

Problem of transitivity of wikipedia category system

Kirillovich A., Nevzorova O.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

This paper analyses a violation of the transitivity principle of Wikipedia category system. Causes of the violation have been analyzed on base of ontological modeling methodologies such as Onto-Clean. A new approach for elimination of the violation has been proposed.

Keywords

Categorization system, OntoClean, Ontological dependence, Ontology engineering, Thesaurus, Wikipedia

References

- [1] Medelyan, O., et al. Mining meaning from Wikipedia. *International Journal of Human-Computer Studies*, 67 (9), pp. 716-754. Academic Press (2009). doi:10.1016/j.ijhcs.2009.05.004
- [2] Hovy, E., Navigli, R., Ponzetto, S.P. Collaboratively built semi-structured content and Artificial Intelligence: The story so far. *Artificial Intelligence*, 194, pp. 2-27. Elsevier (2013). doi:10.1016/j.artint.2012.10.002
- [3] Auer, S., et al. DBpedia: A Nucleus for a Web of Open Data. In: Aberer K. et al. (Eds.) 6th International Semantic Web Conference, 2nd Asian Semantic Web Conference (ISWC 2007 + ASWC 2007). *The Semantic Web. LNCS*, 4825, pp. 722-735. Springer (2007). doi:10.1007/978-3-540-76298-0-52
- [4] Bizer, C., et al. DBpedia: A Crystallization Point for the Web of Data. *Journal of Web Semantics*, 7 (3), pp. 154-165. Elsevier (2009). doi:10.1016/j.websem.2009.07.002
- [5] Lehmann, J., et al. DBpedia: A Large-scale, Multilingual Knowledge Base Extracted from Wikipedia. *Semantic Web Journal*, 6 (2), pp. 167-195. IOS Press (2015). doi:10.3233/SW-140134
- [6] Suchanek, F. M., Kasneci, G., Weikum, G. Yago: a Core of Semantic Knowledge. In: 16th international conference on World Wide Web (www 2007), pp. 697-706 (2007). doi:10.1145/1242572.1242667
- [7] Hoffart, J., et al. G. YAGO2: A spatially and temporally enhanced knowledge base from Wikipedia. *Artificial Intelligence*, 194, pp. 28-61. Elsevier (2013). doi:10.1016/j.artint.2012.06.001
- [8] Mahdisoltani, F., Biega, J., Suchanek, F.M. YA-GO3: A Knowledge Base from Multilingual Wikipedias. In: 7th Biennial Conference on Innovative Data Systems Research (CIDR 2015) (2015)
- [9] Ponzetto, S.P., Strube, M. Deriving a Large Scale Taxonomy from Wikipedia. In: 22nd National Conference on Artificial Intelligence (AAAI 2007), pp. 1440-1445. AAAI Press (2007)
- [10] Ponzetto, S.P., Strube, M. Taxonomy induction based on a collaboratively built knowledge repository. *Artificial Intelligence*, 175 (9-10), pp. 1737-1756. Elsevier (2011). doi:10.1016/j.artint.2011.01.003
- [11] Zirn, C., Nastase, V., Strube, M. Distinguishing between Instances and Classes in the Wikipedia Taxonomy. In: Zirn C., et al. (Eds.) 5th European Semantic Web Conference (ESWC 2008). *LNCS*, 5021, pp. 376-387. Springer (2008). doi:10.1007/978-3-540-68234-9-29
- [12] Nastase, V., Strube, M. Decoding Wikipedia Categories for Knowledge Acquisition. In: Cohn A. (Ed.) 23rd National Conference on Artificial Intelligence (AAAI 2008), Vol. 2, pp. 1219-1224. AAAI Press (2008)
- [13] Nastase, V., et al. WikiNet: A Very Large Scale Multi-Lingual Concept Network. In: Calzolari N., et al. (Eds.) 7th International Conference on Language Resources and Evaluation (LREC 2010), pp. 1015-1022 (2010)

