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Junta de Andalucía

Consejería de Economía, Conocimiento, Empresas y Universidad

INSTITUTO DE ESTADÍSTICA Y CARTOGRAFÍA DE ANDALUCÍA

PRESENTACIÓN

El presente boletín de resúmenes tiene una periodicidad bimestral y con él la Biblioteca del Instituto de Estadística y Cartografía de Andalucía pretende dar a conocer a los usuarios de una forma detallada el contenido de las revistas especializadas que entran en su colección. Se trata de un complemento al boletín de novedades de publicaciones seriadas ya que en él se incluyen los resúmenes de cada uno de los artículos que aparecen publicados en los diferentes números de las revistas en el idioma original de las mismas.

Los resúmenes de este boletín corresponden a las revistas que han ingresado en la Biblioteca del Instituto de Estadística y Cartografía de Andalucía durante los meses de julio y agosto de 2020 y que pueden consultarse gratuitamente en sus instalaciones en la siguiente dirección:

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Searching for the 'Right' Legend: The Impact of Legend Position on Legend Decoding in a Cartographic Memory Task

P. 6-17

Dennis Edler, Julian Keil, Marie-Christin Tuller, Anne-Kathrin Bestgen & Frank Dickmann

Abstract

Map legends are key elements of thematic maps and cartographic communication. The question of how to style map legends is a topic which has often been addressed by cartographic academics and practitioners. Nevertheless, the question of where to position a map legend has only hardly been discussed. Principles of cognitive sciences allow the assumption that a legend positioned to the right of a map field can be read and decoded faster than a legend on the left side. This study investigates the impact of legend positioning on legend decoding. It involves an experiment based on a recognition memory paradigm and the registration of eye-movements. The results show that, in less time, a legend positioned to the right of the map field (compared to a left legend) can be decoded faster. The same accuracy of a cognitive representation of geographic space can be achieved in spatial memory.

Medieval Macrospace Through GIS: The Norse World Project Approach

P. 18-27

Alexandra Petrulevich, Agnieszka Backman & Jonathan Adams

Abstract

The project 'The Norse Perception of the World' is building a digital infrastructure to facilitate interdisciplinary research on medieval worldviews as recorded in East Norse texts. It does so by collecting spatial material, i.e. attestations of place names and other location-based data from medieval vernacular manuscripts, early prints, and runic inscriptions from fictional, non-biblical, and scientific texts dated to before 1530, and providing free access to these spatial references through a tailored back-end MySQL database and an interactive end-user interface with mapping via Leaflet and Leaflet.markercluster. This paper discusses how geocoding can be problematic when applied to pre-modern materials, as the concept of space is a temporal and social variable, especially when dealing with ideas about places abroad. The geospatial visualization employed by the project has no ambition to represent a historically correct worldview as understood by medieval Scandinavians. Rather, it is an anachronistic tool for managing and obtaining an overview of the spatial references in East Norse texts.

Typology of Meteorological Weather Forecast Maps Printed in World Newspapers

P. 28-42

Jaromir Kolejka & Hana Svobodova

Abstract

This paper presents the results of the analysis of more than 150 different printed newspaper weather forecasting maps, representing 91 global, national, regional and local daily news periodicals from 33 countries in 4 continents. The classification attention focused both on the character of the localizing background layer of the analysed maps as well as on the meteorological thematic layer. The results identify 12 types of background localizing maps and 47 used types of presentation of meteorological forecast information, only 19 of which were used repeatedly in more than one newspaper. All the findings were documented on comparable cartographic models. Conclusions suitable for practical applications are

demonstrated in the discussion.

Semantic Visual Variables for Augmented Geovisualization

P. 43-56

Yun Li, Qing Zhu, Xiao Fu, Bin Feng, Mingwei Liu, Junxiao Zhang, Jun Zhu, Huagui He & Weijun Yang

Abstract

The human–cyber–physical world produces a considerable volume of multi-modal spatio-temporal data, thus leading to information overload. Visual variables are used to transform information into visual forms that are perceived by the powerful human vision system. However, previous studies of visual variables focused on methods of ‘drawing information’ without considering ‘intelligence’ derived from balancing ‘importance’ and ‘unimportance’. This paper proposes semantic visual variables to support an augmented geovisualization that aims to avoid exposing users to unnecessary information by highlighting goal-oriented content over redundant details. In this work, we first give definitions of several concepts and then design a semiotic model for depicting the mechanisms of augmented geovisualization. We also provide an in-depth discussion of semantic visual variables based on a hierarchical organization of the original visual variables, and we analyse the critical influencing factors that affect the choice of visualization forms and visual variables. Finally, a typical application is used to illustrate the relevance of this study.

A Similarity-Based Approach for Improving the Efficiency of Drawing Spatiotemporal Point Features

P. 57-69

Mingguang Wu, Guonian Lv & Kun Zhang

Abstract

The mapping of spatiotemporal point features plays an important role in geovisualization. However, such mapping suffers from low efficiency due to computational redundancy when similar symbols are used to visualize spatiotemporal point features. This paper presents a similarity-based approach to predict and avoid computational redundancy, which improves mapping efficiency. First, to identify computational redundancy, the similarity of point symbols is measured based on commonalities in symbol graphics and symbol drawing operations. Second, a similarity-enhanced method is proposed to comprehensively predict and avoid computational redundancies when mapping spatiotemporal point features. This approach was tested using two real-world spatiotemporal datasets. The results suggest that the proposed approach offers relatively large performance improvements.

