConceptsAnalyticOperations
2001.06	June	2001	Identify and Use Visual Exposure to Create Viewshed Maps — discusses basic considerations and procedures for	B3, Topic 5, S2	Distance_VisualExposure	Basic_ConceptsAnalyticOperations

			<i>establishing visual connectivity</i>			
2000.12	December	2000	Line-of-Sight Buffers Add Intelligent to Maps — describes procedures for creating buffers that track relative visual exposure and noise levels	B3, Topic 5, S1	Distance_VisualExposure	Basic_ConceptsAnalyticOperations
1993.01	January	1993	Take a New Look at Visual Connectivity — describes viewshed and visual exposure procedures	B1, Topic 9, S5	Distance_VisualExposure	Basic_ConceptsAnalyticOperations
2012.08	August	2012	Altering Our Spatial Perspective through Dynamic Windows — discusses the three types of roving windows— fixed, weighted and dynamic	B4, Topic 3, S5	Neighborhood_Configuration	Terrain_Analysis
2008.05	May	2008	Shedding Light on Terrain Analysis — discusses how terrain orientation is used to generate Hillshade maps	B4, Topic 3, Further Reading1	Neighborhood_Configuration	Terrain_Analysis
2007.07	July	2007	The Long and Short of Slope — investigates longitudinal and transverse slope calculation	B4, Topic 3, S2	Neighborhood_Configuration	Infrastructure_Pipeline
2005.10	October	2005	Computer Processing Aids Spatial Neighborhood Analysis — discusses approaches for calculating slope and profile	B3, Topic 6, S1	Neighborhood_Configuration	Terrain_Analysis
2003.01	January	2003	Beware of Slope's Slippery Slope — describes various slope calculations and compares results	B3, Topic 6, Further Reading7	Neighborhood_Configuration	Basic_ConceptsAnalyticOperations
2002.11	November	2002	Identify Valley Bottoms in Mountainous Terrain — illustrates a technique for identifying flat areas connected to streams	B3, Topic 4, Further Reading17	Neighborhood_Configuration	Terrain_Analysis
2000.03	March	2000	Characterizing Terrain Slope and Roughness — discusses techniques for determining terrain inclination and coarseness	B3, Topic 6, Further Reading6	Neighborhood_Configuration	Terrain_Analysis
1992.09	September	1992	There's More Than One Way to Figure Slope — describes procedures for calculating surface slope and its varied applications	B1, Topic 9, S1	Neighborhood_Configuration	Basic_ConceptsAnalyticOperations
1990.08	Aug/Sep	1990	It's Like the New Math. I am Just Too Old — discusses the concept of calculating a "map derivative" and its use	B1, Topic 3, S2	Neighborhood_Configuration	Basic_ConceptsAnalyticOperations
1990.06	Jun/July	1990	Imagination is More Important than	B1, Topic 3, S1	Neighborhood_Configuration	Basic_ConceptsAnalyticOperations

