Chapter 16
Phoenix Precision Algorithm for Blind People With Enhanced Voice Assistant

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ABSTRACT

The chapter presents an innovative approach to object detection that combines the advantages of the DETR (DEtection TRansformer) and RetinaNet models and features a phoenix precision algorithm. Object tracking is a basic computer vision task for identifying and locating objects in an image. The DETR model revolutionized object detection by introducing a transformer-based architecture that eliminates the need for anchor boxes rather than maximum damping, resulting in industry-leading performance. On the other hand, RetinaNet is a popular single-stage object detection model known for its efficiency and accuracy. This chapter proposes a hybrid model that uses both DETR and RetinaNet. The transformer-based architecture of the DETR model provides an excellent understanding of the overall context and allows you to capture long-range dependencies and maintain object associations. Meanwhile, RetinaNet's pyramid array (FPN) and focus loss enable precise localization and manipulation of objects at different scales.

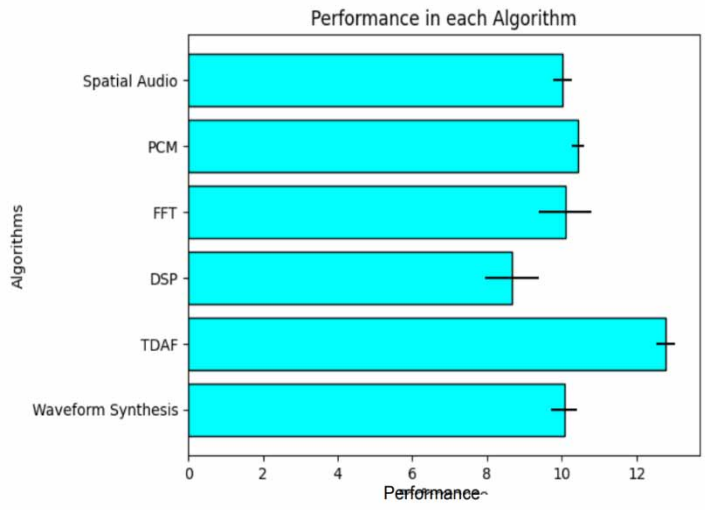
DOI: 10.4018/979-8-3693-0502-7.ch016

INTRODUCTION

Visual impairment is a major challenge affecting millions of people worldwide. According to the World Health Organization, there are more than 285 million visually impaired people worldwide, of whom 39 million are completely blind (Abdullahi et al., 2023). The lack of visual cues in daily activities creates difficulties, such as recognizing objects, navigating unfamiliar environments, and performing routine tasks (Anand et al., 2023). These difficulties can significantly limit the autonomy and quality of life of people with visual impairments (Angeline et al., 2023).

Recent advances in computer vision have enabled the development of assistive devices that can increase the visually impaired's independence and quality of life (Kanyimama, 2023). One such technology is object recognition, which allows users to recognize and interact with objects in their environment (Arslan et al., 2021). Object detection algorithms use image processing techniques to identify objects in the image and use envelopes to locate them (Aryal et al., 2022). These algorithms can detect various objects, including but not limited to vehicles, pedestrians, street signs, and obstacles. Several object detection algorithms are available in the literature, including but not limited to YOLO, Faster R-CNN, and RetinaNet (Bansal et al., 2023). These algorithms have successfully improved object detection accuracy and reduced computation time (Bansal et al., 2022). However, these algorithms rely solely on visual cues, which may not be enough for visually impaired people who rely on other senses to perceive the world around them (Das et al., 2022) (Fig.1).

Figure 1. Phoenix precision backbone architecture



There has been growing interest in developing object detection algorithms that can help visually impaired people in recent years (Bhardwaj et al., 2023). These algorithms use other senses, such as hearing, touch, and smell, to enhance the user's ability to recognize and recognize objects (Gunturu et al., 2023). Delayed Acoustic Feedback (TDAF) is one technique in which the acoustic feedback of the user's voice or other sounds is delayed. This technique could help blind users to be more aware of their