Remapping Fictional Worlds: A Comparative Reconstruction of Fictional Maps

P. 70-85

Primož Gašperič & Blaž Komac

Abstract

This article presents a quantitative analysis of fictional maps and their relation to historic maps from different periods. Fictional maps are maps of imaginary territories. This type of map is now common in fiction, but they arose relatively late, in the second half of the nineteenth century, and are considered an independent branch of cartography today. They stand out through the way they are published because they are component parts of books and not independent cartographic works, and therefore their creators are not cartographers but rather the authors of these books. Fictional maps are mostly subordinate to the story, but they serve to give a sense of historical authenticity and draw the reader into the story. Without networks of coordinates and with labels such as ‘the end of the world’, they are spatially indeterminate, but they establish a connection between the fictional landscape and its identity. This study deals with 89 fictional maps from recent children’s and young adult literature. First we present a historical overview of these works and fictional maps, and then a cartographic analysis of fictional maps. We examined seventy-seven books with fictional maps and evaluated the maps according to five groups of standard cartographic elements: natural elements, built elements, toponyms, mathematical elements, and explanatory elements. We discuss the differences between cartographic representation of fictional maps and historic maps, and build a cartographic model based on the frequency of cartographic elements to put fictional maps into historic and geographical contexts.



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DEMOGRAPHY

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Parental Migration and Early Childhood Development in Rural China

P. 403–422

Ai Yue, Yu Bai, Sean Sylvia

Abstract

Nearly one-quarter of all children under age 2 in China are left behind in the countryside as parents migrate to urban areas for work. We use a four-wave longitudinal survey following young children from 6 to 30 months of age to provide first evidence on the effects of parental migration on development, health, and nutritional outcomes in the critical first stages of life. We find that maternal migration has a negative effect on cognitive development: migration before children reach 12 months of age reduces cognitive development by 0.3 standard deviations at age 2. Possible mechanisms include reduced dietary diversity and engagement in stimulating activities, both known to be causally associated with skill development in early life. We find no effects on other dimensions of physical and social-emotional health.

Ethnic Violence and Birth Outcomes: Evidence From Exposure to the 1992 Conflict in Kenya

P. 423–444

Fredah Guantai, Yoko Kijima,

Abstract

This study is an examination of the effect of intrauterine exposure to electoral violence on child birth weight, an outcome that has long-term effects on an individual's education, income, and health in later life. We consider the electoral violence that resulted from the introduction of multiparty democracy in Kenya as an exogenous source of shock, using a difference-in-differences method and a mother fixed-effects model. We find that prenatal exposure to the violence increased the probabilities of low birth weight and a child being of very small size at birth by 19 and 6 percentage points, respectively. Violence exposure in the first trimester of pregnancy decreased birth weight by 271 grams and increased the probabilities of low birth weight and very small size at birth by 18 and 4 percentage points, respectively. The results reaffirm the significance of the nine months *in utero* as one of the most critical periods in life that shapes future health, economic, and educational trajectories.

Does Parents' Union Instability Disrupt Intergenerational Advantage? An Analysis of Sub-Saharan Africa

P. 445–473

Emily Smith-Greenaway

Abstract

The long arm of childhood, with its wide-ranging influence on individuals' life chances, highlights the importance of understanding the determinants of health in early life. Research has established that parents' education is a major determinant of childhood health, but children across the globe increasingly experience their parents' divorce and subsequent remarriage, raising questions of whether union instability alters these intergenerational processes. Does divorce and remarriage interfere with parents' education benefiting their young children's health? I explore this question in sub-Saharan Africa, a world region where parents' education plays a major role in protecting children against severe health risks, and where young children commonly experience parental divorce and remarriage.

Moreover, sub-Saharan Africa features distinct family lineage systems, affording an opportunity to explore this question in both majority matrilineal and patrilineal contexts. Analyses of Demographic and Health Survey data on 271,292 children in 30 sub-Saharan African countries offer no evidence that the high levels of union instability in the region will weaken the health benefits of parents' education for future generations. Following divorce, children benefit from their biological parents' education to the same degree as children with married parents—a finding that is consistent across lineage contexts. Moreover, stepfathers' education corresponds with pronounced health benefits for their coresident stepchildren, particularly in patrilineal regions where these children benefit less dramatically from their mothers' education. Together, the study results offer a renewed sense of the importance of parents'—including stepfathers'—education for early childhood health across diverse family structures.

Same-Sex Couples' Shared Time in the United States

P. 475–500

Katie R. Genadek, Sarah M. Flood, Joan Garcia Roman

Abstract

This study examines and compares shared time for same-sex and different-sex coresident couples using large, nationally representative data from the 2003–2016 American Time Use Survey (ATUS). We compare the total time that same-sex couples and different-sex couples spend together; for parents, the time they spend together with children; and for both parents and nonparents, the time they spend together with no one else present and the time they spend with others (excluding children). After we control for demographic and socioeconomic characteristics of the couples, women in same-sex couples spend more time together, both alone and in total, than individuals in different-sex arrangements and men in same-sex couples, regardless of parenthood status. Women in same-sex relationships also spend a larger percentage of their total available time together than other couples, and the difference in time is not limited to any specific activity.

