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Mobile and Context-Aware GeoBI Applications: A Multilevel Model for Structuring and Sharing of Contextual Information

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ABSTRACT

With the requirements for high performance results in the today ' s mobile, global, highly competitive, and technology-based business world, business professionals have to get supported by convenient mobile decision support systems (DSS). To give an improved support to mobile business professionals, it is necessary to go further than just allowing a simple remote access to a Business Intelligence platform. In this paper, the need for actual context-aware mobile Geospatial Business Intelligence (GeoBI) systems that can help capture, filter, organize and structure the user mobile context is exposed and justified. Furthermore, since capturing, structuring, and modeling mobile contextual information is still a research issue, a wide inventory of existing research work on context and mobile context is provided. Then, step by step, we methodologically identify relevant contextual information to capture for mobility purposes as well as for BI needs, organize them into context-dimensions, and build a hierarchical mobile GeoBI context model which (1) is geo-spatial-extended, (2) fits with human perception of mobility, (3) takes into account the local context interactions and information-sharing with remote contexts, and (4) matches with the usual hierarchical aggregated structure of BI data.

KEYWORDS

Context-Awareness; Decision Support System (DSS); Mobile Geospatial Business Intelligence (GeoBI); Decision-Making; Relevant Contextual Information; Context Dimensions; Context Modeling; Context Sharing; Context Structuring, BI Data

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References

[1] A. Cuzzocrea, F. Furfaro and D. Saccam, "Hand-olap: a system for delivering olap services on handheld devices," in ISADS 2003,, Pisa, Italy, 2003.

[2] A. Maniatis, "The case for mobile OLAP," in First International Workshop on Pervasive Information Management (in conjunction with EDBT '04), Heraklion, Greece, 2004.

[3] é. Dubé, T. Badard and Y. Bédard, "Service Web de constitution en temps réel de mini-cubes SOLAP pour clients mobiles.," in Atelier SIG ubiquitaire-SIG mobiles, CQFD-Géo / Sageo, Clermont-Ferrand , France, 2007.

[4] BusinessObject.com, "Getting Information Where and When You Need It," 2008. [Online]. Available: http://www.businessobjects.com/pdf/product/catalog/information_delivery/mobile/mobile_product_sheet.pdf.

[5] IBM.com, "Cognos 8 Go! Mobile Extend business intelligence value by accessing information on mobile devices.," 2009. [Online]. Available: http://www-01.ibm.com/software/data/cognos/products/cognos-8-go/mobile/.

[6] D. J. Power, Decision support systems: concepts and resources for managers, Greenwood Publishing Group, 2002.

[7] M. Golfarelli, S. Rizzi and I. Cella, "Beyond data warehousing: What's next in business intelligence?," in DOLAP '04 Proceedings, New York, NY, USA, 2004.

[8] D. Oard and G. Marchionini, "A conceptual framework for text filtering.," Technical Report EE-TR-96-25 CAR-TR-830 CLIS-TR-9602 CS-TR-3643 , University of Maryland, 1996.

[9] J. Herring, "Building a Business Intelligence System," The journal of Business Strategy May/June, pp. 4-9, 1988. doi：10.1108/eb039219

[10] H. Luhn, "A business intelligence system," IBM Journal of Research and Development 2 (4) - October, pp. 314-319, 1958.

[11] S. Negash and G. Paul, "Business Intelligence," Handbook on Decision Support Systems 2 - Springer, pp. 175-193, 2008 .

[12] E. Turban, J. E. Aronson and T.-P. Liang, Decision Support Systems and Intelligent Systems, NJ, USA: Pearson Prentice Hall, 2005.

[13] B. Evelson and N. Norman, "Topic Overview: Business Intelligence," Forrester research, p. http://www.forrester.com/rb/Research/topic_overview_business_intelligence/q/id/39218/t/2, 2008.

[14] M. Frolich and T. Ariyachandra, " Business performance management: One truth," Information Systems Management 23 (1), pp. 41-48, 2006. doi：10.1201/1078.10580530/45769.23.1.20061201/91771.5

[15] whatis.com, "business intelligence (BI)," 2009. [Online]. Available: http://searchdatamanagement.techtarget.com/sDefinition/0,,sid91_gci213571,00.html . [Accessed 7 Feb 2011].

