Realizing Trustworthiness in Linked Data Applications Based on Individual Data Source Trust Assessment. Extended Abstract

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Robots need large amounts of semantic environment and object information in order to autonomously accomplish given tasks [1, 2]. *The Semantic Web* offers vast semantic information in *Linked Data* sources that robots can utilize to understand object-related actions [3, 4, 5] such as determining if a product is vegan or vegetarian and if a vegetarian meal should be served to a vegan, for example. *The Semantic Web*[6] is an extension of the current Web[7] aiming at structuring content of Web pages by using standardized formats to represent entities, their properties and relations so that it can be understood by robotic or software agents. When these structured ontologies are linked to each other, we refer to them as *Linked Data* [8]. Through an integration of Linked Data, robots get access to tremendous amounts of data and semantic information that can be acessed by propagating the links between ontologies. With that much data being accessible however, reliability and trustworthiness of the provided information needs to be adressed. For a robotic store assistant, it is important to know if the product they are to pick out of a shelf weighs 200 gram or 2 kilogram, and whether the provided information is reliable. If a robot is enabled to appraise information reliability, they can be enabled to exclude data from certain sources, implement a minimal trust value for queried data or adapt their action plan to account for varying trust values and successfully pick a 2 kilogram object they thought would weigh 200 gram.

The amount of Web pages and data contributors with different foci as well as the continuous data expansion in the Semantic Web call for a reliability assessment of its contained information. Aditionally, an ontology in Semantic Web format can be comprised of data from many other sources. The wikidata overview page for the word “vegan’, for example, includes information from sources like KBpedia or WordNet. On the one hand, these connections are one of the main advantages of Linked Data, allowing for an inspection of different data sources as well as a query propagation over many links. On the other hand, they permit unreliable data to be accessed.

The tRDF vocabulary was developed as a tool for an assessment of trustworthiness of data published on the Web [9]. Since ontologies in the Semantic Web can be comprised of data from

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many different sources, the focus in the tRDF vocabulary lies on data sources of entities in the offered ontologies. This concentration on data instead of publisher is also called content trust [10]. With tRDF, an individual trust analysis can be performed by modeling trust as a value `[-1,1]`, with `-1` representing not trustworthy data and `1` trustworthy data [11].
The representation of trustworthiness of data sources for entities in ontologies enables a robot to assess trustworthiness of the acquired data. For a continuos trust assessment and recommendation however, we believe that logging of data access is necessary. Individual preferences for data access can thus be derived from the activity log for creation of a trustworthiness recommendation. As a consequence, regular content updates of data sources can result in higher trust values of the queried data as proposed by Gil and Artz [10].
Such a data source representation and trustworthiness assessment builds the basis for an automated inclusion or exclusion of certain content as an implementation of trustworthiness. This can be achieved by using tSPARQL [12, 13], for example.
We believe that the realization of trustworthiness in Linked Data applications is very important and therefore will continue to work on the topic in robotic applications, where we face the research challenge of a fine-tuned handling of trust values in robot action planning. Future work therefore will focus on an adaption of action plans for a range of trust values.

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