Cumulative Effects of Doubling Up in Childhood on Young Adult Outcomes

P. 501–528

Hope Harvey

Abstract

Living in a doubled-up, or shared, household is a common experience. Nearly one-half of children in the United States double up at some point during childhood, yet we know little about the cumulative effects of these households on children. This study estimates the effects on young adult health and educational attainment of childhood years spent in three doubled-up household types: (1) those formed with children's grandparent(s), (2) those formed with children's adult sibling(s), and (3) those formed with other extended family or non-kin adults. Using marginal structural models and inverse probability of treatment weighting—methods that account for the fact that household composition is both a cause and consequence of other family characteristics—I find that doubling up shapes children's life chances, but the effects vary depending on children's relationships with household members. Childhood years spent living with nongrandparent extended family or non-kin adults are associated with worse young adult outcomes, but coresidence with grandparents is not significantly associated with young adult outcomes after selection into these households is accounted for, and coresidence with adult siblings may be beneficial in some domains. By studying the effects of coresidence with adults beyond the nuclear family, this research contributes to a fuller understanding of the implications of family complexity for children.

Fertility History and Biomarkers Using Prospective Data: Evidence From the 1958 National Child Development Study

P. 529–558

Maria Sironi, George B. Ploubidis, Emily M. Grundy

Abstract

Research on the later-life health implications of fertility history has predominantly considered associations with mortality or self-reported indicators of health. Most of this previous research has either not been able to account for selection factors related to both early-life and later-life health or has had to rely on retrospectively reported accounts of childhood circumstances. Using the 1958 National Child Development Study, and in particular the biomedical survey conducted in 2002–2003, we investigate associations between fertility histories (number of children and age at first and at last birth) and

biomarkers for cardiometabolic risk and respiratory function in midlife among both men and women. Results from models that adjusted for a very wide range of childhood factors, including early-life socioeconomic position, cognitive ability, and mental health, showed weak associations between parity and biomarkers. However, we found an inverse association between age at first birth and biomarkers indicative of worse cardiometabolic health, with poorer outcomes for those with very young ages at entry to parenthood and increasingly better outcomes for those becoming parents at older ages. A very young age at last birth was also associated with less favorable biomarker levels, especially among women. Results highlight the value of prospectively collected data and the availability of biomarkers in studies of life course determinants of health in midlife and later.

Double Trouble: The Burden of Child-rearing and Working on Maternal Mortality

P. 559–576

Tabea Bucher-Koenen, Helmut Farbmacher, Johan Vikström

Abstract

We document increased old-age mortality rates among Swedish mothers of twins compared with mothers of singletons, using administrative data on mortality for 1990–2010. We argue that twins are an unplanned shock to fertility in the cohorts of older women considered. Deaths due to lung cancer, chronic obstructive pulmonary disease, and heart attacks—all of which are associated with stress during the life course—are significantly increased. Stratifying the sample by education and pension income shows the highest increase in mortality rates among highly educated mothers and those with above-median pension income. These results are consistent with the existence of a double burden on mothers' health resulting from simultaneously child-rearing and working.

The Consequences of Incarceration for Mortality in the United States Authors

P. 577–598

Sebastian Daza, Alberto Palloni, Jerrett Jones

Abstract

Previous research has suggested that incarceration has negative implications for individuals' well-being, health, and mortality. Most of these studies, however, have not followed former prisoners over an extended period and into older adult ages, when the risk of health deterioration and mortality is the greatest. Contributing to this literature, this study is the first to employ the Panel Study of Income Dynamics (PSID) to estimate the long-run association between individual incarceration and mortality over nearly 40 years. We also supplement those analyses with data from the National Longitudinal Survey of Youth 1979 (NLSY79). We then use these estimates to investigate the implications of the U.S. incarceration regime and the post-1980 incarceration boom for the U.S. health and mortality disadvantage relative to industrialized peer countries (the United Kingdom).

Does Sexual Orientation Complicate the Relationship Between Marital Status and Gender With Self-rated Health and Cardiovascular Disease?

P. 599–626

Alexa Solazzo, Bridget Gorman, Justin Denney

Abstract

A substantial body of work has demonstrated the importance of marital status for health, yet the vast majority of this work has studied heterosexual marriages and relationships. To understand the role of marital status in shaping health among heterosexual, lesbian, gay, and bisexual men and women, we examine data from a probability-based sample of adults living in 40 U.S. states for selected years between 2011–2015. We test two physical health outcomes—poor-to-fair self-rated health and cardiovascular disease—and present predicted probabilities and pairwise comparisons from logistic regression models before and after adjustment for demographic characteristics, socioeconomic status, health behaviors, and depression. Overall, findings reveal some important similarities and differences in the relationships between marital status and health by sexual orientation and gender. First, the health benefits of marriage extend to sexual minority adults, relative to adults who are either formerly or never married. Among heterosexual adults, adjusted models also highlight the healthy status of never-married adults. Second, the health benefits associated with intimate relationships appear less dependent on legal marriage among sexual minorities than among heterosexual adults. Third, we document a persistent health disadvantage for bisexual

adults compared with heterosexual adults, particularly among women who are formerly married, indicating some elevated health vulnerability among selected sexual minority women. Fourth, associations between sexual orientation and health are more similar across marital status groups for men than women. Altogether, these findings add much needed nuance to our understanding of the association between marital status and health in an era of increasing diversity in adult relationships.

