Sustainability in Food: Al-based interactions, based on data fusion for consumer protection by the government

Peter Kuhn ¹ and Dian Balta ¹

¹ fortiss GmbH, Research Institute of the Free State of Bavaria for software-intensive systems, Munich, Germany

Abstract

Sustainability-aware grocery shopping can be challenging for consumers since product information becomes more and more extensive. Especially the variety and trustworthiness of labels makes it difficult to find the most sustainable products, in particular with respect to the heterogenic and varying level of detail claimed by producers based on these labels. In order to decrease information overload and increase consumer protection, we develop a government-driven platform that fuses heterogeneous food data and provides chatbot-like AI services to communicate a sustainability score. We demonstrate the use and potential of the government-governed platform with two prototypical interfaces. Furthermore, we present first insights from the cooperation with start-ups who integrate the data platform into their products.

Keywords

Data Platform, Artificial Intelligence, Data Fusion, Consumer Protection

1. Introduction

Grocery shopping can be complicated since product information become more and more extensive. Especially the variety of labels makes it difficult to find the most sustainable products. Studies show that users pay attention to sustainability and want to buy sustainable food [1]. At the same time the information provided on products is perceived as confusing, not individualized, and sometimes even not trustworthy [1].

On a technical level, the challenge lies in the decentral and heterogeneous data sources. Information on sustainability of food is often held by the producers or in proprietary databases. Attempts to centralizes food data are promising but vary in data quality from country to country [2], [3]. Finally, the different data schemas and standards complicate the data processing (cf. e.g. [4]).

2. First results

This poster presents preliminary results from a research project in Germany. Guided by design science research methodology [5], we develop a government-driven platform (cf. e,g. [6]) that fuses heterogeneous food data from several sources. The platform has a modular architecture which allows for a simple addition of further data sources (cf. e.g. [7]). Moreover, the platform defines a data schema that is used to provide several services to its users. An AI services was trained for intent detection, understanding the specific need of costumers. Then, the platform calculates a sustainability scoreeither from the included data sources or from the data provided by the user. Finally, a blockchain solution is used to provide trustworthy and verifiable data sources regarding the supply chain of the product.

In order to demonstrate the use and potential of the platform, we developed two prototypical interfaces. First, a chatbot that can answer sustainability questions and provide the sustainability score

Proceedings EGOV-CeDEM-ePart 2023, September 5-7, Budapest, Hungary EMAIL: pkuhn@fortiss.org (A. 1); balta@fortiss.org (A. 2) ORCID: 0000-0001-6774-2904 (A. 1); 0000-0001-8311-3227 (A.2)



via barcode scanning. Second, an online form that calculates the sustainability score based on information provided by the user.

2.1. Implications and Future Work

Our results show that a platform approach can address the issues of serving sustainability information to consumers based on unified and trustworthy data about food. Apart from the prototypical interfaces, we work with two startups who integrate services of the platform into their products. Future work should integrate with existing solutions such as OpenFoodFacts to evaluate potential synergies towards a government-driven ecosystem (cf. [8], [9]).

3. Acknowledgements

This research is based on the project KI-SusCheck, which is funded by the German Federal Ministry of Education and Research (Funding ID: 28-D-K1.27A-20).

4. References

- [1] L. M. van Bussel, A. Kuijsten, M. Mars, and P. van 't Veer, "Consumers' perceptions on food-related sustainability: A systematic review," *Journal of Cleaner Production*, vol. 341, p. 130904, Mar. 2022, doi: 10.1016/j.jclepro.2022.130904.
- [2] M. N. K. Boulos, A. Yassine, S. Shirmohammadi, C. S. Namahoot, and M. Brückner, "Towards an 'Internet of Food': Food Ontologies for the Internet of Things," *Future Internet*, vol. 7, no. 4, Art. no. 4, Dec. 2015, doi: 10.3390/fi7040372.
- [3] D. M. Dooley *et al.*, "FoodOn: a harmonized food ontology to increase global food traceability, quality control and data integration," *npj Sci Food*, vol. 2, no. 1, Art. no. 1, Dec. 2018, doi: 10.1038/s41538-018-0032-6.
- [4] D. Balta and H. Krcmar, "Managing Standardization in eGovernment: A Coordination Theory based Analysis Framework," in *Electronic Government*, P. Parycek, O. Glassey, M. Janssen, H. J. Scholl, E. Tambouris, E. Kalampokis, and S. Virkar, Eds., in Lecture Notes in Computer Science. Cham: Springer International Publishing, 2018, pp. 60–72. doi: 10.1007/978-3-319-98690-6_6.
- [5] A. Hevner et al., "Design Science in Information Systems Research," Management Information Systems Quarterly, vol. 28, p. 75, Mar. 2004.
- [6] P. Kuhn, S. Dallner, M. Buchinger, and D. Balta, "Towards 'Government as a Platform': An analysis framework for public sector infrastructure," in *Wirtschaftsinformatik* 2022 *Proceedings*, Jan. 2022. [Online]. Available: https://aisel.aisnet.org/wi2022/e_government/e_government/4
- [7] S. Ahmed, H. Kremar, and D. Balta, "An Architecture for Dynamic Conversational Agents for Citizen Participation and Ideation," 2019. doi: 10.13140/RG.2.2.33576.80644.
- [8] M. G. Jacobides, C. Cennamo, and A. Gawer, "Towards a theory of ecosystems," *Strategic Management Journal*, vol. 39, no. 8, pp. 2255–2276, 2018, doi: 10.1002/smj.2904.
- [9] M. M. Rantanen, J. Koskinen, and S. Hyrynsalmi, "E-Government Ecosystem: A new view to explain complex phenomenon," in 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), May 2019, pp. 1408–1413. doi: 10.23919/MIPRO.2019.8756909.