			Information — describes procedures for characterizing surface configuration (slope, aspect and profile)			
2011.07	July	2011	Extending Information into No-Data Areas — describes a technique for “filling-in” information from surrounding data into no-data locations	B4, Topic 2, Further Reading1	Neighborhood_Summary	NaturalResources_WildFire
2006.02	February	2006	Nearby Things Are More Alike — use of decay functions in weight-averaging surrounding conditions	B3, Topic 6, Further Reading2	Neighborhood_Summary	NaturalResources_WildFire
2006.01	January	2006	Spatially Aggregated Reporting: The Probability is Good — discusses techniques for smoothing “salt and pepper” results and deriving probability surfaces from aggregated incident records	B3, Topic 6, S3	Neighborhood_Summary	NaturalResources_WildFire
2005.12	December	2005	Filtering for the Good Stuff — investigates a couple of spatial filters for assessing neighborhood connectivity and variability	B3, Topic 6 , Further Reading3	Neighborhood_Summary	Basic_ConceptsAnalyticOperations
2005.11	November	2005	Milking Spatial Context Information — describes a procedure for deriving a customer density surface	B3, Topic 6, S2	Neighborhood_Summary	Basic_ConceptsAnalyticOperations
2002.12	December	2002	Use Surface Area for Realistic Calculations — describes a technique for adjusting planimetric area to surface area considering terrain slope	B3, Topic 6, Further Reading8	Neighborhood_Summary	Basic_ConceptsAnalyticOperations
2000.02	February	2000	Characterizing Local Terrain Conditions — discusses the use of “roving windows” to distinguish localized variations	B3, Topic 6, Further Reading5	Neighborhood_Summary	Terrain_Analysis
2000.01	January	2000	Use Data to Characterize Micro-Terrain Features — describes techniques to identify convex and concave features	B3, Topic 6, Further Reading4	Neighborhood_Summary	Terrain_Analysis
1991.08	August	1991	Need to Ask the Right Questions Takes You Beyond Mapping — describes indices of map variability (Neighborhood Complexity and Comparison)	B1, Topic 5, S1	Neighborhood_Summary	Basic_ConceptsAnalyticOperations
1990.12	December	1990	I Don’t Do Windows — describes procedures for summarizing weighted roving windows	B1, Topic 3, S4	Neighborhood_Summary	Basic_ConceptsAnalyticOperations
2007.06	June	2007	Segmenting Our World — discusses	B4, Topic 3, S1	Overlay_CellbyCellCoincidence	Infrastructure_Pipeline

			<i>techniques for segmenting linear routes based on terrain inflection</i>			
2006.04	April	2006	Key Concepts Characterize Unique Conditions — describes a technique for handling unique combinations of map layers	B3, Topic 3, Further Reading1	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
2004.11	November	2004	‘Straightening’ Conversions Improve Optimal Paths — discusses a procedure for spatially responsive straightening of optimal paths	B3, Topic 8, Further Reading1	Overlay_CellbyCellCoincidence	Infrastructure_Routing
2004.10	October	2004	Logic and Extent Elevate Suitability Models to New Levels — extends Rating discussion to include additional habitat considerations and model weighting	B3, Topic 7, S3	Overlay_CellbyCellCoincidence	NaturalResources_Suitability
2004.09	September	2004	Use “Shadow Maps” to Understand Overlay Errors — describes how shadow maps of certainty can be used to estimate error and its propagation	B3, Topic 3, Further Reading2	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
2004.08	August	2004	Mapping Techniques Rate Hugag Habitat Suitability — expands discussion to Binary Progression and Rating suitability models	B3, Topic 7, S2	Overlay_CellbyCellCoincidence	NaturalResources_Suitability
2004.07	July	2004	Suitability Models Find the Good, the Bad and the Hugag — describes a simple suitability model for characterizing habitat	B3, Topic 7, S1	Overlay_CellbyCellCoincidence	NaturalResources_Suitability
2004.06	June	2004	Computers Quickly Characterize Spatial Coincidence — discusses several human considerations in implementing GIS	B3, Topic 3, S4	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
2004.05	May	2004	Overlay Operations Feature a Variety of Options — discusses the basic overlaying map operations	B3, Topic 3, S3	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
1996.02	February	1996	Evaluating Map-ematical Relationships — discussed the differences and similarities between the two basic types of GIS models (Cartographic and Spatial) using the Revised Universal Soil Loss Equation (RUSLE) as an example	B2, Topic 8, S3	Overlay_CellbyCellCoincidence	NaturalResources_Planning
1994.08	August	1994	Spawning Uncertainty — identifies a procedure for tracking error propagation in map overlay	B2, Topic 4, S2	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
1994.07	July	1994	The This, That, There Rule — describes	B2, Topic 4, S1	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations

			creating a “Shadow Map of Certainty” that characterizes the spatial distribution of probable error			
1992.02	Feb/Jan	1992	Characterizing Spatial Coincidence the Computer’s Way — describes point-by-point overlay techniques	B1, Topic 7, S1	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
1991.12	December	1991	Analyzing the Non-Analytical — describes how “joint probability of coincidence” and “minimum mapping resolution” can be used to assess results of overlaying maps	B1, Topic 6, S2	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
1991.11	November	1991	GIS Facilitates Error Assessment — discusses potential sources of error when overlaying maps and how “shadow maps” of error and “fuzzy theory” can shed light on the problem	B1, Topic 6, S1	Overlay_CellbyCellCoincidence	Basic_ConceptsAnalyticOperations
1992.04	April	1992	If I Hadn’t of Believed It, I Wouldn’t Have Seen It — discusses map-wide overlay techniques and the spatial evaluation of algebraic equations, such as regression	B1, Topic 7, S3	Overlay_MapWide	Basic_ConceptsAnalyticOperations
2009.04	April	2009	What’s Missing in Mapping? — discusses the need for identifying data dispersion as well as average in Thematic Mapping	B4, Topic 4, S1	Overlay_RegionWide	Basic_ConceptsApproach
1992.03	March	1992	Map Overlay Techniques— there’s more than one — discusses region-wide summary and map coincidence techniques	B1, Topic 7, S2	Overlay_RegionWide	Basic_ConceptsAnalyticOperations
2008.03	March	2008	Contiguity Ties Things Together — describes an analytical approach for determining effective contiguity (clumped features)	B4, Topic 2, S3	Reclassify_Contiguity	NaturalResources_Suitability e
1991.10	October	1991	Discovering Feature Patterns — describes procedures for assessing landscape pattern (Spacing and Contiguity)	B1, Topic 5, S3	Reclassify_Contiguity	Basic_ConceptsAnalyticOperations
2004.04	April	2004	Options Seem Endless When Reclassifying Maps — discusses the basic reclassifying map operations	B3, Topic 3, S2	Reclassify_InitialValue	Basic_ConceptsAnalyticOperations
2012.07	July	2012	Narrowing-In on Absurd Gerrymanders — discusses how a Narrowness Index (NI) can be applied to assess redistricting configurations	B4, Topic 2, S5	Reclassify_shape	Basic_ConceptsAnalyticOperations

1999.08	August	1999	Use Metrics to Assess Forest Fragmentation — describes some landscape indices for determining richness and fragmentation	B3, Topic 6, Further Reading12	Reclassify_Shape	NaturalResources_Planning
1999.07	July	1999	Get to the Core of Landscape Analysis — describes techniques for assessing core area and edge characterization	B3, Topic 6, Further Reading11	Reclassify_Shape	NaturalResources_Planning
1999.06	June	1999	Use GIS to Analyze Landscape Structure — discusses the underlying principles in landscape analysis and introduces some example landscape indices	B3, Topic 6, Further Reading10	Reclassify_Shape	NaturalResources_Planning
1999.05	May	1999	Use GIS to Calculate Nearby Neighbor Statistics — describes a technique that calculates the proximity to all of the surrounding parcels of a similar vegetation type	B3, Topic 6, Further Reading9	Reclassify_Shape	NaturalResources_Planning
1991.09	September	1991	You Can't See the Forest for the Trees — discusses indices of feature shape (Boundary Configuration and Spatial Integrity)	B1, Topic 5, S2	Reclassify_Shape	Basic_ConceptsAnalyticOperations

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 posted at: www.innovativegis.com/Basis/BeyondMappingSeries/

Spatial Statistics Classes:

