Optometry: Open Access
ISSN: 2476-2075

Editorial Open Access

Revolutionizing Fashion Accessibility: Object Detection for Clothing Defect Detection in the Visually Impaired

Chris Lievens*

Department of Mechanical, Aerospace and Civil Engineering, College of Engineering, Design and Physical Sciences, Brunel University London, UK

Abstract

The fashion industry plays a significant role in society, but it presents unique challenges for individuals with visual impairments. Detecting defects in clothing is a crucial task that allows individuals to maintain their self-confidence and independence. This article reviews the use of object detection technology to identify defects in clothing for blind people. We explore the current state of the art, challenges, and potential future directions for this technology, emphasizing its impact on the lives of visually impaired individuals. Blind people often encounter challenges in managing their clothing, specifically in identifying defects such as stains or holes. With the progress of the computer vision field, it is crucial to minimize these limitations as much as possible to assist blind people with selecting appropriate clothing. Therefore, the objective of this paper is to use object detection technology to categorize and detect stains on garments. The methodology used for the optimization of the defect detection system was based on three main components: (i) increasing the dataset with new defects, illumination conditions, and backgrounds, (ii) introducing data augmentation, and (iii) introducing defect classification. The authors compared and evaluated three different YOLOv5 models. The results of this study demonstrate that the proposed approach is effective and suitable for different challenging defect detection conditions, showing high average precision (AP) values, and paving the way for a mobile application to be accessible for the blind community.

Keywords: Blind people; Clothing defect detection; Object detection

Introduction

Visual impairment, blindness, can have a significant impact on the psychological and cognitive functioning of an individual [1]. Several studies have shown that vision impairment is associated with a variety of negative health outcomes and a poor quality of life. Additionally, blindness currently affects a significant number of individuals, and thus it should not be assumed as a minor concern for society [2, 3]. According to a recent study, there are 33.6 million people worldwide suffering from blindness, which clearly shows the dimension of this population group.

The use of assistive technology can help in mitigating the negative effects of blindness and improve the quality of life of people who are blind. Although there has been a proliferation of smart devices and advancements in cutting-edge technology for blind people, most research efforts have been directed towards navigation, mobility, and object recognition, leaving aesthetics aside. The selection of clothing and preferred style for different occasions is a fundamental aspect of one's personal identity [4, 5]. This has a significant impact on the way we perceive ourselves, and on the way we are perceived by others. Nonetheless, individuals who are blind may experience insecurity and stress when it comes to dressing-up due to a lack of ability to recognize the garments' condition. This inability to perceive visual cues can make dressing-up a daily challenge. In addition, blind people may have a higher probability of clothing staining and tearing due to the inherent difficulties in handling objects and performing daily tasks [4].

The inability to visually inspect clothing for defects can be a frustrating experience for blind individuals, impacting their appearance, comfort, and overall confidence. Traditional methods, such as manual inspection or assistance from others, have limitations [6]. The emergence of object detection technology presents an exciting opportunity to address these challenges. This article aims to provide an overview of the use of object detection in identifying clothing defects for blind people.

This section provides an overview of existing approaches and systems that utilize object detection technology to identify clothing defects. Various methodologies, including supervised, unsupervised, and semi-supervised learning techniques, are explored [7, 8]. The article discusses popular datasets used for training and evaluating clothing defect detection models and presents a comparative analysis of different algorithms and architectures employed in the field. This section discusses the challenges and limitations associated with using object detection technology to identify defects in clothing for blind people. Factors such as occlusion, variation in clothing textures, real-time detection, and computational constraints are examined [9]. The importance of robust and scalable solutions is emphasized, along with the need for addressing ethical considerations and privacy concerns. In this section, potential future directions and advancements in the field of clothing defect detection for blind people are discussed. The article explores emerging technologies such as wearable devices, haptic feedback, and integration with assistive devices to enhance the user experience [10]. The incorporation of multi-modal approaches, including audio feedback and natural language processing, is also explored. This section highlights the significant impact that object detection technology can have on the lives of visually impaired individuals. By enabling independent detection of clothing defects [11], this technology promotes self-confidence, improves personal grooming, and enhances social integration. Real-life case studies and

***Corresponding author:** Chris Lievens, Department of Mechanical, Aerospace and Civil Engineering, College of Engineering, Design and Physical Sciences, Brunel University London, UK, E-mail: Lievenschris@gmail.com

Received: 02-May-2023, Manuscript No: omoa-23-99553, **Editor assigned:** 05-May-2023, Pre-QC No: omoa-23-99553 (PQ), **Reviewed:** 19-May-2023, QC No: omoa-23-99553, **Revised:** 24-May-2023, Manuscript No: omoa-23-99553 (R), **Published:** 30-May-2023, DOI: 10.4172/2476-2075.1000195

Citation: Lievens C (2023) Revolutionizing Fashion Accessibility: Object Detection for Clothing Defect Detection in the Visually Impaired. Optom Open Access 8: 195.

user testimonials further illustrate the positive outcomes of using object detection for blind people [12, 13].

