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**Sensor-assisted Multi-view Face Recognition System on Smart Glass**

**Abstract:**

Face recognition is a hot research topic with a variety of application possibilities, including video surveillance and mobile payment. It has been well researched in traditional computer vision community. However, new research issues arise when it comes to resource constrained devices, such as smart glasses, due to the overwhelming computation and energy requirements of the accurate face recognition methods. In this paper, we propose a robust and efficient sensor-assisted face recognition system on smart glasses by exploring the power of multimodal sensors including the camera and Inertial Measurement Unit (IMU) sensors. The system is based on a novel face recognition algorithm, namely Multi-view Sparse Representation Classification (MVSRC), by exploiting the prolific information among multi-view face images. To improve the efficiency of MVSRC on smart glasses, we propose two novel sampling optimization strategies using the less expensive inertial sensors. Our evaluations on public and private datasets show that the proposed method is up to 10% more accurate than the state-of-the-art multi-view face recognition methods while its computation cost is the same order as an efficient benchmark method (e.g., Eigenfaces). Finally, extensive real-world experiments show that our proposed system improves recognition accuracy by up to 15% while achieving the same level of system overhead compared to the existing face recognition system (OpenCV algorithms) on smart glasses.

**Existing System:**

Face recognition is a hot research topic with a variety of application possibilities, including video surveillance and mobile payment. It has been well researched in traditional computer vision community. However, new research issues arise when it comes to resource constrained devices, such as smart glasses, due to the overwhelming computation and energy requirements of the accurate face recognition methods. In this paper, we propose a robust and efficient sensor-assisted face recognition system on smart glasses by exploring the power of multimodal sensors including the camera and Inertial Measurement Unit (IMU) sensors. The system is based on a novel face recognition algorithm, namely Multi-view Sparse Representation Classification (MVSRC), by exploiting the prolific information among multi-view face images. To improve the efficiency of MVSRC on smart glasses, we propose two novel sampling optimization strategies using the less expensive inertial sensors. Our evaluations on public and private datasets show that the proposed method is up to 10% more accurate than the state-of-the-art multi-view face recognition methods while its computation cost is the same order as an efficient benchmark method (e.g., Eigenfaces). Finally, extensive real-world experiments show that our proposed system improves recognition accuracy by up to 15% while achieving the same level of system overhead compared to the existing face recognition system (OpenCV algorithms) on smart glasses.

**Proposed System:**

We propose a novel face recognition algorithm called Multi-view Sparse Representation based Classification (MVSRC). It exploits the high agreement among the sparse representations of the face images from different view angles and applies a novel weighted SRC model to improve the Signal to Noise Ratio (SNR). Our evaluation on several datasets show that MVSRC outperforms several state-of-the-arts multi-view face recognition algorithms.

• We propose a Support Vector Regression (SVR)-based estimation model to relate the recognition accuracy to the angle information obtained by IMU sensors. Then we design two sampling optimization approaches: Maximum Accuracy Sampling Optimization (MASO) and Minimum Energy Sampling Optimization (MESO) based on the estimation model to improve the efficiency of MVSRC while preserving its high recognition accuracy. We refer to MVSRC after sampling optimization as fast-MVSRC.