Transition of Son Preference: Evidence From South Korea

P. 627–652

Eleanor Jawon Choi, Jisoo Hwang

Abstract

Sex ratio at birth remains highly skewed in many Asian countries because of son preference. The ratio in South Korea, however, declined beginning in 1990 and reached the natural range in 2007. We study changes in child gender effects on fertility and parental investment during this period of decreasing sex ratio at birth. We find that gender discrimination on the extensive margin (fertility), such as sex-selective abortions and son-biased stopping rules, have nearly disappeared among recent cohorts. On the intensive margin (parental inputs), boys receive higher expenditures on private academic education, have mothers with fewer hours of labor supply, and spend less time on household chores relative to girls. These gender gaps have also narrowed substantially, however, over the past two decades. We consider alternative explanations, but altogether, evidence suggests the weakening of son preference in South Korea.

Natural Hazards, Disasters, and Demographic Change: The Case of Severe Tornadoes in the United States, 1980–2010

P. 653–674

Ethan J. Raker

Abstract

Natural hazards and disasters distress populations and inflict damage on the built environment, but existing studies yielded mixed results regarding their lasting demographic implications. I leverage variation across three decades of block group exposure to an exogenous and acute natural hazard—severe tornadoes—to focus conceptually on social vulnerability and to empirically assess local net demographic change. Using matching techniques and a difference-in-difference estimator, I find that severe tornadoes result in no net change in local population size but lead to compositional changes, whereby affected neighborhoods become more White and socioeconomically advantaged. Moderation models show that the effects are exacerbated for wealthier communities and that a federal disaster declaration does not mitigate the effects. I interpret the empirical findings as evidence of a displacement process by which economically disadvantaged residents are forcibly mobile, and economically advantaged and White locals rebuild rather than relocate. To make sense of demographic change after natural hazards, I advance an unequal replacement of social vulnerability framework that considers hazard attributes, geographic scale, and impacted local context. I conclude that the natural environment is consequential for the sociospatial organization of communities and that a disaster declaration has little impact on mitigating this driver of neighborhood inequality.

Skill-Based Contextual Sorting: How Parental Cognition and Residential Mobility Produce Unequal Environments for Children

P. 675–703

Authors

Jared N. Schachner, Robert J. Sampson

Abstract

Highly skilled parents deploy distinct strategies to cultivate their children's development, but little is known about how parental cognitive skills interact with metropolitan opportunity structures and residential mobility to shape a major domain of inequality in children's lives: the neighborhood. We integrate multiple literatures to develop hypotheses on parental skill-based sorting by neighborhood socioeconomic status and public school test scores, which we test using an original follow-up of the Los Angeles Family and Neighborhood Survey. These data include more than a decade's worth of residential histories for households with children that are linked to census, geographic information system, and educational administrative data. We construct discrete-choice models of neighborhood selection that account for heterogeneity among household types,

incorporate the unique spatial structure of Los Angeles County, and include a wide range of neighborhood factors. The results show that parents' cognitive skills interact with neighborhood socioeconomic status to predict residential selection after accounting for, and confirming, the expected influences of race, income, education, housing market conditions, and spatial proximity. Among parents in the upper/upper-middle class, cognitive skills predict sorting on average public school test scores rather than neighborhood socioeconomic status. Overall, we reveal skill-based contextual sorting as an overlooked driver of urban stratification.

Does Skin Tone Matter? Immigrant Mobility in the U.S. Labor Market

P. 705–726

JooHee Han

Abstract

A rich literature has documented the negative association between dark skin tone and many dimensions of U.S.-born Americans' life chances. Despite the importance of both skin tone and immigration in the American experience, few studies have explored the effect of skin tone on immigrant assimilation longitudinally. I analyze data from the New Immigrant Survey (NIS) 2003 to examine how skin tone is associated with occupational achievement at three time points: the last job held abroad, the first job held in the United States, and the current job. Dark-skinned immigrants experience steeper downward mobility at arrival in the United States and slower subsequent upward mobility relative to light-skinned immigrants, net of human and social capital, race/ethnicity, country of origin, visa type, and demographics. These findings shed light on multiple current literatures, including segmented assimilation theory, the multidimensionality of race, and the U.S. racial hierarchy.

Migration and Unrest in the Deep South Thailand: A Multilevel Analysis of a Longitudinal Study

P. 727–745

Aree Jampaklay, Kathleen Ford

Abstract

Although migration of Muslims from the southernmost provinces of Thailand to Malaysia has a long history, research suggests that the intensity of this migration has increased in the past 10 years along with increased unrest in the provinces. This study examines how migration in the three southernmost provinces is affected by the ongoing unrest. Data are drawn from household probability surveys conducted in 2014 and 2016. An individual sample of 3,467 persons who were household residents at the 2014 survey was followed to see who remained in the household of origin or moved out two years later (2016 survey). Data on violent events from the Deep South Watch, an independent organization, were used to measure exposure to violence. Results from a multilevel analysis show that net of other characteristics at the individual, household, and village levels, individuals who live in a village in which a violent event occurred in the previous year are more likely to move out than those who live in a village with no violent event in the previous year. Findings suggest that in addition to the economic reasons that have long motivated migration from this area, violent events accelerate this migration.

Multidimensional Mortality Selection: Why Individual Dimensions of Frailty Don't Act Like Frailty

P. 747–777

Elizabeth Wrigley-Field

Abstract

Theoretical models of mortality selection have great utility in explaining otherwise puzzling phenomena. The most famous example may be the Black-White mortality crossover: at old ages, Blacks outlive Whites, presumably because few frail Blacks survive to old ages while some frail Whites do. Yet theoretical models of unidimensional heterogeneity, or frailty, do not speak to the most common empirical situation for mortality researchers: the case in which some important population heterogeneity is observed and some is not. I show that, when one dimension of heterogeneity is observed and another is unobserved, neither the observed nor the unobserved dimension need behave as classic frailty models predict. For example, in a multidimensional model, mortality selection can increase the proportion of survivors who are disadvantaged, or "frail," and can lead Black survivors to be more frail than Whites, along some dimensions of disadvantage. Transferring theoretical

results about unidimensional heterogeneity to settings with both observed and unobserved heterogeneity produces misleading inferences about mortality disparities. The unusually flexible behavior of individual dimensions of multidimensional heterogeneity creates previously unrecognized challenges for empirically testing selection models of disparities, such as models of mortality crossovers.

