Patent Search

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Abstract:

The present disclosure relates to systems and methods, and provides a GPU-Accelerated Real-Time CCTV Face Recognition Attendance System (100) configured to op multi-stage local processing pipeline handling CCTV RTSP video streams natively on edge network hardware, separating detection, mathematical encoding, and storag mechanisms for optimal processing speed and security. The system (100) includes a CCTV video intake and detection layer (102), a hardware-agnostic abstraction laye dynamically selecting among NVIDIA CUDA, Intel OpenVINO, Microsoft DirectML, or CPU fallback, a recognition and tensor encoding module (108) generating 512-dim facial embeddings (112), and a GPU-cached matrix comparison layer (114) performing sub-millisecond cosine similarity matching against a GPU volatile memory tens (116). A continuous reinforcement learning module (118) applies a weighted average embedding update formula (120) to adapt stored embeddings over time. This co achieves high frame-rate throughput and eliminates dependency on remote servers, converting passive CCTV networks into active, locally-processed automated atter systems.

Complete Specification

Description:TECHNICAL FIELD

[001] The present invention relates to the field of computer vision, biometric identification, and automated attendance tracking systems, and more particularly to a Accelerated Real-Time CCTV Face Recognition Attendance System employing a hardware-agnostic, edge-computing architecture for real-time face detection, 512-dimensional embedding recognition, and attendance logging utilizing live CCTV camera networks and graphics processing units.

BACKGROUND

[002] The field of computer vision, biometric identification, and automated attendance tracking systems has seen significant development in recent years. Attendan management across educational and corporate institutions has long been addressed through methods such as manual roll calls, Radio Frequency Identification car readers, and contact-based biometric scanners including fingerprint and retinal scan devices. These conventional approaches, while functional in isolation, typically interrupt the natural flow of movement of personnel, consume considerable administrative time, and remain susceptible to proxy attendance practices, commonly to as buddy punching, wherein one individual records presence on behalf of another. Such vulnerabilities may compromise the integrity of attendance records and measurable operational inefficiencies on institutions.

[003] Most institutions of scale typically already possess extensive Closed-Circuit Television camera infrastructure deployed primarily for passive surveillance and pe security. This existing infrastructure ordinarily remains unutilized for active identity verification or attendance tracking purposes. Leveraging such camera networks automated face recognition attendance presents substantial technical challenges that conventional systems may not adequately resolve. Processing multiple simul high-resolution video streams in real time requires immense and sustained computational throughput that passive surveillance architectures are not configured to

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