Management of the Wardrobe System: An Understudied and Powerful Influence on Clothing Waste

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While sustainability of the apparel industry is a widely acknowledged challenge and the subject of significant emphasis by both researchers and practitioners, most efforts focus on materials, labor, or design approaches to reduce environmental and social justice impacts, reduce waste in the supply chain, and promote long-duration use or circularity of products. However, our empirical studies have measured significant waste in the clothing that is purchased and maintained in the home wardrobe. For some of our research participants, more than 90% of the clothing they characterize as being in active use is not in fact worn more than once per month. Most consumers see this as a non-optimal outcome, and would prefer to use what they own more efficiently. Our research finds that a key driver of this inefficiency is the decision-making challenge in managing a wardrobe: deciding what to buy, building successful outfits from the individual garments in the system, and selecting an outfit appropriate to a given context.

Rule-based or artificially intelligent decision support systems (recommender systems) have the potential to improve the individual user's decision-making, both in the home (as they make daily dressing decisions) and at the point-of-purchase. However, in the absence of rich data sources, success of a recommendation system relies on modeling and understanding the characteristics that predict a successful outfit for a specific user. This information is not well understood in current practice. Our work considers approaches to defining ontologies of user, garment, and outfit characteristics; developing methods for assessing these characteristics; identifying characteristics that have more influence on the success of an outfit recommendation; and modeling the relationship between user, garment, and outfit characteristics. We draw on expert knowledge sources as well as empirical data, including wardrobe catalogs and dressing logs.

Beyond the implications for a consumer of clothing or manager of a home wardrobe, evidence-based understanding and accurate prediction of outfit success has broader implications for design practice. Current methods of clothing design involve speculation about consumer characteristics and preferences, or aggregation of sparse feedback. Even more than consumers, designers have no means of understanding the way a novel garment design will interact with existing components of a wardrobe system (whether or not a new garment will coordinate well with garments an individual already owns). Thus, designers are not able to accurately design for utility or usability, beyond the basics or minimalist categories. Future use of AI or recommendation systems in apparel design may emphasize different objectives than consumer-facing systems. Our work also considers potential impacts of AI and recommendation for fashion design practice.