Dynamic Multistate Models With Constant Cross-Product Ratios: Applications to Poverty Status

P. 779–797

Robert Schoen

Abstract

Cross-product ratios (α s), which are structurally analogous to odds ratios, are statistically sound and demographically meaningful measures. Assuming constant cross-product ratios in the elements of a matrix of multistate transition probabilities provides a new basis both for calculating probabilities from minimal data and for modeling populations with changing demographic rates. Constant- α estimation parallels log linear modeling, in which the α s are the fixed interactions, and the main effects are calculated from relevant data. Procedures are presented showing how an N state model's matrix of transition probabilities can be found from the constant α s and (1) the state composition of adjacent populations, (2) $(N - 1)$ known probabilities, (3) $(N - 1)$ known transfer rates, or (4) $(2N - 1)$ known numbers of transfers. The scope and flexibility of constant- α models makes them applicable to a broad range of demographic subjects, including marital/union status, political affiliation, residential status, and labor force status. Here, an application is provided to the important but understudied topic of poverty status. Census data, separately for men and women, provide age-specific numbers of persons in three poverty statuses for the years 2009 and 2014. Using an estimated transition matrix that furnishes a set of cross-product ratios, the constant- α approach allows the calculation of male and female poverty status life tables for the 2009–2014 period. The results describe the time spent in each poverty state and the transitions between states over the entire life course.



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Panorama y evolución de las políticas de datos en la IDEE

P. 6-11

Antonio Federico Rodríguez Pascual

Resumen

El informe «Mid-Term Evaluation Report on INSPIRE Implementation» (Informe Técnico nº 17/2014 de la Agencia Europea de Medioambiente) identificaba en sus conclusiones la correlación existente en Europa entre la implementación de datos abiertos y la puesta en práctica de la Directiva INSPIRE. Naturalmente, los principios INSPIRE se ven potenciados por la tendencia general observada en los últimos años de abrir los datos del sector público. En consecuencia, el Subgrupo de Trabajo de la IDEE «Política de Datos» inició su andadura en el año 2017 y durante el 2018 realizó un estudio sobre las licencias de datos, los formatos usados y la oferta de información en 90 centros de descarga de organismos de la administración nacional, regional y local, cuyos resultados se presentaron en las JIIDE 2018. Llamaba la atención el hecho de que más de la mitad de los centros de descarga publicaban datos sin licencia ni condiciones, lo que crea una situación confusa para los usuarios de inseguridad jurídica en el uso de la información. En esta comunicación se expone la repetición del estudio realizado en el 2019, se analizan los resultados y se formulan algunas conclusiones sobre la evolución de la situación de datos geográficos abiertos en España.

National register for geographic data and the new SNIG GeoPortal

P. 12-21

Paulo Patrício, Danilo Furtado, Vanda Bica, Alexandra Fonseca, Ana Luísa Gomes, André Serronha, Henrique Silva, Sérgio Ferreira, Mário Caetano

Resumen

SNIG es la Infraestructura Portuguesa de Datos Espaciales y la Dirección General del Territorio (DGT) es responsable de su coordinación operativa. En 2015 la DGT inició un proceso de reestructuración estratégica y tecnológica de esta Infraestructura de Datos Espaciales (IDE) y en 2019 la DGT lanzó el nuevo GeoPortal SNIG y formalizó el Registro Nacional de Datos Geográficos (RNDG). Esta nueva infraestructura se basa en la tecnología Open Source y, además de mejorar el diseño de la plataforma para hacer la interfaz más dinámica y fácil de usar, también se han desarrollado nuevas funcionalidades para mejorar la búsqueda de conjuntos de datos espaciales y procesos de visualización. Este documento reflexiona sobre la evolución del nuevo GeoPortal SNIG y la implementación del RNDG.

Arqueología del planeamiento urbano de Cáceres

P. 22-28

Faustino Cordero Montero, Luis Antonio Álvarez Llorente, Antonio José Gómez González, Carlos Sánchez Franco

Resumen

Las estrategias de crecimiento y desarrollo urbano de las ciudades vienen definidas en su planeamiento urbanístico. Desde su inicio, uno de los principales objetivos del SIG municipal de Cáceres fue hacer más accesible el planeamiento a todos. En 2016 se llevó a cabo un complicado trabajo de transformación del Plan General Municipal vigente, aprobado en marzo de 2010 en papel, para su publicación en la IDE local. Se definieron los mecanismos necesarios para garantizar que su versión SIG y la original en papel fueran iguales, y para gestionar las futuras modificaciones asegurando la consistencia en todo momento de los servicios WMS ofrecidos. El resultado se puede ver

sobre dos visualizadores, uno para móviles y otro disponible en la app oficial del Ayuntamiento, denominada «Cáceres View». Gracias a ese trabajo, los técnicos y profesionales pueden consultar los planos y obtener fichas urbanísticas directamente en sus dispositivos móviles y en tiempo real, sin necesidad de realizar la consulta en persona en las dependencias municipales. Igualmente, en los tres últimos años, y gracias al trabajo coordinado de los servicios de Urbanismo y Planeamiento, se ha rescatado e inventariado toda la documentación urbanística desde el año 1961, para su digitalización, georreferenciación y publicación en la IDE local. Es lo que llamamos la «Arqueología del Planeamiento Urbano de Cáceres», que permite analizar en cada momento la situación geográfica y urbanística de una parcela concreta del municipio.