- [14] Nastase, V., Strube, M. Transforming Wikipedia into a large scale multilingual concept network. *Artificial Intelligence*, 194, pp. 62-85. Elsevier (2013). doi:10.1016/j.artint.2012.06.008
- [15] Gangemi, A., et al. Automatic Typing of DBpedia Entities. In: Cudré-Mauroux P. et al. (Eds.) 11th International Semantic Web Conference (ISWC 2012). LNCS, 7649, pp. 65-81. Springer (2012). doi:10.1007/978-3-6-2-35176-1-5
- [16] Nuzzolese, A.G., et al. Towards the Natural Ontology of Wikipedia. In: Blomqvist E., Groza T. (Eds.) Proceedings of the ISWC 2013 Posters & Demonstrations Track. CEUR Workshop Proceedings, Vol. 1035, pp. 273-276 (2013)
- [17] Flati, T., et al. Two Is Bigger (and Better) Than One: the Wikipedia Bitaxonomy Project. In: Toutanova K., Wu H. (Eds.) 52nd Annual Meeting of the Association for Computational Linguistics (ACL 2014), Vol. 1, pp. 945-955. ACM (2014). doi:10.3115/v1/P14-1089
- [18] de Melo, G., Weikum, G. MENTA: Inducing Multilingual Taxonomies from Wikipedia. In: 19th ACM international conference on Information and knowledge management (CIKM '10), pp. 1099-1108. ACM (2010). doi:10.1145/1871437.1871577
- [19] Navigli, R., Ponzetto, S.P. BabelNet: Building a Very Large Multilingual Semantic Network. In: 48th Annual Meeting of the Association for Computational Linguistics (ACL 2010), pp. 216-225. ACL (2010)
- [20] Navigli, R., Ponzetto, S.P. BabelNet: The automatic construction, evaluation and application of a wide-coverage multilingual semantic network. *Artificial Intelligence*, 193, pp. 217-250. Elsevier (2012). doi:10.1016/j.artint.2012.07.001
- [21] Moro, A., Navigli, R. WiSeNet: Building a Wikipedia-based Semantic Network with Ontologized Relations. In: 21st ACM international conference on Information and knowledge management (CIKM 2012), pp. 1672-1676. ACM (2012). doi:10.1145/2396761.2398495
- [22] Wu, F., Weld, D.S. Automatically Refining the Wikipedia Infobox Ontology. In: 17th international conference on World Wide Web (www 2008), pp. 635-644. ACM (2008). doi:10.1145/1367497.1367583
- [23] Ruiz-Casado, M., Alfonseca, E., Castells, P. Automatic Assignment of Wikipedia Encyclopedic Entries to WordNet Synsets. In: Szczepaniak P.S., et al. (Eds.) 3rd International Conference on Advances in Web Intelligence (AWIC 2005). LNCS, 3528, pp. 380-386. Springer (2005). doi:10.1007/11495772-59
- [24] Toral, A., Muñoz, R., Monachini, M. Named Entity WordNet. In: 6th Conference on Language Resources and Evaluation (LREC 2008), pp. 741-747 (2008)
- [25] Niemann, E., Gurevych, I. The people's web meets linguistic knowledge: automatic sense alignment of Wikipedia and WordNet. In: 9th International Conference on Computational Semantics (IWCS 2011), pp. 205-214. ACL (2011)
- [26] Ponzetto, S.P., Navigli, R. Large-Scale Taxonomy Mapping for Restructuring and Integrating Wikipedia. In: 21st International Joint Conference on Artificial Intelligence (IJCAI 2009), pp. 2083-2088. Morgan Kaufmann Publishers (2009)
- [27] Gella, S., Strapparava, C., Nastase, V. Mapping WordNet Domains, WordNet Topics and Wikipedia Categories to Generate Multilingual Domain Specific Resources. In: Calzolari N., et al. (Eds.) 9th International Conference on Language Resources and Evaluation (LREC 2014), pp. 1117-1121. ELRA (2014)
- [28] Titze, G., et al. DBpedia Domains: augmenting DBpedia with domain information. In: Calzolari N., et al. (Eds.) 9th International Conference on Language Resources and Evaluation (LREC 2014), pp. 1438-1442. ELRA (2014)
- [29] ANSI-NISO Z39.19-2005
- [30] Loukachevitch, N. *Thesauri in Information Retrieval Tasks*. Moscow University Press (2011)
- [31] Guarino, N., Welty, C. An Overview of OntoClean. In: Staab S., Studer R. (Eds.) *Handbook on Ontologies*. 2nd edition. Springer (2009). doi:10.1007/978-3-540-92673-3-9
- [32] Guarino, N., Welty, C. A Formal Ontology of Properties. In: Dieng R., Corby O. (Eds.) *Knowledge Engineering and Knowledge Management Methods, Models, and Tools (EKAW 2000)*. LNCS, 1937, pp. 97-112. Springer (2000). doi:10.1007/3-540-39967-4-8
- [33] Guizzardi, G. *Ontological foundations for structural conceptual models*. CTIT (2005)
- [34] Loukachevitch, N., Dobrov, B. RuThes Linguistic Ontology vs. Russian Wordnets. In: Orav H., Fellbaum C., Vossen P. (Eds.) 7th Conference on Global WordNet (GWC 2014), pp. 154-162. University of Tartu Press (2014)
- [35] Loukachevitch, N., Dobrov, B., Chetviorkin, I. RuThes-Lite, a Publicly Available Version of The-sauru of Russian Language RuThes. In: *Computational Linguistics and Intellectual Technologies: Papers from the Annual International Conference "Dialogue"*, pp. 340-349. RGGU (2014)
- [36] Loukachevitch, N., Dobrov, B. Development of Ontologies with Minimal Set of Conceptual Relations. In: Lino, M.T., et al. (Eds.) 4th International Conference on Language Resources and Evaluation (LREC'04), pp. 1889-1892. ELRA (2004)
- [37] Loukachevitch, N., Dobrov, B. Ontological Types of Associative Relations in Information-Retrieval Thesauri and Automatic Query Expansion. In: Oltramari A. et al. (Eds.) *Ontologies and Lexical Resources in Distributed Environments (Ontolex 2004)*, pp. 24-29 (2004)

