

Machine Learning-Driven Refinement of Concept Maps from Domain-Relevant Textual Data

Mayur Narendra Agrawal¹ and Dr. Amit Singhal²

Research Scholar, Department of Computer Science¹

Research Guide, Department of Computer Science²

Sunrise University, Alwar, Rajasthan, India

Abstract: *This research paper explores the application of machine learning techniques to enhance the refinement process of concept maps derived from domain-relevant textual data. Concept maps serve as powerful knowledge representation tools, facilitating a visual and hierarchical depiction of relationships among concepts. However, the construction of accurate and meaningful concept maps from large volumes of domain-specific texts poses challenges that can be effectively addressed through machine learning methodologies. Our approach leverages advanced natural language processing and neural network architectures to automatically extract, categorize, and refine concepts, fostering a more nuanced and contextually relevant representation. The research delves into the design and implementation of a machine learning-driven pipeline for concept map refinement, encompassing stages such as text preprocessing, feature extraction, and model training. Evaluation metrics are employed to assess the effectiveness of the refined concept maps in capturing the intricacies of domain-specific knowledge. The paper not only contributes to the growing body of literature on the intersection of machine learning and knowledge representation but also provides practical insights into the development of intelligent systems capable of autonomously refining and updating concept maps in dynamic and information-rich domains.*

Keywords: Machine Learning, Concept Maps, Textual Data

REFERENCES

- [1]. Krunoslav Zubrinic, Damir Kalpic, Mario Milicevic, The automatic creation of concept maps from documents written using morphologically rich languages, *Expert Systems with Applications*, Volume 39, Issue 16, 2012, Pages 12709-12718, ISSN 0957-4174, <https://doi.org/10.1016/j.eswa.2012.04.065>.
- [2]. Cromley, J. G., Snyder-Hogan, L. E., & Luciw-Dubas, U. A. (2010). Reading comprehension of scientific text: A domain-specific test of the direct and inferential mediation model of reading comprehension. *Journal of Educational Psychology*, 102(3), 687–700. <https://doi.org/10.1037/a0019452>.
- [3]. Kim T, Yun Y, Kim N. Deep learning-based knowledge graph generation for COVID-19. *Sustainability*. 2021 Feb 19;13(4):2276.
- [4]. You J, Liu B, Ying Z, Pande V, Leskovec J. Graph convolutional policy network for goal-directed molecular graph generation. *Advances in neural information processing systems*. 2018;31.
- [5]. Tseng, H., Chen, B., Chang, T., & Sung, Y. (2019). Integrating LSA-based hierarchical conceptual space and machine learning methods for leveling the readability of domain-specific texts. *Natural Language Engineering*, 25(3), 331-361. doi:10.1017/S1351324919000093.
- [6]. Omid Mohamad Beigi, Mohammad H. Moattar, Automatic construction of domain-specific sentiment lexicon for unsupervised domain adaptation and sentiment classification, *Knowledge-Based Systems*, Volume 213, 2021, 106423, ISSN 0950-7051, <https://doi.org/10.1016/j.knosys.2020.106423>.
- [7]. Yijing Li, Haixiang Guo, Qingpeng Zhang, Mingyun Gu, Jianying Yang, Imbalanced text sentiment classification using universal and domain-specific knowledge, *Knowledge-Based Systems*, Volume 160, 2018, Pages 1-15, ISSN 0950-7051, <https://doi.org/10.1016/j.knosys.2018.06.019>.
- [8]. Pashev, George, Silvia Gaftandzhieva, and Y. Hopterieva. "Domain specific automated essay scoring using cloud based NLP API." *Int. J. Comput. Sci. Mobile Comput* 10.10 (2021): 33-39.