Información Geográfica de Referencia de Redes de Transporte: soporte para la implementación de referenciación lineal

P. 30-38

Alicia González Jiménez, Cristina Calvo Guinea

Resumen

La Información Geográfica de Referencia de Redes de Transporte (IGR-RT) del IGN es una red tridimensional que contempla los modos de transporte viario, ferroviario, cable, marítimo y aéreo, con sus conexiones intermodales, topología de red y cobertura nacional. La complejidad de su mantenimiento reside en la cantidad de información que contiene y la necesidad de garantizar la calidad (semántica, geométrica y topológica) y la oficialidad de la información que incorpora. En el marco de la colaboración entre el IGN y el Ministerio de Transporte, Movilidad y Agenda Urbana establecido a través del proyecto HERMES, se ha desarrollado un proyecto piloto para trasladar la información alfanumérica que gestiona el Ministerio en relación a la Red de Interés General del Estado sobre las geometrías de carreteras de IGR-RT. Se ha realizado con la metodología de referenciación lineal que permite ubicar elementos o atributos procedentes de tablas alfanuméricas, que contienen la localización de sus puntos inicio y fin, sobre la red previamente calibrada a partir de sus hitos kilométricos. Mientras en el modelo de datos tradicional se crea un segmento cada vez que un atributo cambia, en el modelo de referenciación lineal esto no es necesario ya que los atributos pueden almacenarse en tablas alfanuméricas y volcarse sobre las geometrías cuando sea necesario, lo que permite incorporar a la red calibrada cualquier atributo inicialmente externo a ella.

Estimación de costes-beneficios de un nodo IDE

P. 40-44

Antonio Federico Rodríguez Pascual, Emilio López Romero, Paloma Abad Power

Resumen

Uno de los aspectos en los que las IDE progresan más lentamente es el de las estimaciones de coste-beneficios. Se han realizado muy pocos estudios de ese tipo, probablemente por su dificultad, debida entre otras causas a que: buena parte de los beneficios son intangibles y de difícil cuantificación; al convertirse el usuario de servicios estándar y abiertos en anónimo, se pierde el contacto y resulta difícil conocer todas las aplicaciones que tienen lugar, y la economía es una disciplina de la que suelen estar alejados los técnicos que mejor conocen una IDE. En esta comunicación se realiza un primer planteamiento, aproximado pero objetivo, para realizar una estimación de los beneficios y costes anuales de un nodo IDE. Se habla de estimación porque se manejan aproximaciones y solo se puede hablar de órdenes de magnitud. Se han tratado de evaluar grosso modo todos los beneficios de un nodo IDE de manera indirecta, tomando como referencia el valor por tesela de la API del proveedor de mapas web más utilizado. Por otro lado, se han cuantificado los costes de todos los gastos e inversiones que supone implementar y mantener un nodo IDE en producción en España.

GEOBIG. Gestión de grandes volúmenes de datos abiertos

P. 46-50

Alejandro Guinea de Salas, Kepa López Pérez, Daniel Navarro Cueto

Resumen

La información geográfica disponible está creciendo a pasos agigantados. Cada día se publican nuevos datos, a menudo a través de portales de datos abiertos, lo que implica inversiones nada desdeñables para su creación y

mantenimiento. Sin embargo, son a menudo difíciles de reaprovechar, dada su heterogeneidad y la variedad de formas de acceso. Paralelamente, la tecnología relacionada con la inteligencia artificial ha sufrido un gran avance, sin embargo, es difícil aplicar esas tecnologías a grandes conjuntos de datos abiertos, por su dispersión y la dificultad en procesarlos. Por ello, es necesario preparar los datos de forma previa a cualquier proceso de análisis. Se expondrá cómo se han preprocesado más de 125 000 capas de todo el mundo, que contienen más de 250 millones de elementos, y cómo se han preparado e integrado en una arquitectura capaz de aplicar procesos de forma automatizada, independientemente de sus características. Se exponen aspectos como la identificación y acceso a los datos, y los procesos seguidos hasta obtener un sistema capaz de procesar miles de capas en paralelo, como el enriquecimiento de metadatos. El sistema permite obtener el máximo valor de la ingente cantidad de datos geográficos disponibles, ya sean datos INSPIRE o no.

