VisiAide: A Multifaceted Self-Learning AI Assistant for the Visually Impaired Using a Novel Context-Based Approach

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VisiAide uses a novel context-based machine learning approach to use mobile devices to guide the visually impaired by detecting obstacles along their path, identifying objects, and detecting scene type and additional details. This innovative context-based learning allows targeted machine-learning models representing hierarchical spaces, greatly improving accuracy and scalability. This enables expanding guidance for wide-ranging environments, not possible today. A mobile device interfaces a cloud-based AI system to control a custom Raspberry Pi-based perceiver device. It is equipped with multi-technology sensors: camera, LIDAR, and ultrasonic to sense the user's vicinity, and accelerometer to automatically detect gestures for switching guidance tasks. VisiAide learns to create and manage contexts using cloud-based collaboration of feedback across numerous users. It automatically builds and (re)trains multiple task-specific models with different structures using user feedback. With a novel reinforcement-learning-based model selection algorithm, it automatically learns to select a relevant model for a task at each location. This further enables VisiAide to continuously self-learn to improve performance. A novel bounding box detector using LIDAR detection and NLoG operators automatically identifies relevant portions of an image in real time. VisiAide’s collaboration and context-based approach guides tasks with over 98% accuracy. This enables efficient and automatic adaptation to new environments, vast scalability, and outstanding performance otherwise not possible today. VisiAide's expandability can effectively assist for numerous aspects of visually impaired people's lives, and its versatility can power revolutionary applications like space exploration assistant.

Awards Won:

Central Intelligence Agency: First Award: $1000 award