Project Title

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Abstract

The abstract is a brief summary of the paper, which needs to be written extremely well. Try to address the following points in your abstract, with a single sentence per point. This will naturally keep the abstract compact:

1. Describe the task/problem the paper is going to address (high level)
2. Why is this an interesting/important problem?
3. How does one usually solve this?
4. How (and why) do we do it in this paper (key idea)? Highlight the novelty here.
5. Interpretation of the results (impact and importance)

Contents

Chapter 1

Introduction

Instructions for section: What is the problem and why is it interesting. State very clearly the problem that you are investigating. If your examiner cannot even understand the first few pages of your thesis, there is no chance that you will obtain a high mark.

1.1 Motivation

The fashion industry is one the most significant contributors to the current climate crisis and is responsible for around 10% of global greenhouse gas emissions and approximately 20% of global wastewater. In addition to its toxic environmental impact, the fast fashion industry has substantial implications on an individual's overall well-being and finances. The fashion and textile industries have recently been channelling digital technology to create a more sustainable and circular economy. Examples such as virtual clothing try-on and digital clothing for virtual presence aim to lessen consumers' one-time use and return of physical clothing. This project investigates how technology can be used to design a more fulfilling clothes shopping experience for the consumer whilst minimizing waste. A novel machine learning approach is introduced to estimate people's sensations and liking of the textile being touched. Mention affective touch

1.1.1 Fast fashion and its environmental impact

Introduction to fast fashion

'Fast fashion' refers to speedily and mass-produced, low-quality clothing that is quickly circulated through high street stores to satisfy the latest trends and maximise consumer demand. Fast fashion garments are cheaply produced and priced and replicate the latest celebrity or catwalk styles [1,2,3].

Fast fashion involves swift design, production, distribution, and marketing. This allows retailers to obtain a larger quantity of assorted designs, and in turn, consumers are presented with a more extensive choice of inexpensive clothing [1,2].

The term 'Fast fashion' was first coined in the early 1990s by the New York Times to describe how Zara, the Spanish apparel giant, only took 15 days between designing the garment and selling it in their stores. The most prominent names in the current fast fashion industry include Zara,

H&M (Hennes and Mauritz), Uniqlo and Gap. All four apparel manufacturers sold over $15 billion worth of clothes in the 2021 fiscal year [1,2,4].

Include paragraph on how big fast fashion is - stats on how many people buy using fast fashion, proposed trajectories etc

As fast fashion relies on cheap and quick production, it promotes overproduction. Fast fashion also encourages overconsumption because consumers are attracted to cheap and trendy clothing that copies current trends compared to relatively expensive, long-lasting items that fall out of style shortly. This toxic system of constantly buying clothing and almost immediately discarding them due to its low quality is the most significant pitfall of fast fashion. As a result, fast fashion harms the environment [2,3].

Environmental impact of fast fashion

The environmental impact of fast fashion includes large-scale emission of greenhouse gases, the use of massive amounts of water and energy, and the depletion of non-renewable resources. Fast fashion is also one of the world's largest polluters.

According to the United Nations Environment Programme (UNEP), textile production accounts for up to 10% of total global carbon emissions (1.2 billion tonnes). This figure is larger than the emissions from all international flights and maritime shipping combined. As per the UN Framework Convention on Climate Change, global carbon emissions are estimated to skyrocket by more than 60% by 2030 [1, 5, 6].

The fashion industry is also the second largest consumer of the world's water supply. Approximately 700 gallons (3182.26 litres) of water is required to produce a single cotton shirt; this is enough water for an individual to drink at least eight cups per day for three-and-a-half years. Roughly 2 000 gallons (9092.18 litres) of water is used to produce a pair of jeans; this is more than enough for one person to drink eight cups per day for ten years. Further, the United Nations Environment Programme (UNEP) discovered that the fashion industry produces 20% of the world's wastewater and that fabric dyeing is the second largest water polluter because the water leftover from the dyeing process is dumped into rivers, streams, and other water bodies. This severely affects marine life and the aquatic ecosystem [1, 7, 8].

Textile production is also highly energy intensive and requires large quantities of petroleum. According to STAND.earth, the largest component of the fashion supply chain still relies on coal for electricity generation and heat used in apparel manufacturing. Burning coal releases greenhouse gases such as carbon dioxide, and such gases are the leading cause of global warming and climate change. Further, the global textile and apparel industry consumes 98 million tonnes of non-renewable resources [1, 13, 14, 15].