How to assess and showcase the impact of open spatial information?: A case study

P. 52-55

Fabio de Avila Bittencourt, Jaana Mäkelä

Resumen

Algunas de las preocupaciones más frecuentes relacionadas con las Infraestructuras de Datos Espaciales y los datos espaciales abiertos son: ¿Cuál es el impacto de mis servicios geoespaciales? Y ¿Cuál es el impacto de los datos espaciales abiertos que proporcionamos? Países, regiones y municipios de la UE han invertido una cantidad significativa de dinero en la creación de sus infraestructuras de datos espaciales y sus servicios espaciales. Las organizaciones públicas que han abierto sus conjuntos de datos espaciales esperan que los datos abiertos se utilicen ampliamente para el beneficio de sus sociedades y negocios locales. Hasta ahora, se ha informado el impacto de los servicios geoespaciales en general por medio de estadísticas sobre la cantidad de servicios, la cantidad de solicitudes enviadas a los servicios y la cantidad de descargas de datos espaciales desde una IDE. Estos indicadores son relativamente fáciles de recopilar, pero no describen el impacto total de los datos, por lo que se necesitan análisis más avanzados. En este estudio de caso describimos una nueva metodología para la evaluación de impacto de datos espaciales abiertos. El estudio de caso aquí analiza el impacto de la información espacial abierta del Instituto Finlandés del Medio Ambiente (SYKE). Los indicadores se definieron en función de los objetivos estratégicos de SYKE y los datos de los indicadores se recopilaron automáticamente de los servicios de SYKE que proporcionan información ambiental como mapas web, servicios geoespaciales y servicios de descarga. Las fuentes de datos utilizadas fueron Google Analytics, archivos de log y la plataforma Spatineo. Todos los indicadores y sus valores se visualizaron en un tablero de indicadores para que los tomadores de decisiones, los propietarios de productos y los desarrolladores de servicios pudieran obtener fácilmente una conciencia situacional compartida del impacto de la información ambiental.



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Bayesian State Space Modeling of Physical Processes in Industrial Hygiene

P. 147-160

Nada Abdalla, Sudipto Banerjee, Gurumurthy Ramachandran & Susan Arnold

Abstract

Exposure assessment models are deterministic models derived from physical–chemical laws. In real workplace settings, chemical concentration measurements can be noisy and indirectly measured. In addition, inference on important parameters such as generation and ventilation rates are usually of interest since they are difficult to obtain. In this article, we outline a flexible Bayesian framework for parameter inference and exposure prediction. In particular, we devise Bayesian state space models by discretizing the differential equation models and incorporating information from observed measurements and expert prior knowledge. At each time point, a new measurement is available that contains some noise, so using the physical model and the available measurements, we try to obtain a more accurate state estimate, which can be called filtering. We consider Monte Carlo sampling methods for parameter estimation and inference under nonlinear and non-Gaussian assumptions. The performance of the different methods is studied on computer-simulated and controlled laboratory-generated data. We consider some commonly used exposure models representing different physical hypotheses.

Model-Based Clustering of Nonparametric Weighted Networks With Application to Water Pollution Analysis

P. 161-172

Amal Agarwal & Lingzhou Xue

Abstract

Water pollution is a major global environmental problem, and it poses a great environmental risk to public health and biological diversity. This work is motivated by assessing the potential environmental threat of coal mining through increased sulfate concentrations in river networks, which do not belong to any simple parametric distribution. However, existing network models mainly focus on binary or discrete networks and weighted networks with known parametric weight distributions. We propose a principled nonparametric weighted network model based on exponential-family random graph models and local likelihood estimation, and study its model-based clustering with application to large-scale water pollution network analysis. We do not require any parametric distribution assumption on network weights. The proposed method greatly extends the methodology and applicability of statistical network models. Furthermore, it is scalable to large and complex networks in large-scale environmental studies. The power of our proposed methods is demonstrated in simulation studies and a real application to sulfate pollution network analysis in Ohio watershed located in Pennsylvania, United States.

A Bayesian Nonparametric Mixture Measurement Error Model With Application to Spatial Density Estimation Using Mobile Positioning Data With Multi-Accuracy and Multi-Coverage

P. 173-183

Youngmin Lee, Taewon Jeong & Heeyoung Kim

Abstract

The development of mobile network technologies has made it possible to collect location data of mobile devices through various positioning technologies. The location data can be used to estimate the spatial density of mobile devices, which in turn can be used by mobile service providers to plan for network capacity improvements. The two most prevalent positioning technologies are the assisted global positioning system (AGPS) and cell tower triangulation (CTT) methods. AGPS data provide more accurate location information than CTT data but can cover only a fraction of mobile devices, while CTT data can cover all mobile devices. Motivated by this problem, we propose a Bayesian nonparametric mixture measurement error model to estimate the spatial density function by integrating both noise-free data (i.e., AGPS data) and data contaminated with measurement errors (i.e., CTT data). The proposed model estimates the true latent locations from contaminated data, and the estimated latent locations, combined with noise-free data, are used to infer the model parameters. We model the true density function using a Dirichlet process (DP) mixture model with a bivariate beta distribution for the mixture kernel and a DP prior for the mixing distribution. The use of bivariate beta distributions for the mixture kernel allows the density function to have various shapes with a bounded support. Moreover, the use of a DP prior for the mixing distribution allows the number of mixture components to be determined automatically without being specified in advance. Therefore, the proposed model is very flexible. We demonstrate the effective performance of the proposed model via simulated and real-data examples.

Modeling and Change Detection for Count-Weighted Multilayer Networks

P. 184-195

Hang Dong, Nan Chen & Kaibo Wang

Abstract

In a typical network with a set of individuals, it is common to have multiple types of interactions between two individuals. In practice, these interactions are usually sparse and correlated, which is not sufficiently accounted for in the literature. This article proposes a multilayer weighted stochastic block model (MZIP-SBM) based on a multivariate zero-inflated Poisson (MZIP) distribution to characterize the sparse and correlated multilayer interactions of individuals. A variational-EM algorithm is developed to estimate the parameters in this model. We further propose a monitoring statistic based on the score test of MZIP-SBM model parameters for change detection in multilayer networks. The proposed model and monitoring scheme are validated using extensive simulation studies and the case study from Enron E-mail network.

