Digital Memory Map: A Visual Object Memory System using AI

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Abstract- *The Digital Memory Map System is an AI-based intelligent object tracking application designed to help users locate frequently misplaced personal items such as mobile phones, wallets, keys, bottles, and other daily-use objects. Traditional methods of searching for misplaced objects are time-consuming and inefficient. The proposed system uses real-time object detection with YOLOv8 and OpenCV to identify objects through a webcam and store their last detected location in a database.The system divides the camera frame into spatial zones and records object positions with timestamps using SQLite. Users can later query the system through a Flask-based web interface to retrieve the last known location of an object. The proposed solution improves object management, reduces search time, and demonstrates the practical application of Artificial Intelligence and Computer Vision in smart assistance systems.*

Keywords: Computer Vision, YOLOv8, Object Detection, Artificial Intelligence, Deep Learning, Smart Tracking System, OpenCV

I. INTRODUCTION

1.1 Background

People frequently misplace personal items such as mobile phones, keys, wallets, and remote controls in homes and workplaces. Searching for these objects wastes time and reduces productivity. Recent advancements in Artificial Intelligence and Computer Vision have enabled systems to recognize and track objects automatically using cameras and deep learning models.The Digital Memory Map System is developed to assist users by remembering where objects were last detected. The system uses real-time webcam input, object detection algorithms, and database storage to create a smart memory assistance platform.

1.2 Need for the System

Traditional object searching methods have several limitations:

- Time wastage while searching
- Difficulty remembering object locations
- Inefficient manual tracking
- Lack of automated assistance

The proposed system addresses these problems using AI-powered object detection and memory mapping.

1.3 Scope of the System

The system can be implemented in:

- Smart homes
- Offices
- Hostels
- Libraries
- Personal workspaces

It can also be extended for:

- Voice-based search
- Mobile applications
- Smart surveillance systems
- Elderly assistance systems

II. PROBLEM STATEMENT

People often forget where they placed important daily-use objects. Existing systems do not provide intelligent object memory tracking using real-time detection and location mapping.

There is a need for an automated intelligent system that:

- Detects objects automatically
- Tracks object positions
- Stores object location history
- Helps users retrieve misplaced items

III. OBJECTIVES

3.1 Main Objective

To develop an AI-based Digital Memory Map system that detects and remembers object locations using real-time Computer Vision techniques.

3.2 Specific Objectives

- To perform real-time object detection
- To identify object locations using spatial zones
- To store object detection history in a database
- To provide user-friendly search functionality
- To improve smart object management

IV. LITERATURE SURVEY

Several studies have explored object detection and smart tracking systems using deep learning models. Modern Computer Vision applications use CNN-based models such as YOLO for real-time object recognition.

Research studies indicate that AI-based object tracking systems:

- Improve automation
- Reduce manual searching
- Increase detection efficiency
- Support smart assistance applications

Modern technologies used include:

- Deep Learning
- Computer Vision
- Real-Time Video Processing
- Database Systems
- Web-Based Interfaces

V. PROPOSED SYSTEM

5.1 Overview

The proposed Digital Memory Map system uses a webcam to capture live video frames. The frames are processed using YOLOv8 to detect objects in real time. The system divides the frame into multiple spatial zones such as:

- Top-left
- Top-center
- Top-right
- Bottom-left
- Bottom-center
- Bottom-right

Detected objects, locations, and timestamps are stored in an SQLite database. Users can search for previously detected objects through a Flask-based web interface.

5.2 Working Principle

1. Webcam captures live video
2. OpenCV reads video frames
3. YOLOv8 detects objects
4. Object location zones are identified
5. Detection details are stored in SQLite
6. Users search objects through web interface
7. System returns last detected location

VI. SYSTEM ARCHITECTURE

6.1 Input Layer

Handles:

- Webcam video input
- Frame acquisition using OpenCV

6.2 Processing Layer

Handles:

- Object detection using YOLOv8
- Frame analysis
- Zone mapping
- Timestamp generation