Synthetic materials such as nylon, polyester and acrylic are created from fossil fuels and currently comprise over two-thirds of the materials used in the apparel industry. Such materials take over hundreds of years to biodegrade. A 2017 report from the International Union for the Conservation of Nature (IUCN) estimated that 35% of all microplastics (tiny pieces of plastics that never biodegrade) in the ocean came from laundering synthetic textiles like polyester. It is also estimated that microplastics cause up to 31% of plastic pollution in the ocean [1, 7, 12, 13].

There is also massive amounts of monetary and resource wastage resulting from fast fashion. According to Business Insider, 85% of textiles of all textiles go to the landfills each year – this is

enough to fill the Sydney harbour each year. Further, the equivalent of one garbage truck full of clothes is dumped in a landfill or burned every second [7, 9, 10, 11].

Other detrimental effects of fast fashion

There is also a significant human cost resulting from fast fashion. Garment workers in the global South pay a large price so fast fashion brands can keep their profit margins high and price tags low. Garment workers are paid well below the liveable wage and are forced to work long, strenuous hours in abysmal conditions. An Oxfam 2019 report discovered that 0% of Bangladeshi and 1% of Vietnamese garment workers earned a living wage. Nine of 10 Bangladeshi workers starve because they cannot afford food, and three-quarters cannot afford medical treatment. In Vietnam, more than half of workers cannot afford medical treatment, and three-quarters of workers cannot afford to make ends meet in general. Garment workers are often forced to work 14 to 16 hours a day, seven days a week. The devastating Rana Plaza collapse in 2013, which killed 1134 people and injured 2500 others, is a testament to the unacceptable working conditions in the fashion industry. Employees usually work without ventilation and inhale toxic substances such as fibre dust or blasting sand. Accidents, fires, injuries, and diseases frequently occur on apparel production sites. [16, 17, 18]

Animals are also adversely affected by fast fashion. The toxic dyes and microplastics released into waterways are ingested by animals, most often resulting in their deaths. Using animal products such as leather, fur, and wool directly risks animal welfare [3].

Include bridging sentence or paragraph to connect touch and adverse effects of fast fahion

1.1.2 The importance of touch when purchasing clothes

Multiple studies have revealed that consumers heavily depend on affective touch and tactile experience when purchasing clothes. According to [19], affective touch is defined as tactile processing with a hedonic or emotional component; in summary, it is the emotional aspect of touch.

As per [20], touching an object may increase consumer confidence in product assessment and evaluation. Further, tactile input is used more commonly used over macro-spatial characteristics (shape and size, unless there is no way to pass visual judgment) when assessing the physical properties of an item (softness, smoothness, flexibility etc.)[21],[22]. As per a study led by Holbrook [23], tactile cues played a more significant role than visual cues in consumer perception and assessment of sweaters. However, the principal effect of tactile cues may differ from one item to another [24]. For example, consumers will rely more on tactile inputs when assessing a coat with various properties (weight, thickness, texture) than when assessing a standard AAA battery. Therefore, touch is a crucial criterion when assessing items that differ in their textual properties [25]. As a result, it is plausible that conscious or unconscious tactile emotions (affective touch) play a leading role in consumer perception of clothing.

With the expansion of fast fashion and the development of the internet, online clothes shopping became increasingly popular. However, this comes with the caveat that individuals cannot physically touch the clothes they purchase. Many studies on internet retail [26, 27] show that the main drawback of online shopping is the inability of the consumer to touch the products. Therefore, developing a comprehensive evaluation of the object may be challenging purely through online

shopping. Further, studies have discovered that consumers may feel frustrated or disappointed if they do not have the opportunity to physically touch and examine the products [20, 26]; this is particularly true for consumers who have a higher need for touch (NFT). Talk about how people don't engage with clothes when they shop fast fashion

1.2 Objective

The long-term aim of this project is to build a chatbot that helps reduce fast fashion's impact. The chatbot aims to transform clothes shopping into a multi-sensory, reflective and recognition-based experience. Firstly, the chatbot will ask individuals to touch new clothes, engage with the fabric, **reflect** on whether they like the garment and if they will wear it. Secondly, the chatbot will have stored information such as what clothes the individual has in their cupboards, what their favourite and most worn clothes are and what type of clothes they like. Based on this data, the chatbot will look at the cloth the individual is looking at and **recognise** if the individual likes it and will wear it.