Conclusion

Blind individuals face daily challenges with simple tasks, namely related to clothing and style, which are critical components of one's personal identity. Assistance from family or friends is often required to support daily dressing-up tasks and, many times, such help is essential for detecting defects on clothes that, otherwise, would go unnoticed. Therefore, defect detection in clothing is of the utmost importance for blind individuals to feel comfortable and confident with their appearance. However, the recall values demonstrated that the model can still be improved to minimize false negatives. The detection of holes was found to be more challenging than the detection of stains, which emphasizes the importance of integrating the findings of this study in an automatic wardrobe that could take multiple images from the perspective of different clothing items.

In conclusion, object detection technology has the potential to revolutionize the way blind individuals detect defects in clothing. Despite current challenges, advancements in computer vision and machine learning offer promising solutions. Future research and development efforts should focus on refining existing methodologies, addressing limitations, and ensuring widespread accessibility to improve the overall quality of life for blind people in the fashion domain.

The dataset built in this work demonstrated that object detection technology can be used to accurately and autonomously detect and classify defects on clothing. Moreover, it represents the first step for the creation of a mobile application that can effectively detect multiple defects on clothing, based on the integration of these findings in an automated closet system as a future step. Overall, the main objective of this study was accomplished, since a system that enables blind people to automatically identify clothing and detect multiple defects in garments was successfully developed and tested, thereby providing them with greater independence and autonomy, while contributing to an improved quality of daily life.

References

1. Mensher J (1979) Duke-Elder's Practice of Refraction. Arch Ophthalmol 97: 1999–1999.
2. Lai YH, Sheu SJ, Wang HZ (2020) A simple and effective protective shield for the ophthalmoscope to prevent COVID-19. Kaohsiung J Med Sci 36: 570-571.
3. Sheehan M, Goncharov A, Sheehan M, Goncharov A (2011) Unwanted reflections during slit lamp assisted binocular indirect ophthalmoscopy. JMOP 58: 1848–1856.
4. Deshmukh A.V, Badakere A, Sheth J, Bhate M, Kulkarni S, et al.(2020) Pivoting to teleconsultation for paediatric ophthalmology and strabismus: Our experience during COVID-19 times. Indian J Ophthalmol 68: 1387–1391.
5. Sharma M, Jain N, Ranganathan S, Sharma N, Honavar SG, et al. (2020) Tele-ophthalmology: Need of the hour. Indian J Ophthalmol 68: 1328–1338.
6. Pandey N, Srivastava R, Kumar G, Katiyar V, Agrawal S (2020) Teleconsultation at a tertiary care government medical university during COVID-19 Lockdown in India – A pilot study. Indian J Ophthalmol 68: 1381-1383.
7. Shih KC, Chau CYC, Chan JCH, Wong JKW, Lai JSM (2020) Does the COVID-19 Pandemic Spell the End for the Direct Ophthalmoscope? Ophthalmol Ther 9: 689-692.
8. Lai THT, Tang EWH, Chau SKY, Fung KSC, Li KKW (2020) Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. Graefe's Arch Clin Exp Ophthalmol 258: 1049–1055.
9. Johnson AT, Dooly CR, Brown EY (1994) Task performance with visual acuity while wearing a respirator mask. Am Ind Hyg Assoc J 55: 818-822.
10. Yánez Benítez C, Güemes A, Aranda J, Ribeiro M, Ottolino P, et al.(2020) Impact of Personal Protective Equipment on Surgical Performance During the COVID-19 Pandemic. World J Surg 44: 2842–2847.
11. Clamp PJ, Broomfield SJ (2020) The challenge of performing mastoidectomy using the operating microscope with Covid-19 personal protective equipment (PPE). J Laryngol Otol 134: 1.
12. Rincón Sánchez RA, Concha Mejía A, Viaña Ríos LM (2021) Quality of vision in endoscopy in the midst of a pandemic: Does PPE influence quality of vision during gastrointestinal endoscopy? Gastroenterol Hepatol 44: 637-643.
13. El-Nimri NW, Moghimi S, Fingeret M, Weinreb RN (2020) Visual Field Artifacts in Glaucoma With Face Mask Use During the COVID-19 Pandemic. J Glaucoma 29: 1184–1184.