- [38] Tahko, T.E., Lowe, E.J. Ontological Dependence. In: Zalta E.N. (Ed.) The Stanford Encyclopedia of Philosophy (2016). <http://plato.stanford.edu/entries/dependence-ontological/>
- [39] Correia, F. Ontological Dependence. *Philosophy Compass*, 3 (5), pp. 1013-1032. Wiley (2008). doi:10.1111/j.1747-9991.2008.00170.x
- [40] Koslicki, K. Varieties of Ontological Dependence. In: Correia F., Schnieder B. (Eds.) *Metaphysical Grounding: Understanding the Structure of Reality*, pp. 186-213. Cambridge University Press (2012)
- [41] Koslicki, K. Ontological Dependence: An Opinionated Survey. In: Hoeltje M., et al. (Eds.) *Varieties of Dependence*, pp. 31-64. Philosophia Verlag (2013)
- [42] Simons, P. *Parts: A Study in Ontology*. Clarendon Press (1987). Ch. 8. Ontological Dependence. doi:10.1093/acprof:oso/9780199241460.001.0001
- [43] Thomasson, A.L. *Fiction and Metaphysics*. Cambridge University Press. Chapter 2. The Nature and Varieties of Existential Dependence, pp. 24-34 (1999)
- [44] Fine, K. Essence and Modality. *Philosophical Perspectives*, 8, pp. 1-16. Ridgeview Publishing Company (1994). doi:10.2307/2214160
- [45] Fine, K. Ontological Dependence. *Proceedings of the Aristotelian Society*, 95, pp. 269-290. Wiley (1995)
- [46] Thomasson, A.L. Existence Questions. *Philosophical Studies*, 141(1), pp. 63-78. Springer (2008). doi:10.1007/s11098-008-9263-8
- [47] Thomasson, A.L. Answerable and Unanswerable Questions. In: Chalmers D.J., et al. (Eds.) *Metametaphysics: New Essays on the Foundations of Ontology*. Oxford University Press (2009)
- [48] Nevzorova, O., et al. OntoMath Ontology: a Linked Data Hub for Mathematics. In: Klinov P., Mouromstev D. (Eds.) *5th International Conference on Knowledge Engineering and Semantic Web (KESW 2014)*. CCIS, Vol. 468, pp. 105-119. Springer, Heidelberg (2014). doi:10.1007/978-3-319-11716-4-9
- [49] Elizarov, A.M., et al. Mathematical Knowledge Representation: Semantic Models and Formalisms. *Lobachevskii J. Math.* 35(4), pp. 348-354. Pleiades Publishing (2014). doi:10.1134/S1995080214040143
- [50] Elizarov, A., et al. Digital Ecosystem OntoMath: Mathematical Knowledge Analytics and Management. In: Kalinichenko L., et al. (Eds.) *DAMDID/RCDL 2016*. CCIS, Vol. 706, pp. 33-46. Springer, Cham (2017). doi:10.1007/978-3-319-57135-5-3
- [51] Kirillovich, A., et al. RuThes Cloud: Towards a Multilevel Linguistic Linked Open Data Resource for Russian. In: Różewski P., Lange C. (Eds.) *KESW 2017*. CCIS, Vol. 786, pp. 38-52. Springer, Cham (2017). doi:10.1007/978--319-69548-8-4