



## Editorial

## Special section: Semantic Link Network

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Semantic Link Network (SLN) is a self-organized semantic model consisting of three key components: semantic nodes, semantic links and reasoning rules. Semantic nodes can be resources of any type, class of resources, or even a semantic link network. Semantic links reflect relations between nodes. They can be created by tools like creating hyperlink or by some automatic discovery approaches. Reasoning rules are for deriving new semantic links from existing semantic links. The semantics of an SLN is defined by a primitive semantic space consisting of a class hierarchy and rules.

SLN not only describes relations among objective existences but also records the formation process of a semantically linked world. It does not intend to represent human knowledge. It pursues semantic richness rather than correctness. Due to the semantic richness of semantic nodes, automatic discovery of semantic links is feasible, especially, when relevant metadata of resources is available.

SLN naturally supports relational reasoning, analogical reasoning, and inductive reasoning [1]. It can be localized or decentralized. It autonomously evolves with addition or change of nodes and links. SLN inherits the characteristics of the Web and naturally supports relational query.

With the addition and removal of semantic links, an SLN may evolve into semantic communities. The approach to discovering semantic communities in a large SLN is different from those for ordinary graph. The semantic communities dynamically support intelligent applications. Furthermore, the SLN has distinguished network effect, which is useful in social network studies [2].

This special section includes six papers on semantic link network. The first paper is about the application of SLN in resource discovery in a virtual organization. A semantics-aware topology construction method is used to group similar nodes to form a semantic small-world. Semantic links allow queries to be propagated between semantically related nodes [3]. The second paper applies

the semantic link idea to construct a recommendation system. The semantic link incorporates specific domain ontology and user opinion [4]. The third paper is the application of SLN in discovering phishing targets of a suspicious webpage. The approach is based on construction and reasoning of the SLN of the suspicious webpage [5]. The fourth paper suggests an object-oriented SLN language for complex object description and operation [6]. The fifth paper applies SLN idea to a citation network. The methods for aggregating and discovering opinion communities in citation SLNs (C-SLN) are discussed [7]. The sixth paper proposes a schema theory for SLN, including rule-constraint normal forms and relevant algorithms. It helps normalized management of SLN [8].

Things in the world are interrelated. SLN not only reflects the interconnected world but also the interconnected minds. The self-organized characteristic of SLN makes it a suitable model to establish a dynamic semantic image in the interactive semantics [9]. This special section will play an important role in accelerating research and application of SLN. SLN is different from traditional semantic networks in goal, model, technology, and research method. SLN is forming a promising research direction.

## References

- [1] H. Zhuge, *The Knowledge Grid*, World Scientific, 2004.
- [2] H. Zhuge, Communities and emerging semantics in semantic link network: Discovery and learning, *IEEE Transactions on Knowledge and Data Engineering* 21 (6) (2009) 785–799.
- [3] J. Li, Grid resource discovery based on semantically linked virtual organizations, *Future Generation Computer Systems* 26 (3) (2010) 361–373.
- [4] R. Colomo-Palacios, SOLAR: Social link advanced recommendation system, *Future Generation Computer Systems* 26 (3) (2010) 374–380.
- [5] W. Liu, et al., Discovering phishing target based on semantic link network, *Future Generation Computer Systems* 26 (3) (2010) 381–388.
- [6] X. Sun, OSLN: An object-oriented semantic link network language for complex object description and operation, *Future Generation Computer Systems* 26 (3) (2010) 389–399.
- [7] Z. Huang, Y. Qiu, A multiple-perspective approach to constructing and aggregating citation semantic link network, *Future Generation Computer Systems* 26 (3) (2010) 400–407.
- [8] H. Zhuge, Y. Sun, The schema theory for semantic link network, *Future Generation Computer Systems* 26 (3) (2010) 408–420.
- [9] H. Zhuge, *Interactive semantics*, Artificial Intelligence (January 2010).

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