Workshop on Human-Centred AI Design Methods to Understand "Textiles Hand"

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Abstract. This collaborative workshop aims to co-generate tactile-based sensorial data for AI design tools. The project teams experienced in AI design methodologies and sensory materials assessment will deliver a material centric design workshop to understand embodied and tacit knowledge of the textiles world. With the contribution of participants, the new design methods to integrate the generated data will be discussed to build on the current state-of-the-art design tools.

Keywords: Human-centred AI Design, Multisensory Experience, Textile Design, Textile Hand

1 Introduction

1.1 Background

Fashion and Textile Designers have embodied and tacit knowledge of materials which they have gathered over years of working and designing with them. However, they struggle to articulate, communicate and pass on this knowledge. The textile industry has a history of research in the subjective assessment of textiles – notably through running human subject panels of experts and non-experts to

evaluate the feel, or the *hand* of a selection of textile materials. Observing and organising this human experience of textiles is typically costly in time, human effort and the results of these panels are not widely distributed to the greater fashion and textile design community.

Research in human-centred design is embracing the current use of AI technology for design and involves the development and research in AI-driven design tools. AI technology coupled with novel human-centric sensing technology - such as brain-computing interfaces, multi-camera computer vision systems and embedded sensors, provide rich and large datasets about the human experience. Human-centred AI Design aims to centre the human with the new design problems that these technologies pose and establish new methods and processes for designers to use.

1.2 **Objective of Workshop**

We see the domain of multisensory experience of textiles to be rich in many applications that AI intervened in. . In an attempt to bring textile data into human-centred AI design methods, this workshop will welcome designers and experts in sensory experience of textiles and human-centred AI design. Participants will be provided with background knowledge in the state-of-the-art research in these areas and participate in textile subjective assessment activities. With these experiences, a collaborative brainstorming session to come up with design-driven AI application towards the problems of subjective assessment of the textile experience and identifying the gaps of textiles haptic qualities.

The research questions we are looking to answer with the workshop is:

How can Human-robotic Collaborative System (HR-CS) Design contribute to the multisensory experience of textile materials and selection for designers?

How can this newly generated knowledge feed into the Human-centred AI design methods?

This workshop will be delivered via a collaboration between two research teams from the AiDLab - the Laboratory for Artificial Intelligence in Design (http://aidlab.hk) RP2-4 and RP2-5 projects , which is a collaboration between Hong Kong Polytechnic University and the Royal College of Art. The workshop is a collaboration between two research projects, the Human-Centred AI project at the Hong Kong Polytechnic University and the Sensory Material Library project within the Material Science Research Centre at the Royal College of Art.

1.3 **Relevance to DesForM 2023**

The workshop provides an opportunity for knowledge exchange from these research projects to the DesForM community and is particularly applicable to the four themes for the DesForM 2023 conference. As a workshop on the human experience of textiles within the context of the fashion and textiles related industries, it is applicable to theme 01: *Form, interactivity and the human experience* and theme 02: *Fashion: Process, Visualisations, Artifacts and Beyond*. The workshop will welcome all interested parties that are interested in AI- led design tools.

2 **Workshop Structure**

2.1 **Set-up**

Space. The ideal setting for the workshop is in a small studio/flexible classroom space. We aim for the participants to work in small groups of 3-5. Each group has a small table to gather around.

Screen Presentation. There will be a presentation portion (Part 1) of the workshop, so a large screen or projector will be needed.

Group Presentation. Each group will brainstorm as part of the workshop (Part 3), so either a whiteboard or wall close to the table will be required for the groups to post and organize post-its.

2.2 **Workshop Timeline**

It is a 3-hour workshop, and is broken up into three parts, each 45 mins in length. There will be 15-minute breaks between each part, for the participants to relax and for the workshop setting to re-arrange.

Part 1. Presentation (45 mins)

The participants will be introduced to the research of human-centred AI design and multisensory experience of textile materials to engage with the undertaken approaches

Part 2. Activation (45 mins)

This part of the workshop is where participants will experience textiles through sight and touch. First, they will partake in a warm-up exercise ("meet and greet"), where they will raise awareness of the contrasting senses of sight and touch with the provided textile materials.

Then they will partake in a traditional textile subjective assessment activity with participants, they then rate the textiles according to bipolar scales with industry established descriptors. This activity is inline with current sensory textile research.

However, we aim to also integrate human-centred AI design techniques to feed participant's assessments of textile materials into new design tools. For example, a video recording of the textile assessment would provide data for an AI to visually assess the designer's sensory experience through micro-gesture analysis. Or an embedded sensor in the textile material would provide a data-stream for an AI to assess the experience.

This experience with textile assessment along with a human-centred AI design methodology and equipment provides the participants with hands-on experience with our design methods and primes them for the final part of the workshop - collaborative brainstorming.

Part 3. Collaborative Brainstorming (45 mins)

This final part of the workshop is a brainstorming and idea development session which focuses on the following research question as a prompt:

How can HR-CS Design contribute to the multisensory experience of textile materials and selection for designers?

To help participants with this question, we also provide prompts in the form of challenges faced with design-driven AI and human-centred design practices:

1. **Scaling Data.** AI needs a lot of data. So how do you scale the subjective assessment of textiles in a humane manner?

2. **Model Transparency.** Current AI techniques produce black-box models that are opaque. The human is absent in understanding and explainability of AI models.

3. **Subjective Data**. Textile experience is very subjective. Assessments from humans vary greatly and AI typically desires formal or clear or direct input-output data sets. How do you encode or provide an AI with appropriate form of multisensory textile experience data? How do you translate the subjective data, or capture it in a form that does not lose its expressiveness of the human experience?

With this question in mind and challenge prompts, the participants will work through individual and small group brainstorming. Towards the end of this part, the small groups will present their ideas to the greater group. Through this process, the final outcomes of ideation will provide some answers to the research question for the workshop.

3 Workshop Outcomes

The workshop will have various outcomes. Part 1 provides deeper knowledge exchange between the research groups in human-centred AI design and multisensory textile experience, as well as with the participants from the DesForM community.

Part 2 provides hands-on experience with workshop participants with our research techniques while generating new data It also provides a dataset from the workshop participants that is valuable to both research groups. It couples subjective assessment data from textiles through the warm-up exercise bipolar scale ratings and the human-centred AI design tools. We anticipate the dataset to be small in scale, but valuable in revealing how design-driven methodology performs in a small group setting.

Finally, Part 3 provides ideation for future research and inspiration to the workshop participants. We aim to share these findings with the greater human-centred design community in the form of published papers and conference presentations.

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