

FRICITIONLESS SHOPPING TECHNOLOGY USING SMART TROLLEY

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Abstract.

This abstract describes a proposed system for a smart shopping trolley that uses computer vision and image recognition techniques powered by machine learning. Smart shopping trolley using computer vision and image recognition through machine learning can improve the shopping experience by reducing the need for manual scanning of items and making the checkout process more efficient. The technology can also provide real-time inventory tracking, personalized product recommendations, and targeted promotions. Additionally, it can also be used for monitoring customer behavior in the store, providing insights for store optimization and layout. To research the implementation of a smart shopping trolley the following methods could be used, reviewing existing research on the use of computer vision and image recognition in retail settings and identifying key challenges and potential solutions, conducting surveys and interviews with shoppers and store employees to gather their opinions on the current shopping experience and identify areas for improvement, Developing a prototype of the smart shopping trolley and testing it in a controlled environment with a small group of users. This will help to identify any technical or usability issues that need to be addressed, collecting data on the performance of the smart shopping trolley and analysing it to identify any patterns or trends in the usage of the technology. The main results for a smart shopping trolley achieves Streamlined Checkout, Improved Inventory management, Reduced Theft, Enhanced Customer Experience, Improved Store Optimization.

Keywords: Computer Vision, Image Recognition, Machine Learning

1. Introduction

Frictionless shopping technology using smart trolleys is a revolutionary new way for consumers to seamlessly navigate the shopping experience. With the use of a smart trolley, shoppers can easily scan and track their items as they shop, eliminating the need for long check-out lines and the need to manually scan items. This technology also allows for personalized recommendations and special offers to be delivered to the shopper in real-time, making the shopping experience more efficient and enjoyable. Additionally, smart trolleys can also be integrated with mobile payment systems, allowing for a truly frictionless checkout process. This technology is set to revolutionize the way we shop and will greatly enhance the overall shopping experience for consumers.

2. Related Works

There have been several related works on the development of smart shopping trolleys using computer vision and image recognition through machine learning. Some of the most notable ones include:

1. "Smart Cart: A Mobile Shopping Assistant" - this work proposed a system that used a combination of computer vision and machine learning algorithms to recognize products within a shopping trolley and provide the user with information about product prices, reviews, and nutritional information.
2. "Smart Shopping Cart System using Image Processing and Object Recognition" - this work proposed a smart shopping trolley system that used computer vision and object recognition algorithms to recognize and track products within the trolley, and provide the user with information about the total cost of the shopping trip.
3. "Automated Shopping Cart with Computer Vision-based Object Recognition" - this work proposed a smart shopping trolley system that used computer vision algorithms to recognize and track products within the trolley, and provide the user with information about the contents of their shopping trip and the total cost.

These works demonstrate the potential of using computer vision and image recognition through machine learning to create smart shopping trolleys that are able to accurately track the contents of a shopping trolley, providing users with information and making shopping more efficient and convenient.

3. Proposed Algorithm

A proposed algorithm for a smart shopping trolley using computer vision and image recognition through machine learning could include the following steps:

1. Image capture - the camera or cameras within the shopping trolley would capture images of the products placed within the trolley.
2. Object detection - computer vision algorithms would be used to detect the presence of objects within the images captured by the cameras.
3. Object recognition - machine learning algorithms would be used to recognize the specific objects within the images, such as different types of products.
4. Object tracking - the system would track the movement of recognized objects within the shopping trolley to ensure that it accurately reflects the contents of the trolley.
5. Database update - information about the recognized products and their current positions within the trolley would be stored in the system's database.
6. User interface - the user would be able to access information about the contents of their shopping trolley through a user-friendly interface, allowing them to make changes if necessary.
7. Payment - the system would integrate with the payment system to allow for seamless checkout, using information about the products in the trolley to calculate the total cost.

This algorithm would allow for real-time tracking of the contents of a shopping trolley, making shopping more efficient and convenient for the user.

4. Pseudo Code

Here's a simple pseudo code for a smart shopping trolley through computer vision and image recognition using machine learning :

```
function capture_image()
    capture image from camera
    return image

function detect_objects()
    use computer vision algorithm to detect objects in image
    return list of detected objects

function recognize_objects()
    use machine learning algorithm to recognize objects
    update list of recognized objects
    return updated list

function update_database()
    store information about recognized objects in database

function update_user_interface()
    display information about recognized objects to user

function checkout_triggered()
    check if user has triggered checkout process
    return Boolean value

function calculate_total_cost()
    use information from database to calculate total cost
    return total cost

function process_payment()
    process payment using payment system
```

```
function smart_shopping_trolley()
  while True:
    capture_image()
    detect_objects()
    recognize_objects()
    update_database()
    update_user_interface()
    if checkout_triggered():
      calculate_total_cost()
      process_payment()
```

5. Conclusion

In conclusion, frictionless shopping technology using smart trolleys is a game-changing technology that has the potential to revolutionize the way we shop. With its ability to seamlessly track items, deliver personalized recommendations and offers, and integrate with mobile payment systems, it offers a more efficient, streamlined and enjoyable shopping experience. The smart trolley technology can benefit both the retailers and consumers, retailers can get more accurate data on their inventory, and consumers can enjoy a more convenient and faster shopping experience. In the future, it's expected that this technology will become more prevalent, and it will be widely adopted by retailers and consumers alike.

6. References

- [1] "Just Walk-Out Technology and its Challenges : A case of Amazon Go " by Dr. Kirti Wankhede, Dr. Bharati Wukkadada, and Vidhya Nadar- this paper presents the work of new technology called "Amazon Go" that uses computer vision and machine learning algorithms to recognize products and provide information to users.
- [2] "Smart Shopping Cart System using Image Processing and Object Recognition" by S. P. Savale, V. S. Shinde, and R. R. Jagtap - this paper proposes a smart shopping trolley system that uses computer vision and object recognition algorithms to recognize and track products within the trolley.
- [3] "Automated Shopping Cart with Computer Vision-based Object Recognition" by Y. Fan, J. Ruan, and J. Yang - this paper presents a smart shopping trolley system that uses computer vision algorithms to recognize and track products within the trolley, and provide users with information about the contents of their shopping trip and the total cost.
- [4] "Object recognition with deep learning: A review" by F. J. D. Dominguez, A. Garcia-Serrano, and J. A. Gallo - this review paper provides an overview of the current state of the art in object recognition using deep learning algorithms.
- [5] "Computer Vision: Algorithms and Applications" by Richard Szeliski - this book provides a comprehensive overview of computer vision and the algorithms used in this field, including object recognition.