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Date Code (Col 1)	Month (Col 2)	Year (Col 3)	Column Title/Description (Col 4)	Book/ Topic/Section (Col 5)	Approaches and Operations (Col 6)	Application Areas (Col 7)
2006.09	September	2006	Statistically Compare Continuous Map Surfaces — discusses procedures for comparing continuous map surfaces	B3, Topic 10, S2	Map_ComparisonContinuousData	PrecisionAgriculture_Analysis
1999.10	October	1999	Use Statistics to Compare Map Surfaces — describes several techniques for comparing continuous map surfaces	B3, Topic 10, Further Reading6	Map_ComparisonContinuousData	Basic_ConceptsAnalyticOperations
2010.09	September	2010	Comparing Emergency Response Alternatives — describes comparison procedures and route evaluation techniques	B4, Topic 8, S5	Map_ComparisonDiscreteData	NaturalResources_EmergencyResponse
2006.07	July	2006	Statistically Compare Discrete Maps — discusses procedures for comparing discrete maps	B3, Topic 10, S1	Map_ComparisonDiscreteData	Basic_ConceptsAnalyticOperations
1999.09	September	1999	Compare Maps by the Numbers — describes several techniques for comparing discrete maps	B3, Topic 10, Further Reading5	Map_ComparisonDiscreteData	Basic_ConceptsAnalyticOperations
2013.04	April	2013	Spatially Evaluating the T-test — illustrates the expansion of traditional math/stat procedures to operate on map variables to spatially solve traditional non-spatial equations	B4, Topic 4, S5	Map_ComparisonTtest	PrecisionAgriculture_Analysis
2011.06	June	2011	Breaking Away from Breakpoints — describes the use of curve-fitting to derive continuous equations for suitability model ratings	B4, Topic 4, Further Reading3	Map_Normalization	Basic_ConceptsAnalyticOperations
2011.04	April	2011	Comparing Apples and Oranges — describes a Standard Normal Variable (SNV) procedure for normalizing maps for comparison	B4, Topic 4, Further Reading2	Map_Normalization	Basic_ConceptsAnalyticOperations
2007.10	October	2007	Get a Consistent Statistical Picture — describes creation of a Standardized Map	B4, Topic 4, Further Reading1	Map_Normalization	Basic_Discussion

			Variable surface using Median and Quartile Range			
2007.09	September	2007	Normally Things Aren't Normal — discusses the appropriateness of using traditional “normal” and percentile statistics	B4, Topic 4, S3	Map_Normalization	Basic_Discussion
2002.09	September	2002	Normalizing Maps for Data Analysis — describes map normalization and data exchange with other software packages	B3, Topic 1, S3	Map_Normalization	PrecisionAgriculture_Analysis
1994.09	September	1994	Avoid Dis-Information — describes the calculation of a localized Coefficient of Variance map	B2, Topic 4, S3	Map_Normalization	Basic_ConceptsAnalyticOperations
2008.10	October	2008	Get “Map-ematical” to Identify Data Zones — describes the use of “level-slicing” for classifying locations with a specified data pattern	B4, Topic 7, Further Reading2	SpatialDataMining_Classification	GeoBusiness_DataGrouping
2001.11	November	2001	Use Similarity to Identify Data Zones — describes level-slicing for classifying areas into zones containing a specified data pattern	B3, Topic 10, S4	SpatialDataMining_Classification	PrecisionAgriculture_Analysis
1995.10	October	1995	GIS and Remote Sensing Share a Lofty Marriage — identifies the basic concepts, principles and theoretical underpinnings of Remote Sensing (RS) technology	B2, Topic 9, S2	SpatialDataMining_Classification	Basic_ConceptsApproach
2008.11	November	2008	Discover the “Miracles” in Mapping Data Clusters — describes the use of “clustering” to identify inherent groupings of similar data patterns	B4, Topic 7, S5	SpatialDataMining_Clustering	GeoBusiness_DataGrouping
2008.06	June	2008	Linking Numeric and Geographic Distributions — investigates the link between numeric and geographic distributions of mapped data	B4, Topic 7, S2	SpatialDataMining_Clustering	GeoBusiness_DataGrouping
2005.03	March	2005	Making Space for Mapped Data — investigates the link between geographic space and data space for mapping data patterns	B3, Topic 2, S4	SpatialDataMining_Clustering	Basic_ConceptsAnalyticOperations
2001.12	December	2001	Use Statistics to Map Data Clusters — discusses clustering for partitioning an area into separate data groups	B3, Topic 10, S5	SpatialDataMining_Clustering	PrecisionAgriculture_Analysis
1998.08	August	1998	Identify Data Patterns — discusses data	B3, Topic 10, Further	SpatialDataMining_Clustering	SpatialDataMining_Clustering

