Headai Ltd – The Science Behind Transparent Cognitive AI

Combining cognitive psychology, semantic computing and machine learning

Our goal is to build a machine that reads and processes text like human would do. This requires a combination of cognitive psychology, semantic computing, and machine learning. Headai approach emulates the human way to learn: According to cognitive psychology of learning, our thinking is based on conceptual representations of our observations, experiences and relations between these concepts. Phenomena when the structure (concepts or relationships) change is called learning.

Headai's AI learns the work context via 1) general unstructured content and 2) teaching done by human [1][2][3]. In phase 1 it learns the basic semantics of relations of the working context. The learning in this phase follows the ideas of unsupervised learning. In phase 2 the learning is supervised: user teaches it by evaluating its performance. The general content for first phase teaching can be e.g. text documents, databases, conceptual maps, graphs, etc. This means, the AI can be taught to handle very different tasks.

Applications in real world cases

Headai technology has its early background in dealing with several cognitively challenging tasks. Artificial test persons in software testing with one of the largest publishing companies in Finland [4], background for adaptive learning materials [5], assistant teacher for globally published MOOCs [6] and librarian assistant for West-Finland libraries [7].

According to studies [1-7], the AI's behavior and performance in taught domain is relatively similar to human behavior in the same domain, in other words the behavior is believable.

More recently, Headai has focused on labor market mismatch problem and optimizing talent pipelines with efficient use of MyData. Case examples: 1) With World Bank, a labor market demand analysis and curriculum gap assessment based on machine-reading and analyzing tens of thousands of Kenyan job advertisements, and local university curriculums. 2) Finnish Defence Forces together with Headai turned the military programs into the civilian language helping individuals to apply gained skills and competencies better in their education and career paths.

Founders of Headai

Harri Ketamo, Ph.D., AI, machine learning, analytics (previously: founder, www.skillpixels.com)
Marko Laiho, global business operations, quality (major stakeholder: www.virelabs.com)
Antti Koivisto, Ph.D. Cand., R&D, Data science, System architectures

References

1. Ketamo, H. (2011). Sharing Behaviors in Games and Social Media. *International Journal of Applied Mathematics and Informatics*, vol. 5(1), pp. 224-232.
2. Ketamo, H., Nurmi, C. & Kallama, K. (2011). User Generated AI in Sports Education. In proceedings of the 5th European Conference on Games Based Learning. 20-21 October 2011, Athens, Greece, pp. 306-314.
3. Ketamo, H. (2013). Agents and Analytics. In proceedings of *5th International Conference on Agents and Artificial Intelligence, vol2* (ICAART 2013), 15-18 February 2013, Barcelona, Spain, pp. 377-383.
4. Ketamo, H. (2008). Cost Effective Testing with Artificial Labour. In proceedings of 2008 Networked & Electronic Media Summit. Saint-Malo, France, 13-15.10.2008, pp.185-190.
5. Ketamo, H. (2009). Self-organizing content management with semantic neural networks. In Recent Advances in Neural Networks: Proceedings of the 10th WSEAS International Conference on Neural Networks (NN'09), Prague, Czech Republic, 23-25.3. 2009, pp.63-69.
6. Ketamo, H. (2014). Learning Fingerprint: Adaptive Tutoring for MOOCs. In Proceedings of *World Conference on Educational Multimedia, Hypermedia and Telecommunications*. Jun 23, 2014, Tampere, Finland, pp. 2349–2358.
7. Ketamo, H. (2015). Taking Printed Books into Internet of Things. In Berntzen & Böhm (eds.), CENTRIC 2015, The Eighth International Conference on Advances in Human oriented and Personalized Mechanisms, Technologies, and Services. November 15 - 20, 2015, Barcelona, Spain, pp. 5-11.