Sentic Computing

With the recent development of deep learning, research in AI has gained new vigor and prominence. Machine learning, however, suffers from three big issues, namely:
1. *Dependency*: it requires (a lot of) training data and is domain-dependent;
2. *Consistency*: different training or tweaking leads to different results;
3. *Transparency*: the reasoning process is uninterpretable (black-box algorithms).

We address such issues in the context of natural language processing (NLP) through a multi-disciplinary approach, termed *sentic computing*, that aims to bridge the gap between statistical NLP and many other disciplines that are necessary for understanding human language, such as linguistics, commonsense reasoning, and affective computing. Sentic computing (http://sentic.net/computing), whose term derives from the Latin sensus (as in commonsense) and sentire (root of words such as sentiment and sentience), enables the analysis of text not only at document, page or paragraph level, but also at sentence, clause, and concept level. This is possible thanks to an approach to NLP that is both top-down and bottom-up: top-down for the fact that sentic computing leverages symbolic models such as semantic networks and conceptual dependency representations to encode meaning; bottom-up because we use sub-symbolic methods such as deep neural networks and multiple kernel learning to infer syntactic patterns from data. Coupling symbolic and sub-symbolic AI is key for stepping forward in the path from NLP to natural language understanding. Relying solely on machine learning, in fact, is simply useful to make a 'good guess' based on past experience, because sub-symbolic methods only encode correlation and their decision-making process is merely probabilistic. Natural language understanding, however, requires much more than that. To use Noam Chomsky's words, "you do not get discoveries in the sciences by taking huge amounts of data, throwing them into a computer and doing statistical analysis of them: that's not the way you understand things, you have to have theoretical insights". Sentic computing positions itself as a horizontal technology that serves as a backend to many different business applications in areas such as e-business, e-commerce, e-governance, e-security, e-health, e-learning, e-tourism, e-mobility, e-entertainment, and more.

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Erik Cambria received his PhD in Computing Science and Mathematics in 2012 following the completion of an EPSRC project in collaboration with MIT Media Lab, which was selected as impact case study by the University of Stirling for the UK Research Excellence Framework (REF2014). After working at HP Labs India, Microsoft Research Asia, and NUS Temasek Labs, in 2014 he joined NTU SCSE as an assistant professor. His current affiliations include Rolls Royce, A*STAR, and MIT Synthetic Intelligence Lab. Dr Cambria is associate editor of several journals edited by Elsevier, e.g., INFFUS and KBS, Springer, e.g., AIRE and Cognitive Computation, and IEEE, e.g., CIM and Intelligent Systems, where he manages the Department of Affective Computing and Sentiment Analysis. He is also recipient of many awards, e.g., Temasek Research Fellowship and Emerald Citations of Excellence, founder of SenticNet, a Singapore-based university spin-off offering B2B sentiment analysis services, and is involved in several international conferences as PC member, e.g., AAAI, UAI, and ACL, workshop organizer, e.g., ICDM SENTIRE, and program chair, e.g., ELM.