			<i>clustering and its application in identifying spatial patterns</i>	Reading4		
2011.05	May	2011	Correlating Maps and a Numerical Mindset — describes a Spatially Localized Correlation procedure for mapping the mutual relationship between two map variables	B4, Topic 4, S4	SpatialDataMining_Regression	Basic_ConceptsAnalyticOperations
2008.12	December	2008	Can We Really Map the Future? — describes the use of “linear regression” to develop prediction equations relating dependent and independent map variables	B4, Topic 7, Further Reading3	SpatialDataMining_Regression	GeoBusiness_RetailMarketing
2002.02	February	2002	Stratify Maps to Make Better Predictions — illustrates a procedure for subdividing an area into smaller more homogenous groups prior to generating prediction equations	B3, Topic 10, Further Reading10	SpatialDataMining_Regression	PrecisionAgriculture_Analysis
2002.01	January	2002	Spatial Data Mining Allows Users to Predict Maps — describes the basic concepts and procedures for deriving equations that can be used to derive prediction maps	B3, Topic 10, Further Reading9	SpatialDataMining_Regression	PrecisionAgriculture_Analysis
1999.12	December	1999	Can Predictable Maps Work for You? — describes a procedure for deriving a spatial prediction model	B3, Topic 10, Further Reading8	SpatialDataMining_Regression	Basic_Discussion
1999.11	November	1999	Use Scatterplots to Understand Map Correlation — discusses the underlying concepts in assessing correlation among maps	B3, Topic 10, Further Reading7	SpatialDataMining_Regression	Basic_Discussion
2008.09	September	2008	Use Map Analysis to Characterize Data Groups — describes the use of “data distance” to derive similarity among the data patterns in a set of map layers	B4, Topic 7, S4	SpatialDataMining_Similarity	GeoBusiness_DataGrouping
2001.10	October	2001	Geographic Software Removes Guesswork from Map Similarity — discusses basic considerations and procedures for generating similarity maps	B3, Topic 10, S3	SpatialDataMining_Similarity	PrecisionAgriculture_Analysis
1997.04	April	1997	Comparing Map Errors — describes how normalized maps of error can be used to visualize the differences in error surfaces	B3, Topic 9, Further Reading2	SurfaceModeling_Accuracy	Basic_ConceptsApproach
1997.03	March	1997	Move Beyond a Map Full of Errors — discusses a technique for generating a “shadow map” of error	B3, Topic 9, Further Reading1	SurfaceModeling_Accuracy	Basic_ConceptsApproach

