

Application Fields and Innovative Technologies

Validating AgeLign: An AgeTech Standards Search Engine F. Zaffino, S. El-ghazal, S. Abhari, G. Bin Noon, T. Joshi, P. Debergue, C. Genge, H. McNeil, J. McMurray, P.P. Morita. *Gerontechnology* 25(s)

Purpose With the global population of those aged 60 and older expected to double by 2050, there is a growing demand for AgeTech, technologies that support aging in place (1,2). As numerous AgeTech devices enter the market, experts have noted an underuse of standards in the development of these devices (3). Recent studies highlight that existing standards relevant to AgeTech have had limited impact on these innovations, raising concerns about efficacy, safety, and regulatory compliance (3,4). AgeTech innovators must have a straightforward way to navigate the standards landscape. At the same time, search engine technology has been empowered by developments in artificial intelligence, with transformer models enabling state-of-the-art performance in matching natural-language queries with relevant results (5). Our team blended expertise in health informatics, gerontology, and computer science to develop *AgeLign*, an AgeTech standards search engine. The goal of *AgeLign* is to provide innovators with an interface that streamlines the identification of the most applicable standards for their products. By querying *AgeLign* with a product description, the system returns a ranked list of relevant standards. We validated *AgeLign* by comparing its relevancy ranking performance to the recommendations of expert researchers across a curated set of standards and products. **Method** Subject matter experts identified 22 AgeTech standards. Ten sample product descriptions were then compiled from AGE-WELL's Canadian AgeTech Startup Map (6). To create the baseline, three experienced AgeTech researchers rated the relevance of each standard to each product. Ratings utilized a three-point scale and were then aggregated to a final score out of six. The search engine utilized a general-purpose transformer model (bge-large-en-v1.5) to semantically compare a standard's metadata to the ten product descriptions (7). Standard metadata included official abstracts, along with lay summaries and representative AgeTech product examples generated by GPT-4o-mini. Sample product descriptions and standard metadata were embedded at the document level. The search engine output a ranked list of the most relevant standards for each product description, which were then compared with the expert rankings using the NDCG@k statistic (8). **Results and Discussion** *AgeLign* showed strong alignment with expert evaluations. Validation of the system yielded an NDCG@5 score of 0.64, indicating that the search engine ranked the top 5 results with about two-thirds of the ideal ordering quality. This result is in line with other health information retrieval and decision support systems (9). These findings suggest that *AgeLign* surfaces relevant standards with performance comparable to that of human experts. *AgeLign* shows the potential to support AgeTech innovators in finding and applying standards to their products. Use of the platform can help ensure that products are aligned with best practices, creating solutions that are safer, more reliable, and more secure for older adults. Future work focuses on assessing *AgeLign*'s usability with AgeTech developers, consulting with experts to refine and expand the standards corpus, and creating a hosted website to provide open access to the platform.

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