ViABL: Visual Assistant for the Blind With VLMs

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Nearly 300 million people worldwide live with significant visual impairment, resulting in decreased quality of life. Difficulties encountered by the visually impaired include avoiding objects while navigating environments, reading and understanding text, and remembering and identifying objects. Technology exists to address issues, but current solutions are limited by accessibility, capability, and price, with the most popular solutions costing over $2500. ViABL addresses accessibility challenges by using a glasses-mounted device with an easy-to-use audio-based interface. By harnessing the power of LLM-based AI with state-of-the-art vision capabilities, this system improves on and overcomes the capability limitations of current solutions. In addition, ViABL implements novel systems for visual memory, collision avoidance, and navigation assistance. The AI assistant was evaluated using VizWiz, a benchmark of images and queries developed by visually impaired people, and achieved an 85% accuracy, outperforming all other systems by over 15%. ViABL's AI assistant was also tested using benchmarks for specific capabilities, such as text transcription and object localization, and performed better than other existing models on these as well. The collision avoidance system was evaluated on a custom dataset and achieved 100% accuracy. The new visual memory system was evaluated on the CORe50 dataset and outperformed the state-of-the-art systems. ViABL provides a significant improvement over current assistive technologies for the visually impaired by providing enhanced usability and capabilities while costing under $50 to construct. This project presents a promising option for increased independence and safety for the hundreds of millions of people living with visual impairments.