[16] C. Franklin, "An introduction to geographic information systems: linking maps to databases," Database 15 (2), p. 13–21, 1992.

[17] J. Urry, "Mobility and Proximity," Sociology 36(2), p. 255–274, 2002. doi：10.1177/0038038502036002002

[18] C. Bolchini, C. A. Curino, E. Quintarelli, L. Tanca and F. A. Schreiber, "A data-oriented survey of context models," SIGMOD Record 36(4), pp. 19-26, 2007. doi：10.1145/1361348.1361353

[19] P. Lombardi, V. Cantoni and B. Zavidovique, "Context in robotic vision: control for real-time adaptation," in ICINCO, 2004..

[20] G. Chen and D. Kotz, "A survey of context-aware mobile computing research (Tech. Rep. TR2000-381)," Dept. of Computer Science, Dartmouth College, Hanover, N.H., Dartmouth, 2000.

[21] B. Shilit, N. Adams and R. Want, "Context Aware Computing Applications," in 1st International Workshop on Mobile Computing Systems and Applications, 1994. doi：10.1109/WMCSA.1994.16

[22] L. Sarjakoski and A.-M. Nivala, "Adaptation to Context - A Way to Improve the Usability of Mobile Maps.," in Map-based Mobile Services, Theories, Methods and Implementations, New Yprk, Springer Berlin Heidelber, 2005, pp. 107-123.

[23] L. Barkhuus and A. Dey, " Is Context-Aware Computing Taking Control away from the User? Three Levels of Interactivity Examined," in Ubi-Comp2003 conference, LNCS 2864, 2003.

[24] A. K. Dey, Providing architectural support for building context-aware applications, Doctoral Dissertation, Georgia Institute of Technology, 2000.

[25] R. Want, A. Hopper, V. Falcao and J. Gibbons, "The active badge location system," ACM Transactions on Information Systems, vol. 10, no. 1, p. 91–102, 1992. doi:10.1145/128756.128759

[26] M. Weiser, "Some computer science issues in ubiquitous computing," Communications of the ACM, vol. 36, no. 7, pp. 75-84, 1993. doi:10.1145/159544.159617

[27] P. S. Tan, A. E. S. Goh and S. S. G. Lee, "A Context Model for B2B Collaborations," in 2008 IEEE International Conference onServices Computing, SCC 2008, 2008.

[28] P. Kumar, S. Gopalan and V. Sridhar, "Context enabled multi-CBR based recommendation engine for ecommerce," in IEEE International Conference on e-Business Engineering, Beijing, China, 2005.

[29] W. Zheng and Y. Yuan, "Identifying the Differences Between Stationary Office Support and Mobile Work Support: a Conceptual Framework," Framework. Int. J. Mob. Commun. 5(1), p. 107–122, 2007. doi:10.1504/IJMC.2007.011492

[30]H. Wigelius and H. VAaAatAajAa, “Dimensions of context affecting user experience in mobile work,” in INTERACT ‘09: Proceedings of the 12th IFIPTC 13 International Conference on Human-Computer Interaction, Berlin, 2009.

[31]V. Roto, Web Browsing on Mobile Phones-Characteristics of User Experience, Espoo, Finland.: Ph.D. Dissertation. Helsinki University of Technology, 2006.

[32]B. Schilit and M. Theimer, “Disseminating active map information to mobile hosts,” IEEE Network, Vol. 8, No. 5, p. 22–32, 1994. doi:10.1109/65.313011

[33]M. F. Mokbel and J. J. Levandoski, “Toward context and preference-aware location-based services.,” in Proceedings of the Eighth ACM International Workshop on Data Engineering for Wireless and Mobile Access, 2009. doi:10.1145/1594139.1594150

[34]T. S. W. Hofer, M. Pichler, G. Leonhartsberger and J. Altmann, “Context-awareness on mobile devices – the hydrogen approach,” in Proceedings of the 36th Annual Hawaii International Conference on System Sciences, Hawaii , 2002.

[35]N. Bradley and M. Dunlop, “Toward a Multidisciplinary Model of Context to Support Context-Aware Computing,” Human-Computer Interaction 20, p. 403–436, 2005. doi:10.1207/s15327051hci2004_2

[36]A. Dey, G. Abowd and D. Salber, “A conceptual framework and a toolkit for supporting the rapid prototyping of context-aware applications.,” Human-Computer Interaction, 16(2–4), p. 97–166., 2001. doi:10.1207/S15327051HCI16234_02

[37]T. Winograd, “Architectures for context,” Human-Computer Interaction (HCI) Journal, vol. 16, no. 2, p. 401–419, 2001.