1997.02	February	1997	Justifiable Interpolation — describes the "Residual Analysis" procedure for assessing interpolation performance	B3, Topic 9, S4	SurfaceModeling_Accuracy	Basic_ConceptsApproach
2008.04	April	2008	Twisting the Perspective of Map Surfaces — describes the character of spatial distributions through the generation of a customer density surface	B4, Topic 7, S1	SurfaceModeling_DensityAnalysis	GeoBusiness_RetailMarketing
2002.05	May	2002	Grid-Based Mapping Identifies Customer Pockets and Territories — identifies techniques for identifying unusually high customer density and for delineating spatially balanced customer territories	B3, Topic 6, Further Reading1	SurfaceModeling_DensityAnalysis	GeoBusiness_RetailMarketing
2013.08	August	2013	Generating Mountains and Molehills from Field Sampled Data — creating an elevation surface from field sampled data	B4, Topic 3, S4	SurfaceModeling_Interpolation	Terrain_Analysis
2008.08	August	2008	Interpreting Interpolation Results (and why it is important) — describes the use of "residual analysis" for evaluating spatial interpolation performance	B4, Topic 7, Further Reading1	SurfaceModeling_Interpolation	GeoBusiness_SurfaceModeling
2008.07	July	2008	Myriad Techniques Help to Interpolate Spatial Distributions — discusses the basic concepts underlying spatial interpolation	B4, Topic 7, S3	SurfaceModeling_Interpolation	GeoBusiness_SurfaceModeling
2007.11	November	2007	Throwing the Baby Out with the Bath Water — discusses the information lost in aggregating field data and assigning typical values to polygons (desktop mapping)	B4, Topic 4, S2	SurfaceModeling_Interpolation	Basic_Discussion
2006.06	June	2006	Under the Hood of Spatial Interpolation — investigates the basic concepts in IDW and Kriging interpolation procedures	B3, Topic 9, S3	SurfaceModeling_Interpolation	Basic_ConceptsAnalyticOperations
2006.05	May	2006	The Average Is Hardly Anywhere — discusses the difference between spatial and non-spatial data distributions	B3, Topic 9, S2	SurfaceModeling_Interpolation	Basic_ConceptsAnalyticOperations
2005.02	February	2005	Use Spatial Statistics to Map Abnormal Averages — discusses surface modeling to characterize the spatial distribution inherent in a data set	B3, Topic 2, S3	SurfaceModeling_Interpolation	Basic_ConceptsAnalyticOperations
2001.09	September	2001	Use Polar Variograms to Assess Distance and Direction Dependencies — discusses a procedure to incorporate direction as well as distance for assessing spatial	B3, Topic 9, Further Reading10	SurfaceModeling_Interpolation	Basic_ConceptsApproach

			<i>dependency</i>			
1999.01	January	1999	Extending Spatial Dependency to Maps — describes a technique for generating a map of spatial autocorrelation	B3, Topic 9, Further Reading9	SurfaceModeling_Interpolation	Basic_ConceptsApproach
1998.12	December	1998	Measuring Spatial Dependency — describes the basic measures of autocorrelation	B3, Topic 9, Further Reading8	SurfaceModeling_Interpolation	Basic_ConceptsApproach
1998.11	November	1998	Unlocking the Keystone Concept of Spatial Dependency — discusses spatial dependency and illustrates the effects of different spatial arrangements of the same set of data	B3, Topic 9, Further Reading7	SurfaceModeling_Interpolation	Basic_ConceptsApproach
1997.07	July	1997	Uncovering the Mysteries of Spatial Autocorrelation — describes approaches used in assessing spatial autocorrelation	B3, Topic 9, Further Reading6	SurfaceModeling_Interpolation	Basic_ConceptsApproach
1997.05	May	1997	Depending on the Data — discusses the fundamental concepts of spatial dependency	B3, Topic 9, Further Reading5	SurfaceModeling_Interpolation	Basic_ConceptsApproach
1994.03	March	1994	Maneuvering on GIS's Sticky Floor — describes Inverse Distance, Kriging, and Minimum Curvature techniques for surface modeling	B2, Topic 2, S3	SurfaceModeling_Interpolation	Basic_ConceptsAnalyticOperations
1994.02	February	1994	Surf's Up — fitting continuous map surfaces to geographic data distributions	B2, Topic 2, S2	SurfaceModeling_Interpolation	Basic_ConceptsApproach
1990.10	Oct/Nov	1990	Torture Numbers, They'll Tell you Anything — discusses the underlying theory and basic considerations of spatial interpolation	B1, Topic 3, S3	SurfaceModeling_Interpolation	Basic_ConceptsAnalyticOperations
1997.01	January	1997	Designer Samples — describes different sampling patterns and their relative advantages	B3, Topic 9, Further Reading4	SurfaceModeling_PointSampling	Basic_ConceptsApproach
1996.12	December	1996	What's the Point? — discusses the general considerations in point sampling design	B3, Topic 9, Further Reading3	SurfaceModeling_PointSampling	Basic_ConceptsApproach

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