Matrix Linear Discriminant Analysis

P. 196-205

Wei Hu, Weining Shen, Hua Zhou & Dehan Kong

Abstract

We propose a novel linear discriminant analysis (LDA) approach for the classification of high-dimensional matrix-valued data that commonly arises from imaging studies. Motivated by the equivalence of the conventional LDA and the ordinary least squares, we consider an efficient nuclear norm penalized regression that encourages a low-rank structure. Theoretical properties including a nonasymptotic risk bound and a rank consistency result are established. Simulation studies and an application to electroencephalography data show the superior performance of the proposed method over the existing approaches.

Analysis of Large Heterogeneous Repairable System Reliability Data With Static System Attributes and Dynamic Sensor Measurement in Big Data Environment

P. 206-222

Xiao Liu & Rong Pan

Abstract

In the age of Big Data, one pressing challenge facing engineers is to perform reliability analysis for a large fleet of heterogeneous repairable systems with covariates. In addition to static covariates, which include time-invariant system attributes such as nominal operating conditions, geo-locations, etc., the recent advances of sensing technologies have also made it possible to obtain dynamic sensor measurement of system operating and environmental conditions. As a common practice in the Big Data environment, the massive reliability data are typically stored in some distributed

storage systems. Leveraging the power of modern statistical learning, this article investigates a statistical approach which integrates the random forests algorithm and the classical data analysis methodologies for repairable system reliability, such as the nonparametric estimator for the mean cumulative function and the parametric models based on the nonhomogeneous Poisson process. We show that the proposed approach effectively addresses some common challenges arising from practice, including system heterogeneity, covariate selection, model specification and data locality due to the distributed data storage. The large sample properties as well as the uniform consistency of the proposed estimator are established. Two numerical examples and a case study are presented to illustrate the application of the proposed approach. The strengths of the proposed approach are demonstrated by comparison studies. Datasets and computer code have been made available on GitHub.

Student- t Processes for Degradation Analysis

P. 223-235

Chien-Yu Peng & Ya-Shan Cheng

Abstract

Stochastic processes are widely used to analyze degradation data, and the Gaussian process is a particularly common one. In this article, we propose a robust statistical model using a Student- t process to assess the lifetime information of highly reliable products. This model is statistically plausible and demonstrates a substantially improved fit when applied to real data. A computationally accurate approach is proposed to calculate the first-passage-time density function of the Student- t degradation-based process; related properties are investigated as well. In addition, this article provides parameter estimation using the EM-type algorithm and a simple model-checking procedure to evaluate the appropriateness of the model assumptions. Several case studies are performed to demonstrate the flexibility and applicability of the proposed model with random effects and explanatory variables.

Process Monitoring ROC Curve for Evaluating Dynamic Screening Methods

P. 236-248

Peihua Qiu, Zhiming Xia & Lu You

Abstract

In practice, we often need to sequentially monitor the performance of individual subjects or processes, so that interventions can be made in a timely manner to avoid unpleasant consequences (e.g., strokes or airplane crashes) once the longitudinal patterns of their performance variables deviate significantly from the regular patterns of well-functioning subjects or processes. Some statistical methods are available to handle this dynamic screening (DS) problem. Because the performance of the DS methods is related to their signal times, the conventional false positive rate (FPR) and false negative rate (FNR) cannot be effective in measuring their performance. So far, there is no existing metrics in the literature for properly measuring the performance of DS methods. In this article, we aim to fill this gap by proposing a new performance evaluation approach, called process monitoring receiver operating characteristic curve, which properly combines the signal times with (FPR,FNR). Numerical examples and theoretical justifications show that this approach provides an effective tool for measuring the performance of DS methods.

An Effective Method for Online Disease Risk Monitoring

P. 249-264

Lu You & Peihua Qiu

Abstract

Many diseases can be prevented or treated if they can be detected early or signaled before their occurrence. Disease early detection and prevention (DEDAP) is thus important for health improvement of our society. Traditionally, people are encouraged to check their health conditions regularly so that readings of relevant medical indices can be compared with certain threshold values and any irregular readings can trigger further medical tests to find root causes or diseases. One limitation of such traditional DEDAP methods is that they focus mainly on the data collected at the current time point and historical data are not fully used. Consequently, irregular longitudinal pattern of the medical indices could be neglected and certain diseases could be left undetected. In this article, we suggest a novel and effective new method for DEDAP. To detect a disease by this method, a patient's risk to the disease is first quantified at

each time point, and then the longitudinal pattern of the risk is monitored sequentially over time. A signal will be triggered by a large cumulative difference between the longitudinal risk pattern of the patient under monitoring and the longitudinal risk pattern of a typical person without the disease in concern. Both theoretical arguments and numerical studies show that it works well in practice.

Additive Heredity Model for the Analysis of Mixture-of-Mixtures Experiments

P. 265-276

Sumin Shen, Lulu Kang & Xinwei Deng

Abstract

The mixture-of-mixtures (MoM) experiment is different from the classical mixture experiment in that the mixture component in MoM experiments, known as the major component, is made up of subcomponents, known as the minor components. In this article, we propose an additive heredity model (AHM) for analyzing MoM experiments. The proposed model considers an additive structure to inherently connect the major components with the minor components. To enable a meaningful interpretation for the estimated model, the hierarchical and heredity principles are applied by using the nonnegative garrote technique for model selection. The performance of the AHM was compared to several conventional methods in both unconstrained and constrained MoM experiments. The AHM was then successfully applied in two real-world problems studied previously in the literature.
