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FACE DETECTION AND TRACKING UTILIZING ENHANCED CAMSHIFT MODEL

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Abstract. *This paper describes an enhanced model of CAMSHIFT (Continuous Adaptative Mean SHIFT) for face detection and tracking. This enhanced CAMSHIFT technique is predominantly based on selective skin colour adaptive model that computes the log likelihood and threshold values continuously from the processed images. Perceptual grouping scheme is utilized to eliminate background noise from the target face to improve tracking capability. This enhanced CAMSHIFT model is able to tolerate variation in illumination compared to the conventional model. The experimental results revealed that the proposed algorithm is able to track successfully a single moving face target and relatively unaffected by various types of occlusions and similar skin-alike background objects within the video images.*

Keywords: Enhanced CAMSHIFT, Perceptual grouping, Selective skin colour adaptative model, Log likelihood and threshold, Face detection and tracking

1. **Introduction.** Face tracking is one of the most critical tasks in many computer vision applications, such as surveillance, perceptual user interfaces, driver assistance [1,7]. Face detection and tracking algorithm development for the purpose of video occupant detection in automotive has become important [2]. Algorithms developed for face detection and tracking are important for the monitoring/tracking of automotive occupants and the safe deployment of airbags. Such information is useful and provides decision support for the airbag deployment mechanism. Human skin color has been utilized and proven to be an effective feature in certain applications from face detection to hand tracking. Although different races of people have different skin color, for example Asians, Caucasians etc, several studies have shown that, the major differences lies largely between their intensity rather than their chrominance. Several color spaces have been utilized to label pixels as skin including RGB, normalized RGB, HSV, YCrCb etc. In skin-color segmentation systems, some robustness may be achieved through the use of luminance invariant color spaces [3]. It is clear that for face detection and tracking system to be absolutely robust, systems that are based on skin color segmentation alone is insufficient. Sigal et al [3] have emphasized that approaches based on skin color tracking could withstand only changes provided that skin color distributions undergo within a narrow set of conditions. Clearly, if an environment is generally too brightly illuminated or conversely; badly illuminated, skin color tracking system will inevitably fail to perform altogether.