Past studies have discovered and confirmed that consumers rely heavily on affective touch and tactile experience when purchasing clothes. Therefore, developing a method to comprehensively understand what an individual experiences when touching a textile, how they feel after touching it, and if they like it may help to reduce the impact of fast fashion. Therefore, this study proposes a novel machine learning approach to estimate people's sensations and their liking of the textile being touched.

1.3 Project Outline

This paper is organised as follows.

Include paragraph on paper organisation

Chapter 2

Background and Related Work

Describe here work that is connected to your thesis. This should include references to published work. There is no fixed rule, but I would expect a student to have read around 50 published research papers and reference them in a thesis.

Touch is the most advanced sensory function at birth and plays a vital role in emotional, social, cognitive, and cerebral development throughout infancy and childhood [29, 30, 31, 32. 33]. In the words of Michelangelo, 'to touch is to give life' – a study conducted by Tiffany Field observed that premature infants who received touch therapy for 5-10 days gained almost 50% more weight than preterm newborns who received standard medical treatment [29, 34]. Touch continues to play an essential role when we are adults as we use it to express various emotions and manoeuvre various situations [35, 32, 33]. Touch also plays a significant role among nonhuman primates. Nonhuman primates groom each other for 10 to 20 per cent of their day to soothe, reconcile, reinforce reciprocity and build cooperative alliances [34, 36].

Recent studies discovered that touch has incredible health benefits. Touch reduces illness, strengthens the immune system, reduces pain, enhances sleep, and soothes and signals safety and trust [29, 34, 40]. [39] revealed that women who received more hugs from their partner led to lower heart rates and blood pressure – the gentle pressure on the sternum stimulated the thymus gland, which regulates and balances the production of white blood cells. Further, touch increases levels of dopamine and serotonin (2 neurotransmitters that relieve stress and anxiety), reduces cardiovascular tension by releasing oxytocin ('the love hormone') and activating the vagus nerve (involved in showing compassion) [34, 41].

2.1 Emotion recognition through touch in social sciences

Explain how people express emotions through touch and the different types of emotions expressed through touch - Hertenstein 2006 and 2009

As humans, we use touch in our daily life for various reasons. We use touch in our daily life to carry out actions such as flirting (gently stroking face, hair, or arm), offering congratulations (handshake or a pat on the back) or when thanking others (hugging and gently squeezing). We also use touch to express emotions such as love and compassion (embracing, hugging, and stroking), sympathy (embracing, stroking back), fear (squeezing hand) and anger (gently slapping).

Although touch plays an essential role in human life, this modality has received less attention in affective science than facial and vocal displays of emotion [33, 43]. Initially, studies regarding touch as an affective modality claimed that it was mainly used to communicate the hedonic tone of emotions (positive and negative) [32, 43, 44, 45, 46, 47] and increase the intensity of emotion-related communication [32, 47]. However, two consecutive studies by Hertenstein in 2006 and 2009 have argued that touch plays a more significant role in emotional communication.

[32] reveals that there are systematic differences in how touch is used to communicate different emotions. For example, love was associated with stroking; gratitude was associated with shaking of the hand; sympathy was associated with stroking and patting; disgust was associated with a pushing motion; fear was associated with trembling and anger was associated with hitting and squeezing [32]. This paper also found that emotions could be categorized according to differences in intensity and duration [32]. For example, love and sympathy were characterized by a moderate-intensity touch for a longer duration, whereas anger was characterized by a vigorous intensity of touch for a moderate duration [32].

2.2 Machine Learning methods used in xxx

2. How is this this knowledge used to inform ML techniques (automatic recognition, feature base etc)

Chapter 3

Methodology

Describe your method in detail and with great clarity, distinguishing it from other works (if it is indeed a novel idea). It is very important to clearly motivate your method. Describe the results of your method here in this chapter.

3.1 Data Collection

3.2 Feature Analysis

3.3 Models

3.4 Results

Chapter 4

Extensions of methodology

It is unlikely that everything you tried worked well, so in this chapter you may wish to describe a modified version of your method and the associated results. Explain why you were motivated to try this extension and how you think it might help to address some of the shortcomings of the method is Chapter 3.

Chapter 5

Conclusion

Summarise what you have achieved and evaluate honestly if you feel the approach has been largely successful. Explain what could be improved still and perhaps why the method is not working well (if that is the case).

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