6.3 Database Layer

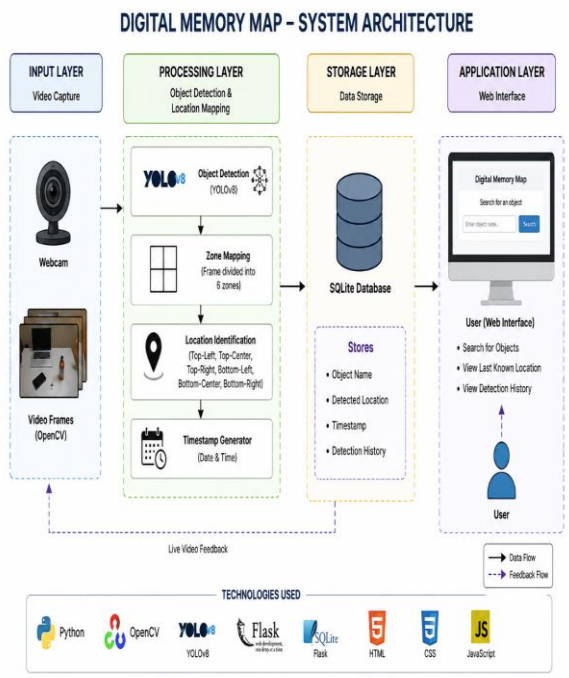
Stores:

- Object names
- Detection timestamps
- Spatial location details

6.4 Application Layer

Provides:

- Flask web interface
- Object search functionality
- Detection history retrieval



VI. METHODOLOGY

The project follows a modular AI development methodology.

Step 1 – Data Collection
Collect webcam video frames and object datasets.
Step 2 – Model Integration
Integrate pretrained YOLOv8 object detection model.
Step 3 – System Development
Develop detection, database, and web modules.
Step 4 – Testing
Perform:

- Detection testing
- Database testing
- User interface testing

Step 5 – Deployment
Run the application using Flask local server.

VIII. SOFTWARE IMPLEMENTATION

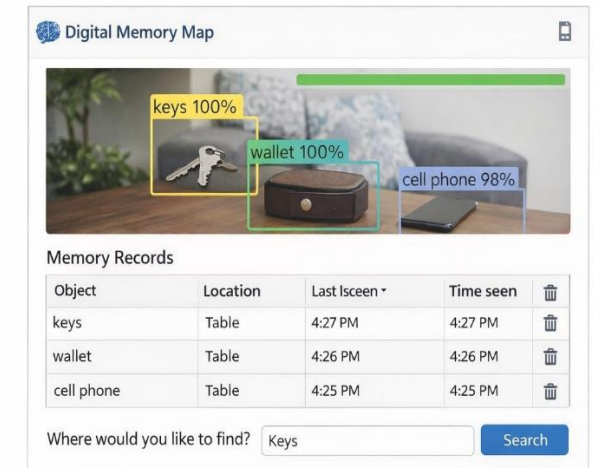
The system is developed using:

- Python
- OpenCV
- YOLOv8
- Flask
- SQLite
- HTML
- CSS
- JavaScript

The frontend provides the user interface, while the backend handles object detection and database operations.

SAMPLE WORKING

CAMERA DETECTING OBJECT



IX. RESULTS AND DISCUSSION

The system successfully detects common objects such as:

- Person
- Mobile phone
- Bottle
- Chair
- Laptop

Observed Results:

- Real-time object detection achieved
- Object locations stored successfully
- Faster object retrieval
- Efficient smart assistance behavior

The system demonstrated reliable performance under proper lighting conditions.

X. ADVANTAGES

The Digital Memory Map system offers several advantages:

- Reduces time spent searching objects
- Provides intelligent object memory
- Supports real-time detection
- Improves smart assistance capability
- Easy to extend for custom objects

XI. APPLICATIONS

The system can be used in:

- Smart homes
- Smart offices
- AI surveillance systems
- Elderly care assistance
- Personal productivity systems

XII. FUTURE ENHANCEMENTS

Future improvements include:

- Custom object training (keys, wallet)
- Mobile application integration
- Voice assistant support
- Cloud database integration
- Multi-camera tracking
- Notification system

XIII. CONCLUSION

The Digital Memory Map System is an effective AI-powered smart assistance solution that combines Computer Vision and Deep Learning for intelligent object tracking. The system successfully detects and stores object locations in real time and helps users retrieve misplaced objects efficiently.

The project demonstrates the practical application of YOLOv8 and OpenCV in smart automation systems and provides a scalable foundation for future intelligent assistance technologies.

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