[38]B. Shilit, N. Adams and R. Want, “Context Aware Computing Applications.,” in 1st International Workshop on Mobile Computing Systems and Applications, 1994. doi:10.1109/WMCSA.1994.16

[39]B. Tversky, “Structures of Mental spaces: How people think about space,” Environment and Behaviour, vol. 35, no. 1, pp. 66-80, 2003. doi:10.1177/0013916502238865

[40]I. Reginster and G. Edwards, “The concept and implementation of perceptual regions as hierarchical spatial units for evaluating environmental sensitivity,” Journal of Urban and Regional Information Sys-tems Association, vol. 13, no. 1, p. 5–16, 2001.

[41]A. Schmidt, M. Beigl and H.-W. Gellersen, “There is more to context than location,” Computers and Graphics 23, 6, p. 893–901, 1999. doi:10.1016/S0097-8493(99)00120-X

[42]A. Kofod-Petersen and M. Mikalsen, “Context: Representation and Reasoning – Representing and Reasoning about Context in a Mobile Environment,” Revue d ’ Intelligence Artificielle 19 , p. 479–498, 2005. doi:10.3166/ria.19.479-498

[43]J. Gwizdka, “What ’ s in the context?,” Computer Human Interaction, 2000.

[44]G. Chen and D. Kotz, “A survey of context-aware mobile computing research,” Tech. Rep. TR2000-381, Dartmouth, 2000.

[45]L. Arhippainen and M. Tahti, “Empirical Evaluation of User Experience in Two Adaptive Mobile Application Prototypes.,” in Proceedings of the 2nd International Conference on Mobile and Ubiquitous Multimedia, Norrkoping, Sweden., 2003.

[46]L. Niu, J. Lu and G. Zhang, “Cognition-Driven Decision Processes,” in Cognition-Driven Decision Support for Business Intelligence, Berlin / Heidelberg, Springer, 2009, pp. 53-73. doi:10.1007/978-3-642-03208-0_5

[47]M. Endsley, “Towards a theory of situation awareness in dynamic systems,” Human Factors 37, p. 32–64, 1995. doi:10.1518/001872095779049543

[48]L. Niu, J. Lu and G. Zhang, “Managerial Cognition,” in Cognition-Driven Decision Support for Business Intelligence, Berlin/Heidelberg, Springer, 2009, pp. 31-37. doi:10.1007/978-3-642-03208-0_3

[49]M. Stanners and H. French, “ An empirical study of the relationship between situation awareness and decision making,” Technical report DSTO-TR-1687 of the Defence Science and Technology Organisation, available at , 2005.

[50]P. Jordan, S. Lawrence and A. Troth, “The impact of negative mood on team performance,” Journal of Management & Organization, 12, p. 131–145, 2006. doi:10.5172/jmo.2006.12.2.131

[51]J. R. Nofsinger, “Social mood and financial economics,” Journal of Behavioral Finance 6(3), p. 144–160,

2005. doi:10.1207/s15427579jpfm0603_4

[52]N. Randewich, "Intel guru: future phones will sense your mood," International Business Times, 15 September 2010. [Online]. Available: http://www.ibtimes.com/articles/62682/20100915/intel-guru-future-phones-will-sense-your-mood.htm#. [Accessed 10 02 2012].

[53]N. Bradley and M. Dunlop, "Toward a Multidisciplinary Model of Context to Support Context-Aware Computing," Human-Computer Interaction 20, p. 403–436, 2005. doi:10.1207/s15327051hci2004_2

[54]Y. Bédard, "Principles of Spatial Database Analysis and Design," in GIS: Principles, Techniques, Applications & Management, Chap. 29, New York, Wiley, 2nd Ed., 1999, pp. 413-424.

[55]S. Tamminen, A. Oulasvirta, K. Toiskallio and A. Kankainen, " Understanding mobile contexts.," Personal and Ubiquitous Computing, 8, 2, pp. 135-143, 2004. doi:10.1007/s00779-004-0263-1

[56]R. J. Thierauf, Effective Business Inteligence Systems, Westport: Quorom Books, 2001.