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Taking Steps Toward Building an Affordance Knowledge Graph

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Affordance theory (Gibson, 1979) is increasingly being adopted in various domains including for example human-computer interaction, product design and organization studies. A fundamental characteristic of an affordance is its relational nature, i.e., it is a relationship between users and objects situated within an environment—or niche or context. This relational property is key to affordances so that the same object with certain basic features can exhibit different affordances based on different actors' uses. Consider the example of stairs at the main entrance of a university campus. Obviously, such stairs afford students in a hurry to get to class with climb-ability affordance; while the same stairs would afford students intending to take a break and relax with sit-ability affordance. Despite the simplicity in these illustrative examples, it is difficult to derive affordances empirically in a robust manner from relevant data. Such data-derived affordances can be useful for instance in automating a variety of tasks related to information retrieval, robotics, recommender systems, and sentiment analysis. As a result, there is a growing interest and calls for efficient computational techniques that can aid in representing affordances and deriving them from empirical bases. Indeed, there is an emerging body of work that attempts to represent affordances and to empirically derive them (e.g., Hidayat et al. 2008, Su et al. 2017, Asprino et al. 2017). We present in this TREO talk our proposal to build on these efforts through a semantic web ontology, which focuses on the above relational-contextual property of an affordance to develop a knowledge graph in order to represent and derive affordances empirically. The ontology is used to design an openly accessible tool on the web following the linked data principles (http://linked.aub.edu.lb/apps/graffordance). The initial implementation of this tool provides the following functionalities: (1) to explicitly connect the affordance, environment and agent concepts; (2) to externally link the entities to the DBpedia linked data graph (http://dbpedia.org); and (3) to visualize the affordance graph. In summary, this research aims to investigate the potential of providing a crowdsourced and openly accessible knowledge graph-based affordance extraction tool, which explicitly accounts for the relationality of affordances as their fundamental property. Subsequently these affordances can be employed for performing different behavior-related computational and analytical tasks.

References

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